Fastfrate

Site Servicing and Stormwater Management Report

Fastfrate Ottawa Warehouse and Distribution Facility

Client Project Number : GA18-0631-01

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December 15, 2021 – Revision 2

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Executive Summary

This Site Servicing and Stormwater Management Report presents the proposed potable water, sanitary and storm servicing for the Fastfrate Ottawa Warehouse and Distribution Facility. This report will be used in support of the Site Plan Approval process.

Sanitary servicing of the site will be achieved with an on-site wastewater treatment system. This system consists of a sewer, septic tank, pumping chamber, Level IV treatment unit, shallow-buried trench system and mantle. It is anticipated that and Environmental Compliance Approval (ECA) from the MECP will be required, as the system will treat over 10,000 L/d of sanitary sewage.

Potable water will be supplied to the site by a new drinking water well, with sufficient capacity to service the intended development. Since the site is not serviced by municipal watermains, and since the proposed drinking water well will not have the capacity required to provide fire protection, the fire protection volumes will be provided from the permanent pool of the proposed stormwater management wet pond. The fire protection system consists of two (2) dry hydrants, a Siamese connection, and a building sprinkler system.

The stormwater management (SWM) for the Fastfrate site is subject to the overall SWM of the Hawthorne Industrial Park, as presented in the Hawthorne Industrial Park Stormwater Management Report (HIP SWM report), prepared by J.L. Richards & Associates, and dated May 2009. This report also demonstrates how the proposed SWM strategy conforms to the requirements of the HIP SWM report and of the regulatory authorities. Overall, the SWM strategy will be achieved with a system of ditches, culverts, and a wet pond which will provide stormwater quality and quantity control for the site.

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Fastfrate - Ottawa

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Table of involved resources

In addition to the signatories of this report, the following individuals have also been involved in the study and writing of the report as technical experts within the project team:

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1. Introduction

CIMA+ was retained by CIVITAS & Fastfrate to prepare a Site Servicing and Stormwater Management Report for the proposed construction of a warehouse containing cross-docks and office building, at 301 Somme Street in Ottawa, Ontario.

The purpose of this assessment is to confirm that the proposed development will be serviced adequately by the proposed water supply well, septic system and stormwater management. This assessment shall be used in support of the application for Site Plan Approval.

The detailed design of sediment and erosion control measures, site servicing (storm, sanitary, water) and grading, as well as measures for the control of stormwater runoff, are considered in this report, in general accordance with the Ottawa Sewer Design Guidelines (2012), the Ottawa Design Guidelines – Water Distribution (2010) and associated Technical Bulletins.

1.1 Site Description and Proposed Development

The Site is located near the intersection of Rideau Road and Somme Street. The subject site is currently vacant and measures approximately 4.05 ha. The site is bounded by Somme Street to the south and west, by Rideau Road and Christie Creek to the north and by vacant land to the east. The proposed development is a 76,505 sq. ft. warehouse building with associated loading dock areas and employee parking stalls. Refer to the project drawings for the site plan of the proposed development (prepared by CIVITAS).

Figure 1-1 : Site Location & Key Plan

The objective of this study is to assess current site servicing conditions through the review of available background documents and to present detailed concepts, calculations, and results to provide adequate site servicing for the new building and associated parking lot.

1.2 Existing Infrastructure

The proposed site is part of the Hawthorne Industrial Park (HIP) which is currently serviced by roads and an existing open ditch system and SWM facility that convey stormwater and provide SWM quantity control for the entire HIP. The site is not serviced by municipal sewers or municipal watermains.

1.3 Summary of Applicable Background Documents

- MOE SWM Manual (2003)
- 2012 Ottawa Sewer Design Guidelines, as amended by technical bulletins
- 2010 Ottawa Design Guidelines for Water Supply, as amended by technical bulletins
- Existing Master SWM Report (prepared by J.L. Richards Associates Ltd., May 2009)
- Hydrogeological Assessment Report (prepared by GHD, 2021)
- Septic Assessment Report (prepared by GHD, 2021)
- Environmental Impact Study (prepared by GHD, 2021)

1.3.1 Stormwater Management Report, Hawthorne Industrial Park By J.L. Richards & Associates Limited – May 2009.

This report addresses stormwater management within the Hawthorne Industrial Park (**Appendix A – JL Richards SWM Plan**). The contents of this report are discussed in more detail in **Section 4**.

1.3.2 Hydrogeological Assessment Report by GHD, 2021.

This report addresses the hydrogeological characteristics of the site and assessing the capacity of the on-site well (GHD, 2021a).

1.3.3 Septic Assessment Report by GHD, 2021.

This report addresses the percolation rate of the site and assessing the capacity of the on-site septic system (GHD, 2021b).

1.3.4 Environmental Impact Study by GHD, 2021.

A scoped environmental impact study was prepared for this project. This report summarised the investigations of potential environmental impacts and required mitigation measures, & setbacks to be respected during construction of this project.

1.4 Consultation and Permits

In response to the pre-consultation requirements defined in the City's Development Servicing Study Checklist, the following agencies were consulted in support of the preparation of this report. The Development Servicing Study Checklist as well as all relevant correspondence with the consulted agencies can be found in **Appendix G**.

City of Ottawa

A Pre-Application Consultation meeting was done with the City of Ottawa. The meeting discussions revolved around planning, engineering, and transportation requirements. Details of this consultation are included in **Appendix G**.

CIMA+ had a second meeting with Harry Alvey from the City of Ottawa on May 18, 2021. The discussion was mostly about SWM strategies and fire protection. Details of this consultation are included in **Appendix G.**

South Nation Conservation Authority (SNCA)

The subject site falls under the jurisdiction of the South Nation Conservation Authority (SNCA). CIMA+ contacted James Holland from the SNCA to identify the any Natural Heritage/Hazards features that may impact the development as well as any Storm Water Management Criteria for the site and required approvals/permits. Correspondence with James Holland has been included in **Appendix G**.

Ministry of the Environment, Conservation and Parks (MECP)

CIMA+ expects that the proposed development will require an Environmental Compliance Approval (ECA) as the development requires an on-site wastewater treatment system treating over 10,000 L/d.

It is expected that the application can be submitted directly to the MECP, and not through the City of Ottawa's Transfer of Review (ToR) Program. The correspondence with the City project manager has been provided in **Appendix G**.

2. Sanitary Servicing

2.1 Existing Conditions

The HIP and the subject site are not serviced by municipal sanitary sewers.

2.2 Sanitary Sewer

Design Criteria

The design criteria for determining the sanitary peak flow rates for the proposed development follow the parameters outlined in the City of Ottawa Sewer Design Guidelines, 2012 as amended by all applicable Technical Bulletins. Namely, the following parameters have been used in determining the peak sanitary flow rates:

Table 2-1: Sanitary Peak Flow Determination Design Criteria

Design Criterion	Commercial Areas
Base Flow	2.80 L/m^2/day
Peaking Factor	1.5
Total Infiltration Allowance	0.33 L/s/effective gross hectare (for all areas)

Proposed Sanitary Peak Flows for Sanitary Sewer Sizing

The estimated peak flows from the proposed development based on the design criteria listed in **Table 2-1** are outlined in the following Table.

Table 2-2: Peak Sanitary Flows – Sanitary Sewer Sizing

Flow Type	Total Flow Rate (L/s)
Average Dry Weather Flow Rate	0.23
Peak Dry Weather Flow Rate	0.35
Peak Wet Weather Flow Rate	0.35

Detailed calculations for peak sanitary flows for sanitary sewer sizing are presented in **Appendix F**.

Sanitary Sewer Sizing

The flows indicated above will be directed from the building to the onsite wastewater disposal system through a new 200mm diameter PVC sanitary sewer. This sewer sizing is acceptable per the calculations and sewer design sheets (refer to **Appendix F**).

2.3 Onsite Wastewater Disposal System

2.3.1 Daily Design Sewage Flow

Onsite wastewater treatment systems are regulated under the Ontario Regulation 332/12, the Building Code Act (1992) (OBC), Part 8 of Division B provides the information required the design, construction, installation, operation, and maintenance of these system. The Fastfrate warehouse facility requires a Class 4 system to accept both greywater and human waste.

The proposed Fastfrate facility will be developed with a maximum of 41 loading bays and will be provided with a total of 7 water closets. The daily design sewage flow for the Fastfrate facility was calculated to be 12,800 L/d in accordance with Table 8.2.1.3.3.B of the OBC. For non-residential occupancies, the septic tank working capacity shall be three times the daily design sanitary sewage flow. Therefore, the septic tank must have a minimum working volume of 38,400 L. A summary of the daily sewage design flow calculations are provided in **Table 2-3** below.

Table 2-3: Daily Design Sewage Flow Rate and Septic Tank Volume

Parameter as per OBC	Volume (L) as per OBC	Design Basis for Fastfrate	Flow (L/d) (1)
Warehouse			
a) Per water closet, **and**	950	7	6,650
b) Per loading bay	150	41	6,150
Total Daily Design Flow			**12,800**
Minimum Septic Tank Volume (3x the Daily Design Flow) (L)			**38,400**
Notes: 1. Column 2 x Column 3 = Column 4 (e.g., 950 L x 7 = 6,650 L/d)			

2.3.2 System Design

A Class 4 septic system typically consists of a septic tank and leaching bed. Depending on the system, a pumping chamber to dose the leaching bed and/or a level IV treatment unit may be required. The design of the septic system is based on the following two factors:

- Daily sewage design flowrate
- Percolation Time of the native soil (T-Time)

The percolation time (T-Time) of the native soil is defined as the amount of time it takes for water to travel 1 cm. Typical T-times of soils ranges from 1 to 50 minutes, with some soils up to 125 minutes. GHD limited (GHD) was retained to excavate test pits to help determine soil stratigraphy and the T-time. Five test pits were advanced to depths ranging from 2.4 to 3.4 m within the proposed septic system area and SWM pond. The soil stratigraphy consisted of fill at each location and described as gravelly sand with silt trace clay to a silty sand with gravel and clay. Fill was observed to the bottom of each test pit. Refer to GHD's septic assessment (GHD, 2021b) for more information. Groundwater seepage was encountered at each test pit and was observed between 1.8 and 2.4 m below ground surface. GHD estimated the T-time to have an average value of 12 to 20 min/cm, based upon gradation test results only. As a conservative approach, a Design T-time of 20 min/cm was selected for sizing the leaching bed for this site.

There are 5 types of leaching beds regulated in Ontario under the OBC:

1. Conventional Leaching Bed
2. Sand Filter Bed
3. Shallow Buried Trench (SBT)
4. Type A Dispersal Bed
5. Type B Dispersal Bed

For the Fastfrate site, a raised SBT leaching bed was selected as it would meet all space and site constraints. The footprint of the SBT system is smaller than a conventional absorption trench system such as a conventional leaching or sand filter bed because the soil is not relied upon for any significant portion of the treatment.

A SBT is an alternative to a conventional leaching bed and are always used in conjunction with a treatment unit capable of consistently providing effluent with 10 mg/L five-day carbonaceous biochemical oxygen demand ($cBOD_5$) and 10 mg/L suspended solids (SS). A SBT leaching bed is a pressurized distribution system which delivers regular timed doses of effluent to small diameter laterals (typically 25 mm PVC pipe) supported inside of a plastic chamber. The laterals are perforated at regular intervals on the top of the pipe with an adequate number of orifices on the bottom to provide self-drainage to prevent freezing during cold weather. When the dosing pump starts, effluent is forced along the entire length of the lateral and sprayed upwards where it hits the chamber and trickles down into the soil. The pump is sized to account for friction losses, static losses, and a residual pressure head of at least 600 mm at the furthest point from the pump. This ensures the entire footprint of the leaching bed is utilized and provides a more efficient distribution and use of the soil absorption system. For soils with T-times of up to 50 min/cm, hourly dosing is generally sufficient to allow the ponded water in the trench to infiltrate into the soil.

Septic Tank, Pumping Chamber & Level IV Treatment Unit Clearances

As per Section 8.2.1.6.(1), the septic tank, level IV treatment unit and the pumping chamber will meet the minimum clearances for treatment unit listed in the OBC Table 8.2.1.6.A. In addition, as per 8.7.4.0.(11), the distances set out in column 2 of Table 8.2.1.6.B. shall be increased by twice the height that the leaching bed is raised above the original grade. The current grade at the site where the septic system will be installed is 90.950 meters above sea level (m ASL). The SBT will be raised with a sand mantle below the SBT. The top of grade of the SBT at the highest elevation is 91.6 m. Therefore, the minimum clearances must be increased by 1.3m. A summary of the clearances required for the treatment units (septic system, pumping chamber, and level IV treatment unit) and the SBT leaching bed at the Fastfrate facility septic system is given in **Table 2-4** and **Table 2-5** below, respectively.

It is noted that there will be a SWM facility located east of the septic system, which will be considered as a pond for establishing minimum separation requirements.

Table 2-4: Minimum Clearances for Treatment Units

Object (1)	Treatment Units Minimum Clearance, m (1)	Additional Clearance required for the Treatment Units at Fastfrate, m (2)	Total Clearance required for the Treatment Units at Fastfrate, m (3)
Structure	1.5	1.3	2.8
Well	15	1.3	16.3
Lake	15	1.3	16.3
Pond	15	1.3	16.3
Reservoir	15	1.3	16.3
River	15	1.3	16.3
Spring	15	1.3	16.3
Stream	15	1.3	16.3
Property Line	3	1.3	4.3

Notes:
1. Columns 1 and 2 are taken from OBC Table 8.2.4.6.A
2. [SBT Top of Grade (91.6 m) - Original ground elevation (90.95 m)] x 2 = 1.3 m
3. Total Clearances required for the Treatment Units for the Fastfrate facility

Table 2-5: Minimum Clearances for Distribution Piping and Leaching Chambers

Object (1)	Distribution Piping and Leaching Chambers Minimum Clearance, m (1)	Additional Clearance required for the SBT leaching bed at Fastfrate, m (2)	Total Clearance required for the SBT leaching bed at Fastfrate (3)
Structure	5	1.3	6.3
Well with a watertight casing to a depth of at least 6 m	15	1.3	16.3
Any other well	30	1.3	31.3
Lake	15	1.3	16.3
Pond	15	1.3	16.3
Reservoir	15	1.3	16.3
River	15	1.3	16.3
Spring not used as a source of potable water	15	1.3	16.3
Stream	15	1.3	16.3
Property Line	3	1.3	4.3

Notes:
1. Columns 1 and 2 is taken from OBC Table 8.2.4.6.B
2. [SBT Top of Grade (91.6 m) - Original ground elevation (90.95 m)] x 2 = 1.3 m
3. Total Clearances required for the Treatment Units for the Fastfrate facility

Pumping Chamber

In accordance with sentence 8.7.6.1(3) of the OBC, the pump chamber should have a volume between 50% and 75% of the daily design capacity is recommended. Therefore, it is recommended the pump chamber have a minimum working capacity of 19,200 L.

Submersible Pumps

Wastewater will flow by gravity to the septic tank, and then by gravity to the pumping chamber. The discharge from the pumping chamber and the rest of the system will be pressurized and require submersible pumps. Submersible, readily available and replaceable pumps are wired and rated for an effluent with 3 mm to 20 mm solids handling capacity. An alternating duplex pump configuration is recommended to allow time for service in the event of a pump failure. The specified pump must have a capacity equal to or greater than the calculated maximum pressure requirement as per the SBT design at the design flow. Five submersible pumps will be required:

+ Two pumps for the pumping chamber discharge which will operate in a duty / standby configuration with rotation on stop, time, and failure
+ Two pumps for the level IV treatment discharge which will operate in a duty / standby configuration with rotation on stop, time, and failure
+ One pump for the level IV treatment discharge that will recycle effluent upstream of the septic tank.

The submersible pumps will be provided by the level IV treatment unit supplier, Waterloo Biofilter. Waterloo Biofilter typically specifies Little Giant WS Effluent Series submersible pumps. As per item 8.6.1.3.(4), when a pump or siphon is required the pump or siphon shall be designed to discharge a dose of at least 75% of the internal volume of the distribution pipe within a time period not exceeding fifteen minutes. Therefore, the volume required to dose 75% of 175 m of 50 mm diameter schedule 40 PVC pipe is approximately 64.5 L within 15 minutes, or a required pump flow rate of 4.30 L/min (0.07 L/s). Sentence 8.7.6.1.(2) requires residual pressure (minimum 600 mm as per sentence 8.7.6.1.(2) at the furthest lateral) to ensure the entire bed is dosed.

The Little Giant WS Effluent Series provides include submersible pumps capable of dosing 1.70 L/s to 9.5 L/s, depending on the model. With a minimum flow rate of 0.07 L/s, the Little Giant submersible pumps will provide more than the minimum required dosing flowrate. There are several Little Giant WS Effluent Series submersible pump models. The Hazen William formula was used to calculate the theoretical total dynamic head (TDH) in meters of each of the three pumping scenarios and plotted against the different Little Giant submersible pump curves to find the theoretical operating flowrate. A summary of the results in listed in Table 2-6 below. Refer to **Appendix E** for the pump system curves and calculations.

Table 2-6: Theoretical Pumping Flow Rates

System	Recommended Pump Model	Theoretical Operating Point
Pumping Chamber Discharge	WS50HM-12-20	3.2 L/s at 12.8 m TDH
Level IV Treatment Discharge to SBT	WS100HM-12-20	2.2 L/s at 23.8 m TDH
Level IV Treatment Discharge Recycle Line	WS50M-20	5.7 L/s at 3.1 m TDH

Level IV Treatment Unit

A Level IV Treatment is required for SBT type leaching beds. The Waterloo Biofilter level IV treatment unit will be designed to meet the level IV treatment effluent requirements of 10 mg/L for both SS and $cBOD_5$, as listed in Table 2-7 (adapted from OBC Table 8.6.2.2.).

Table 2-7: OBC Treatment Unit Levels and Required Effluent Concentrations

Item	Column 1 Classification of Treatment Unit (1)	Column 2 Suspended Solids (2)	Column 3 $CBOD_5$ (2)
1.	Level II	30	25
2.	Level III	15	15
3.	Level IV	10	10

Notes:
1. The classifications of *treatment units* specified in Column 1 correspond to the levels of treatment described in CAN/BNQ 3680-600, “Onsite Residential Wastewater Treatment Technologies”.
2. Maximum concentration in mg/L based on a 30-day average.

The level IV treatment unit must be certified to CAN/BNQ 3680-600 “Onsite Residential Water Treatment Technologies”. The treatment units installed in Ontario typically either use aeration or a filter media to provide treatment. Aeration treatment units have higher operation and maintenance costs and effort as blowers are required in addition to pumps. Filter media type treatment units do not require blowers and require the filter media to be replaced approximately every 10+ years or to the manufacturer’s recommendation. A filter media type level IV treatment unit such as a Waterloo Biofilter is recommended for this application. The sanitary waste from the warehouse will flow by gravity to the septic tank, where settling will occur, and the effluent will flow by gravity to a pumping chamber. The pumping chamber will consist of 2 pumps (duty/ standby configuration with frequent rotation via an alternating timer), which will pump the effluent to the level IV treatment unit to evenly dose the filter media. The filtered water will then be either pumped to the shallow buried trench by one of two pumps (duty / standby configuration with frequenting rotation on an alternating timer) or recycled to the inlet of the septic tank by a third dedicated pump. All pumps will be controlled and monitored by a common control panel for remote monitoring, control, and data logging over a stable cellular network to Waterloo Biofilter who will contact personnel from the Fastfrate facility. Alarms include high water, float failure and pump failure from the Waterloo Smart Panel. A flow schematic of the system is given in **Figure 2-1** below.

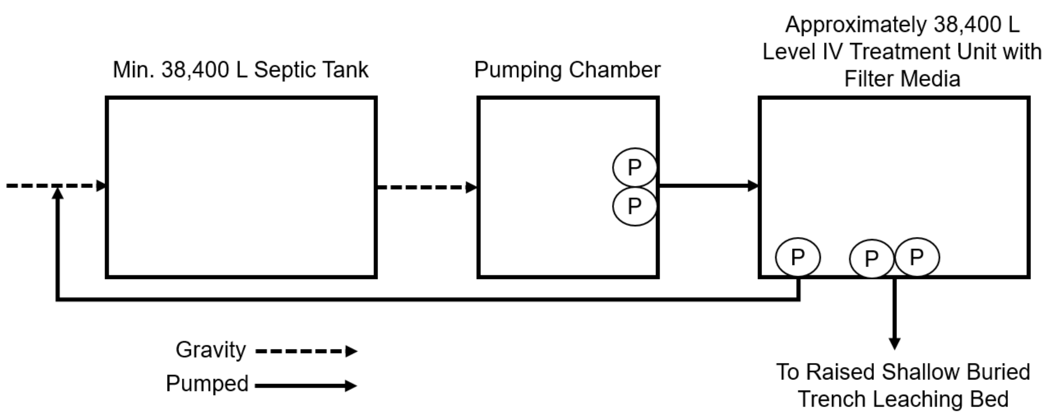

Figure 2-1: Septic System Process Flow Schematic

Shallow Buried Trench Leaching Bed

Due to the shallow groundwater seepage observed at 1.8 to 2.4 m below the surface and the requirement that the bottom of the leaching bed must be a minimum of 900 mm above the top of the high ground water table, the leaching bed must be raised. Due to the size constraint of the system, a SBT with a sand mantle is recommended. The sand mantle will be approximately 15 m in total length with the last 3 meters of the mantle changing direction slightly more north-west than the first 12 m of the mantle. Even with the irregular shape of the mantle, effluent will flow through the mantle as the T-time of the sand mantle will be imported sand fill with a percolation rate of 6 to 10 minutes/cm and have a maximum 5% if fines passing through a No. 200 sieve.

The length of the SBT distribution pipe laterals is calculated based on the T-time and the Table 8.7.3.1 in the OBC. The percolation tests of the native soil in the area of the proposed septic bed yield 12 to 20 minutes/cm according the GHD report. As per Table 8.7.3.1 in the OBC, a percolation between 1 to 20 minutes/cm corresponds to the following formula to calculate the length of distribution pipe required:

$$L = \frac{Q}{75}$$

Where:

L = The length of distribution pipe in m

Q = Total Daily Design Flow Rate (12,800 L/d for the Fastfrate Facility)

Therefore, the SBT must have a minimum distribution pipe length of 171 m (rounded up to the nearest meter). The OBC stipulates the maximum length of a SBT distribution run is 30 m as specified in clause 8.7.3.2(2)(a). To accommodate the clearances for the SWM pond and property line, 7 distribution pipe runs of 25 m (175 m total) is recommended.

Each lateral shall include a test port at the end of each line. Each test port will have a long radium sweep bend at the end, equipped with a normally closed ball valve and a removal plug with a drilled orifice the same diameter as the lateral spray orifices. The test ports are intended to allow individual line squirt testing and testing of all lines at once. The plugs will be removable to allow line flushing and cleaning as necessary.

The spray orifice size is important in the flow/pressure calculation, and it is recommended that 3 mm sizing be used as a default. OOWA best practices recommends orifices are spaced between 0.6 to 1.2 m along the lateral for even distribution of effluent. The orifices for the Fastfrate facility are specified to be spaced 0.6 m apart.

In addition to the spray orifices, drain orifices are recommended to be evenly spaced, facing downward, on each lateral to allow for drain-out and prevent freezing between pump cycles. It is recommended to have a drain orifice every 2 to 4 spray orifices, offset from the spray orifices and having orifice shields installed to prevent erosion of the trench base. The drain orifices will be spaced every 3 m apart and will be offset from the spray orifices.

OOWA Best Practices recommends the manifold should be at least one trade size larger than the laterals, typically between 32 mm (1.25” nominal) and 50 mm (2” nominal). The distribution laterals will be 25 mm diameter Schedule 40 PVC, and the manifold will be 50 mm diameter Schedule 40 PVC. Each lateral will include a ball valve for isolation and a 50 mm to 25 mm reducer. The components of the SBT leaching bed are given in the section below.

Fill will be required for the raised SBT system. The contact area at the base of the fill system was carefully considered. The contact area between the fill and the native receiving soils is important in order to safely transition treated effluent from the fill to the native soils without causing environmental risks. Due to inconsistent native soil type at the site and as a precaution, a sand mantle is recommended.

The mantle for the Fastfrate septic system was designed according to Option 2 of the Ontario Onsite Wastewater Association (OOWA) Best Practices: Shallow Buried Trench Guidance Document:

The contact area between the native soils and the fill material is which the SBT bed and mantle area should be at least equal to the following formula:

$$A = \frac{Q \times T}{850}$$

Where:

A = Contact Area (m^2)

T = The T-time of the receiving soils (a conservative T-time of 20 minutes/cm was used)

Q = Total Daily Design Flow Rate (12,800 L/d for the Fastfrate facility)

Therefore, the minimum recommended mantle area is 302 m^2. The total mantle surface area provided (extended and beneath the SBT) has an approximate contact surface area of 660 m^2 and is over double the minimum surface area as calculated by the OOWA Best Practices.

Each lateral shall include a test port at the end of each line this may be an individual access port at the end of each lateral. Each test port will have a long radium sweep bend at each test port equipped with a normal closed ball valve and a removal plug with a drilled orifice the same diameter as the lateral spray orifices. The test ports are intended to allow individual line squirt testing and testing of all lines at once. The plugs will be removable to allow line flushing and cleaning as necessary.

The orifice size is important in the flow/pressure calculation, and it is recommended that 3 mm sizing be used as a default. OOWA Best Practices recommends orifices are spaced between 0.6 to 1.2 me along the later for even distribution of effluent. The orifices for the Fastfrate facility septic system are specified to be spaced 0.6 m apart.

The drain orifices are evenly spaced, facing downward, on each lateral to allow for drain-out and prevent freezing during pump cycles. It is recommended to have a drain orifice every 2 to 4 spray orifices, offset from the spray orifices and having orifice shields installed to prevent erosion of the trench base. The drain orifices will be spaced every 3 m apart and will be offset from the spray orifices.

OOWA Best Practices recommends the manifold should be at least one trade size larger than the laterals, typically between 32 mm (1.25" nominal) and 50 mm (2" nominal). The distribution laterals will be 25 mm diameter Schedule 40 PVC pipe, and the manifold will be 50 mm diameter Schedule 40 PVC pipe. Each lateral will include a ball valve for isolation and a 50 mm to 25 mm reducer. To summarize, the components of the SBT system for the Fastfrate facility include:

+ Treatment Unit certified to Level IV CAN/BNQ 3680-600 "Onsite Residential Wastewater Treatment Technologies"
+ Dosing pump chamber and pumps equipped with timer controls.
+ Forcemain from dosing chamber to distribution manifold which typically is PVC schedule 40
+ Manifold (header) assembly, consisting of 50 mm (2") pressure pipe (PVC Schedule 40)
+ Laterals in the leaching bed consisting of 25 mm (1") pressure pipe (PVC Schedule 40) with 3 mm orifice holes spaced evenly along the top of the pipe and 3 mm drain holes on the bottom
+ Pipe support to keep the lateral off the bottom of the trench
+ Leaching chamber covering the laterals. Large diameter pipe cut in half is not acceptable, as the footprint of the sidewalls is not sufficient to prevent settling of the chambers over time. Chambers with a wide resting foot are preferred.
+ Filter cloth over the chambers
+ "Sweep 90' fitting extending within 10 cm of the finished grade at the end of each lateral. The vertical piece may be equipped with a ball valve if desired, and terminate with a threaded cap.

Ground Water Elevation and Native Fill

The septic, pump chamber, and level IV treatment unit tanks will require to be wrapped in a waterproof material to prevent groundwater infiltration. Due to the inconsistency of the fill material observed and the shallow groundwater seepage encountered by GHD, the leaching bed will be required to be raised. The 100-year flood elevation is 90.1 m ASL, therefore the SBT leaching bed and sand mantle have been designed to be above this elevation as not to flood out the septic system during a 100-year storm event. It is recommended prior to placement of the imported fill that any surficial organics are to be removed from the tile bed and mantle area. Additionally, the existing fill material is recommended to be compacted to ensure uneven settlement does not occur.

2.4 Sanitary Servicing Summary and Conclusions

The sanitary servicing design for the proposed development conforms to the requirements of the City of Ottawa Sewer Design Guidelines, 2012, as amended by all applicable Technical Bulletins.

The on-site wastewater disposal system (Septic Tank, Level IV treatment unit and shallow-buried trench system) conform to the requirements of the Ontario Building Code part 8. However, due to the Total Daily Design Sewage Flow being >10,000L, and ECA from the MECP will be required for this system.

3. Potable Water Servicing

3.1 Existing Conditions

The site is currently undeveloped and is not serviced by municipal watermains. As such potable water for this site will be provided by a groundwater supply well. Refer to the GHD's Hydrogeological Assessment (GHD, 2021a) for more information.

3.2 Building Water Demands (Domestic and Fire Protection)

3.2.1 Potable Water Quantity Requirements

Based on design flows from the OBC, the average daily water use for the facility is **8.9 L/min** (**Table 3-1**). Considering a peak demand of 35.6 L/min (average demand * 4), the well discharge of 60 L/min in the Hydrogeological Report will sufficiently meet the water demand requirements of the facility.

Table 3-1 Potable Water Design Flows

Parameter as per OBC	Volume (L) as per OBC	Design Basis for Fastfrate	Flow (L/d) (1)
Warehouse			
a) Per water closet, and	950	7	6,650
b) Per loading bay	150	41	6,150
		Total Daily Design Flow	**12,800**

Notes:
1. Column 2 x Column 3 = Column 4 (e.g., 950 L x 7 = 6,650 L/d)

Water demands were also determined per the City of Ottawa Design Guidelines for comparison purposes. The peak water demand obtained using this method is **0.62 L/s (37.2 L/min).** This value is also within well discharge capacity. (**Table 3-2**).

Table 3-2 Potable Water Design Flows – City of Ottawa Design Guidelines

Demand Type	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Maximum (Peak) Hour Demand (L/s)
Residential	0.00	0.00	0.00
Commercial	0.23	0.35	0.62
Total	**0.23**	**0.35**	**0.62**

3.2.2 Fire Protection Quantity Requirements

The facility is not connected to a municipal water supply and will therefore require other means of fire protection. The fire protection volumes to be provided and a description of the proposed fire protection system are presented in this section.

3.2.2.1 Fire Protection Volume – Building Mechanical Fire Protection Requirements

The required volume of water available for fire protection shall be calculated based on NFPA13 requirements:

$$\left[\left(0.2\frac{\mathrm{gpm}}{\mathrm{ft}^2}\right) * (1500\ \mathrm{ft}^2) + 250\ \mathrm{gpm}\right] * 60\mathrm{min} = 33{,}000\ \mathrm{US\ Gal.} = \sim 123.9\mathrm{m}^3$$

Where:

250gpm = Hose Allowance Requirement (NFPA13)

60min = Duration Requirement (NFPA13)

3.2.2.2 Fire Protection Volume – FUS requirements

The FUS method was used to determine the Fire Protection Volume required for this site.

The resulting fire protection volume required is of 480 m^3, for 1 hr of fire protection @ 8000 L/min (**Appendix D**).

3.2.2.3 Fire Protection System

The proposed SWM wet pond shall be used for storing water for fire protection. Refer to **Section 4.5** for more information on the design of the proposed SWM pond.

A fire pump located in a 2-hour fire rated mechanical room in the building shall serve the Fire Protection system. The fire pump inlet shall be connected to an 8m deep sump, to be hydraulically connected to the pond via an intake pipe at the base of Pond.

To ensure that the fire protection volumes are adequate during winter conditions, the maximum ice thickness on the permanent pool of the SWM wet pond was determined based the Annual Freezing Degree Days method. Based on an Ice cover condition coefficient of 2.4 and the Annual Freezing Degree Days value 785 °C-day for 2019, the ice thickness of 67.24 cm was obtained. Based on this calculation, the design ice thickness used is of 69 cm. Detailed calculations are presented in **Appendix D**.

In the permanent pool of the proposed SWM pond, fire protection volumes of 520.3 m^3 and 987.9 m^3 with and without ice cover respectively. These volumes satisfy the FUS and NFPA 13 requirements, and will supply the building fire protection intake, and two (2) dry hydrants.

A free-standing Siamese connection will be located outside the front entrance and would be used to supply the sprinkler system if the pump within the shaft were unable to draw water from the fire protection pond.

The large volume provided in the permanent pool is required to satisfy the minimum depth of water above the building fire protection and dry hydrant intakes, per City of Ottawa detail W53.

To prevent exfiltration and maintain the water level of the permanent pool, the SWM pond will be constructed with a liner. In the event the water level in the sump & pond drops below the minimum level, makeup water will be provided to the sump and pond from the well to mitigate losses due to infiltration and evaporation. Alarm indicators will monitor the levels in the sump & pond, and will control the supply of makeup water to the pond and sump from the well.

The building fire protection system requires 250 US gal. per minute (15.8 L/s) per NFPA 13. As such, the building fire protection intake was sized as a 300mm pipe, slopes at 0.1% with a capacity of 33 L/s under gravity free flow conditions (Factor of safety = 1.90). An intake screen capacity of 64 L/s is also specified for the building fire protection intake (Factor of safety = 4.05).

3.3 Proposed Water Supply Well

3.3.1 Well Quality

Samples tested from an existing water supply well confirmed that there were no health-related parameters in exceedance of the Ontario Drinking Water Standards (ODWS). There were several parameters that exceeded their respective ODWS for aesthetic objectives including hardness, total dissolved solids, turbidity, manganese, and iron. These parameters will require commercially available treatment equipment (for example a water softener for treatment of hardness). The treatment systems will be determined later in the design process. A detailed breakdown of test results is presented in GHD's Hydrogeological Assessment (GHD, 2021a).

As a proactive measure, it is recommended that bacteriological treatment (i.e., ultraviolet treatment) be used at a minimum. It is anticipated that the well system will be regulated and will require treatment to meet appropriate standards to ensure potable water is available to employees and visitors. A water treatment specialist should be retained for treatment and a qualified engineer should review the final treatment system before use.

3.3.2 Well Quantity

The water supply well referred to as TW-2 in the Hydrogeological Assessment is capable of providing long-term quantities of groundwater at a pumping rate of 60 L/min based upon the pumping test completed (GHD, 2021a). After 6 hours of pumping, the well drawdown was 1.15 m with 23.9 m of available drawdown remaining. A total of 21,600 L was pumped from the well during the testing.

Based upon the septic total daily design values of 12,800 L/day, the well exceeds the daily design quantities estimated. The actual water volume required for the development on a daily basis is expected to be much less than 10,000 L/day. The water supply well and the aquifer that it is drilled into can safely provide the long-term quantities required for this development based upon the testing completed without significant interference to future and existing neighbouring wells.

3.4 Conclusion – Potable Water Servicing

The proposed well will provide sufficient potable water supply for the development, while the proposed SWM pond permanent pool will provide sufficient fire protection volume for the development.

4. Storm Water Management

4.1 Background

As previously mentioned, the subject site is currently vacant and is part of the Hawthorne Industrial Park (HIP). The site is generally flat and slopes towards the North-East corner before it reaches the 6m tall embankment and reaches Christie Creek on Rideau Road. There is a fill layer of approx. 6m thick across most of the site.

The HIP sector and the Fastfrate site are subject to the HIP Stormwater Management Report and associated drawings (**Appendix A**), developed by J.L. Richards and dated May 2009. This report established the Stormwater Management design for the HIP, which was then used as the design basis for the roads, open ditch system, and HIP SWM facility (refer to Drawings issued for MOE Approval; **Appendix A**).

The HIP SWM facility, located east of the industrial site, only provides stormwater quantity control for the HIP sector. The HIP SWM facility controls storm events up to the 2 - year post-development peak flow to 50% of the 2-year pre-development peak flow; and controls post-development peak flows to pre-development levels for storm events ranging from the 2-year to the 100-year recurrence. The HIP SWM report specifies that individual parcels of the HIP must provide stormwater quality control.

4.2 Stormwater Management Strategy

4.2.1 Deviations from the HIP SWM Report & Drainage Plan

The proposed SWM strategy for this site deviates from that of the HIP SWM report.

The drainage plan for the HIP divides the drainage of the Fastfrate site between two outlets. Part of the site drains to Christie Creek while the remainder drains to the HIP SWM facility via the open ditch system along Somme Street. (**Figure 4-1**).

To simplify the SWM strategy the drainage distribution between both outlets has been altered from what was presented in the HIP SWM report, redirecting more runoff towards the HIP SWM facility (**Figure 4-1**). This simplifies the site grading and allows all quality control measures to be in a single location. Therefore, the proposed conditions require quantity control (through on-site retention) to respect the allowable release flowrates up to the 100-year storm stipulated in the HIP SWM report.

Figure 4-1 SWM Drainage Area from HIP SWM (left), and from Proposed SWM (right)

The original drainage plans and sewer design sheets for the HIP sector, as well as the proposed SWM plan for the Fastfrate site are provided in **Appendix B**.

4.2.2 Allowable Post Development Flow Rates

The allowable release rate was determined based on parameters of the HIP SWM report, Sewer Design sheets and SWM plans as summarized in **Table 4-1**.

Table 4-1: Post-development Allowable 100-year Release Flows – HIP SWM Facility

Catchment ID	Catchment area (ha)	Runoff Coefficient (factored)	Time of Concentration (minutes)	Rainfall Intensity (mm/hr)	Release Rate (L/s)
Fastfrate Site – HIP SWM Report	3.06	0.88	19.43	122.15	**906.87**

Based on this calculation, the storm runoff under post-development conditions for the site area draining to the HIP SWM facility must be controlled to the allowable release rate of **906.9 L/s**, up to and including the 100-year storm event.

Using this allowable release rate, the resulting unit release rates (as L/s/ha) were determined for the Fastfrate site, assuming an identical time of concentration for the proposed Site SWM (Table *4-2*; **Appendix C, pages 2- 4**).

Table 4-2: *Post-development Allowable 100-year Release Rates – HIP SWM Facility*

Catchment ID	Catchment area (ha)	Runoff Coefficient (factored)	Allowable Release Flow – 100-year (L/s)	Allowable Release Rate – 100-year (L/s/ha)
Fastfrate Site – HIP SWM Report	3.06	0.88	906.9*	296.89
Fastfrate Site – Proposed SWM	3.66	0.88	906.9	247.78

4.3 Design Criteria and Assumptions

- Quality control requirements: 80% TSS Removal must be provided for our site as required by the South Nation Conservation Authority (SNCA).
- Per the HIP SWM report, the existing open ditch system is designed to the 100-year event, and the existing culverts are designed to the 10-year event.
- The current site plan deviates from the HIP SWM report. To conform with the original SWM, the 100-year allowable release rate to the SWM facility must remain at 906.9 L/s (refer to **Section 4.2.2**).

4.4 Proposed Storm Servicing

All detailed SWM calculations are presented in **Appendix C.**

4.4.1 Stormwater Quality Control

As specified in the HIP SWM report, the HIP SWM facility was not designed to provide quality control. It was anticipated that each individual parcel was to provide its own quality control and achieve the normal level of protection (70% TSS Removal).

Through consultation with the South Nation Conservation Authority (SNCA, refer to **Appendix G**) the quality control requirements for the HIP parcels have been revised to the enhanced level of protection (80% TSS removal).

The portion of the site that naturally drains into Christie Creek will not require quality treatment since this area will remain undeveloped and vegetated. Therefore, only the developed portion of the site draining towards the Somme Street ditches and to the existing HIP SWM facility will be treated for quality.

The quality control requirements will be achieved using a combination of grassed swales and a wet pond, operating as a “treatment train”. The grassed swales, which are sloped to promote infiltration and low channel velocities (<0.5 m/s) will provide the required pre-treatment for the wet pond.

The wet pond was designed based on the volumetric water quality criteria, as presented in Table 3.2 of the MECP SWM guidelines (2003). The wet pond requires a total water Quality Storage of 824m^3. In the pond dimensioning, at least 677 m^3 will be provided in the permanent pool and at least 146m^3 will be provided as extended detention (**Table 4-3**).

For this facility, the extended detention volume will be retained for a period of 12 hours, as per the MECP SWM Guidelines on wet ponds with < 8 ha of drainage area.

Table 4-3: Wet Pond Volume Calculations – 70% Impervious; 80% TSS Removal

Control Area	Storage Volume (m^3/ha)	Catchment Area (ha)	Required Storage Volume (m^3)
Permanent Pool	185	3.66	677.1
Extended Detention	40		146.4
Total	**225**	**3.66**	**823.5**

4.4.2 Stormwater Quantity Control

The anticipated post-development flow rates and required storage when controlled to the allowable post-development release rate are summarized in the table below.

Table 4-4: Post-development Flowrate and Storage Summary

Control Area	100-year Release Rate (L/s)	Available Storage Volume (m^3)	100-year Storage Volume (m^3)
Roof Areas	212.6	137.4	115.1
SWM Pond	906.9	729.2	280.51
Total	906.9	866.6	395.61

For the warehouse and office building, the proposed release rate for roof runoff is **212.6 L/s.** This release rate generates **115 m^3** of roof storage. This value is conservative with respect to the maximum available (**Table 4-4)**.

To restrict stormwater discharge to the allowable release rate of **906.9 L/s**, a storage volume of **281 m^3** is proposed in the SWM pond and a storage volume of **115 m^3** is proposed on roofs for a total of **396 m^3** (**Table 4-4).** These volumes do not account for surface storage within swales, storm sewers, and culvert sections. Refer to **Appendix C** for detailed stormwater storage calculations.

The proposed SWM system will be equipped with a backflow preventer and enough storage capacity on site to ensure the site SWM is not overwhelmed in the event of prolonged surcharging of the receiving open ditch system during the 100-year event.

4.4.3 Municipal Ditch and Culverts

The two entrances to the site cross the existing open ditch system and require installation of culverts. The sizing of the culverts was determined with consideration of the upstream municipal culverts since the SWM system outlet for stormwater is situated downstream of these culverts. Culvert sizing suitability calculations can be found in **Appendix C**.

4.4.4 Site Ditches and Culverts

The site's swales and culverts were sized based on capacity to convey the 100-year peak flow under free flow conditions of the site's storm outlet. Culverts were sized using a constant tailwater elevation.

Table 4-5: Culvert Sizing Summary

Culvert	Size	Q (L/s)	HW/D	HW elevation	TW elevation
East Ditch	1x CSPA 910x660	405	1.13	90.160	89.800
West Ditch	1x CSPA 910x660	231	0.93	90.09	89.800
STM Pond Transfer Culvert	2x CSPA 1030x740	907	0.81	89.820	89.510

Detailed calculations supporting the culvert sizing are available under **Appendix C**.

4.4.5 Building Service Connection

A 600 mm storm sewer service connection will be provided on the south side of the proposed building and will be directed towards the SWM pond. The storm sewer will convey controlled runoff from the roof and uncontrolled runoff from catchments A4 and A5 (refer to **Appendix B – SWM plan**).

4.4.6 Deviations from the Sewer Design Guidelines – Swale Minimum Slope

The slope of the swales conveying stormwater for this site are inferior to the minimum slope specified in section 6.4.1 of the Sewer Design guidelines.

The grassed swales are intended to contribute to runoff quality control, operating with the proposed wet pond as a “treatment train”. The reduced slope of grassed swales promotes infiltration and low channel velocities (<0.5 m/s). This improves the effectiveness of grassed swales for runoff quality control (LID SWM Planning and Design Manual).

Based on the interpretation from percolation tests for this site, the soil infiltration rate can be estimated to range between 30 to 50mm/hr. With dry swales, an underdrain is typically recommended if the soil infiltration rate is <15 mm/hr.

As such, the risk of prolonged ponding of water in the ditches is mitigated by the soil infiltration rate and presence of on-site existing fill and well draining soil.

4.5 Proposed SWM Pond Sizing

A summary of the required volumes to be provided in the Wet Pond is presented in the table below.

Table 4-6: Summary of Required SWM Pond Volumes

Parameter	Required Volume (m^3)	Source
Retention Volume	280.51	Table 4-4
Extended Detention	146.4	Table 4-3
Fire Protection Volume	480	Section 3.2.2.2
Permanent Pool for Quality Control	677.1	Table 4-3
Sediment Accumulation Volume (25 years)	208	Section 4.6.1

A summary table of the pond volumes is presented below (**Table 4-7**).

Table 4-7: Summary of Provided SWM Pond Volumes

<table>
<tr><th colspan="3" rowspan="2">Control Volumes</th><th>Bottom Elevation</th><th>Top Elevation</th><th>Depth</th><th>Provided Volume</th><th>Required Volume</th></tr>
<tr><th>(m ASL)</th><th>(m ASL)</th><th>(m)</th><th>(m^3)</th><th>(m^3)</th></tr>
<tr><td colspan="3">Freeboard to Overflow</td><td>90.100</td><td>90.150</td><td>0.050</td><td>50.2</td><td>-</td></tr>
<tr><td colspan="3">Retention Volume</td><td>89.500</td><td>90.100</td><td>0.60</td><td>560.10</td><td>280.51</td></tr>
<tr><td colspan="3">Extended Detention</td><td>89.300</td><td>89.500</td><td>0.200</td><td>169.1</td><td>146.4</td></tr>
<tr><td rowspan="5">Permanent Pool (PP)</td><td rowspan="2">Fire Protection Volume</td><td>With Ice Cover</td><td>87.700</td><td>88.610</td><td>0.690</td><td>520.3</td><td rowspan="2">480</td></tr>
<tr><td>Normal</td><td>87.700</td><td>89.300</td><td>1.60</td><td>987.9</td></tr>
<tr><td colspan="2">Depth of Fire Protection Intake</td><td>87.100</td><td>87.700</td><td>0.600</td><td>243.4</td><td>-</td></tr>
<tr><td colspan="2">Sediment Accumulation Volume</td><td>86.100</td><td>87.100</td><td>1.0</td><td>229.9</td><td>205</td></tr>
<tr><td colspan="2">Total PP Volume</td><td>86.100</td><td>89.300</td><td>3.2</td><td>1510</td><td>677.1</td></tr>
</table>

4.6 Calculations

4.6.1 Sediment Accumulation Volume

Based on the MECP SWM planning and design guidelines, a conservative estimate of the sediment accumulation volume required for a duration of 25 years is 205 m3 assuming an annual TSS loading of 2.84 m^3/ha/year and a removal efficiency of 80%.

4.6.2 Pond Controls

As defined in the City of Ottawa Sewer Design Guidelines (2012), the Rational Method is a valid approach to determination of peak flows and pipe capacity for drainage areas of less than 40 ha in size. Thus, the Rational Method has been used in the determination of required storage volumes to store the 100-year storm events to the pre-determined allowable release rates.

4.6.2.1 Extended Detention Control (Quality)

The wet pond will use a 200mm reverse pipe with **one 80 mm dia. orifice plate** to control the detention time to the minimum detention time of 12h, per MOE Guidelines for drainage areas less than 8 ha.

Using equation 4.10 from the MECP SWM guidelines resulted in a drawdown time of 15.53 hours.

$$t = \frac{2\,A_p}{C\,A_o(2g)^{0.5}}\left(h_1^{0.5} - h_2^{0.5}\right)$$

Equation 4.10: Drawdown Time

Where:

t = drawdown time in seconds

A_p = surface area of pond (m^2)

C = discharge coefficient

A_0 = cross-sectional area of the orifice (m^2)

g = gravitational acceleration constant

h_1 = starting water elevation above the orifice (m)

h_2 = ending water elevation above the orifice (m)

$$t = \frac{2A_p}{CA_0(2g)^{0.5}}\left(h_1^{0.5} - h_2^{0.5}\right)$$

$$t = \frac{2(876.75)}{(0.63)(0.005)(2 * 9.81)^{0.5}}\left(0.2^{0.5} - 0^{0.5}\right)$$

$$t = 55906\ s = 15.53\ hours$$

4.6.2.2 Release Rate Control (Quantity)

The release rate control, under free flow conditions, will be achieved by **one 600x1040mm rectangular orifice** set at an invert elevation of 89.500 m ASL. Under free flow conditions, this opening will act as a weir, and will control the 100-year release rate to 904.6 L/s on average.

Table 4-8 Resulting Release Flow with Proposed Controls

Release Rate Control Flow condition	Average Release Flow (L/s)	Max. Water Surface Elevation at pond outlet (m ASL)
Free Flow Condition	904.6	9.100

4.7 SWM Conclusions

The storm servicing design for the proposed development generally conforms to the requirements of the City of Ottawa Sewer Design Guidelines, 2012, as amended by all applicable Technical Bulletins. The storm servicing design also conforms to the HIP SWM report (J.L. Richards ,2009). Justifications have been provided where deviations were proposed by the SWM strategy.

The allowable release rate for the site post-development was calculated to be **906.9 L/s**. It is expected that this can be achieved via roof storage and the proposed SWM wet pond.

A Roof Flow Control Declaration will be provided upon completion of the Mechanical and Structural design.

5. Sediment and Erosion Control

Appropriate measures must be taken to control erosion and sedimentation during the construction process for the proposed development. Sediment will be trapped on site, implementing the Ontario Ministry of Natural Resources and Forestry's (MNRF) "Guidelines on Erosion and Sediment Control for Urban Construction Sites," to assure proper control measures are upheld. Furthermore, the following measures must be considered:

+ Supply and install silt fences (as per OPSD 219.110) along the perimeter of the impacted lands, including borrow and stockpile areas resulting from topsoil stripping or excavating activities; locations determined during field grading operations;
+ Catch basin inserts must be used within the limits of the project and must remain in place until project completion. The inserts must also be inspected regularly and corrected as deemed necessary;
+ A dewatering system, such as a sedimentation basin or approved equivalent, shall be implemented to filter sediments from an excavated trench should dewatering and pumping operations become necessary, all in accordance with the City of Ottawa Sewer Use By-Law 2003-514.

All control measures will be carried out in accordance with the following documents:

+ "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs and Housing, and Transportation and Communication, Association of Construction Authorities of Ontario, and Urban Development Institute, Ontario, May 1987.
+ "Erosion and Sediment Control" Training Manual by Ministry of the Environment, Spring 1998.
+ Applicable Regulations and Guidelines of the Ministry of Natural Resources and Forestry.

Refer to the following project drawings for additional information: Sediment and Erosion Control Plan (C004) and Notes Plans (C005 and C006).

6. Conclusion

The current study demonstrates how the proposed servicing of the site will be achieved, in that the proposed SWM strategy conforms to the existing SWM plan and that the proposed Potable Water, Fire Protection and Sanitary Servicing works will be sufficient to service the proposed development.

Within the site, all services have been designed in keeping with the City of Ottawa design requirements and the requirements of the HIP SWM Report.

We trust this site servicing and stormwater management report is to your satisfaction. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

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A

Appendix A -
J.L. Richards Storm Water Management Plan

STORMWATER MANAGEMENT REPORT

HAWTHORNE INDUSTRIAL PARK

February 2009
(Revised April 2009)
(Revised May 2009)

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STORMWATER MANAGEMENT REPORT

HAWTHORNE INDUSTRIAL PARK

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STORMWATER MANAGEMENT REPORT

HAWTHORNE INDUSTRIAL PARK

1.0 INTRODUCTION

1.1 Background

In 1999, J.L. Richards & Associates Limited (JLR) completed a Stormwater Management Study, on behalf of Beaver Road Builders Ltd., for the development of a proposed area previously referred to as the Hawthorne Road Industrial Subdivision. The main objective of the1999 Study was to develop a conceptual storm servicing alternative (including stormwater management) that would support the proposed development without adversely affecting the hydrological regimes of receiving streams. The 1999 Study provided a conceptual design of the conveyance system and on-site storage requirements for the proposed development in order to satisfy the regulatory agencies of the time, namely the Region of Ottawa-Carleton, the City of Gloucester and the South Nation Conservation Authority (SNC).

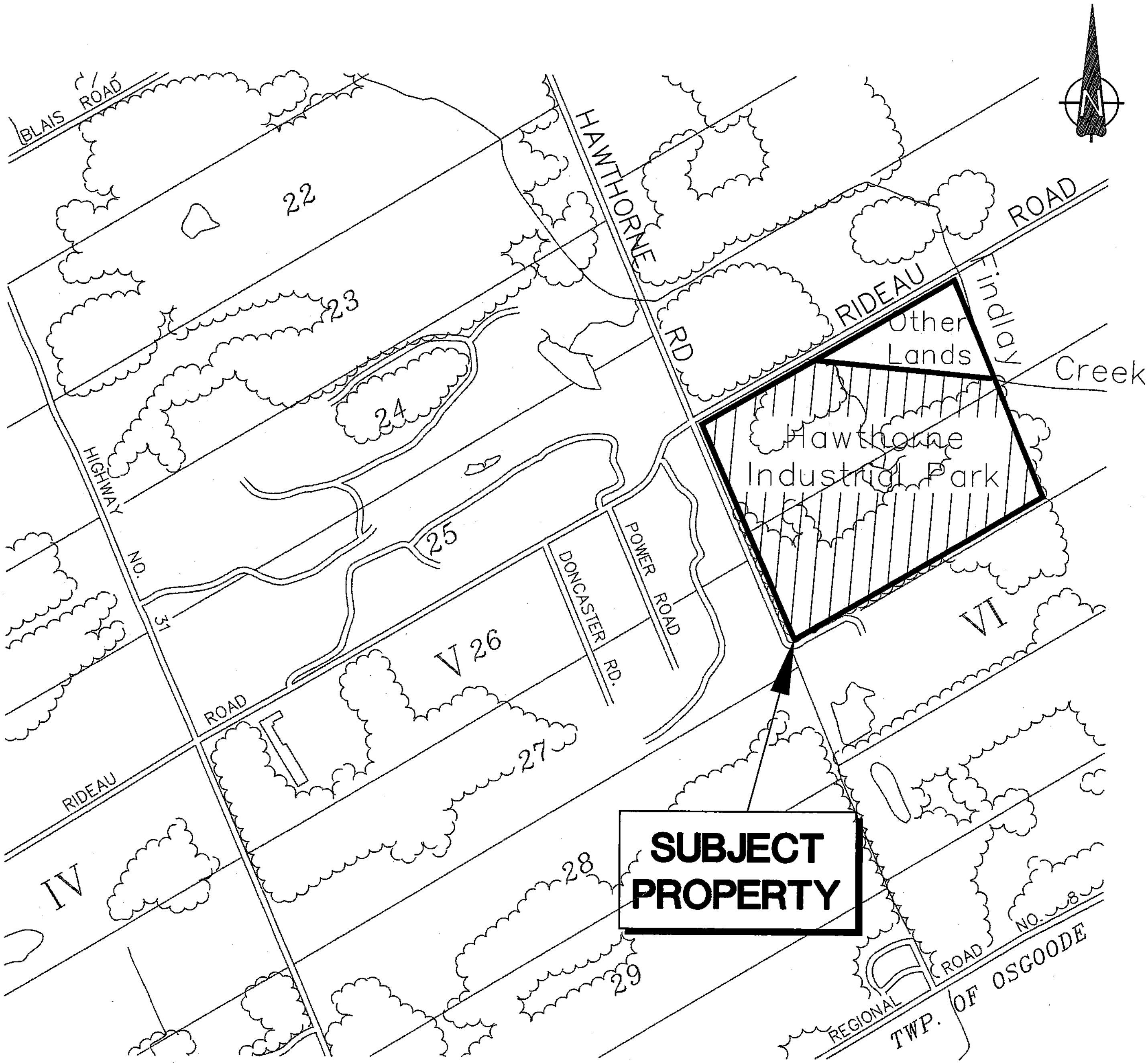
The current landowner, R.W. Tomlinson Limited (Tomlinson), now wishes to complete the development of the subject land, herein referred to as the Hawthorne Industrial Park (HIP).

1.2 General

The proposed 70 hectare (ha) site is located immediately southeast of the Hawthorne Road/ Rideau Road intersection (refer to Figure 1) in the City of Ottawa (formerly in the City of Gloucester) and is expected to service future industrial operations varying in size. Over the past decade, the site has been used to dispose of fill materials resulting from Tomlinson's construction activities. The fill material has been placed in areas where fill was required for the construction of the proposed HIP.

Currently, Orgaworld Canada Ltd. (Orgaworld), has leased approximately 10 ha within HIP, which will house the source separated organics program being implemented by the City of Ottawa in 2009. The Orgaworld site includes a Stormwater Management Facility with a capacity of 15,994 m^3 providing on-site water quantity and quality control.

In addition, a permanent facility within the above subject lands is a total suspended solids (TSS) treatment facility. Consisting of three (3) ponds, this facility was designed



NOT TO SCALE

PROJECT:	DRAWING:
HAWTHORNE INDUSTRIAL PARK	KEY PLAN

J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS

J.L. Richards & Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
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DESIGN:	M.B.	DRAWING NO.:	FIGURE 1
DRAWN:	ARM		
CHECKED:	G.F.	JLR NO:	20983
PLOTTED:	Apr 30, 2009		

to provide aggregate wash water management to Tomlinson's existing quarry operations on the west side of Hawthorne Road (refer to Appendix 'I' for a copy of the Ministry of the Environment (MOE) Certificate of Approval (C of A) related to these works). In addition to the existing aggregate wash treatment facility, it is proposed to construct separate stormwater management facilities to service water quantity and quality requirements for the HIP.

1.3 Objectives

This Stormwater Managment Report (SWMR) was prepared to demonstrate that the subject lands can be developed as an Industrial Park Subdivision in compliance with the current surface water objectives of the watershed. Since the subject lands drain to Findlay Creek, which is tributary to the North Castor River, storm runoff criteria for this development must be in accordance with the recommendations of the document entitled "Shield's Creek Subwatershed Study, Totten Sims Hubicki Associates, June, 2004", referred throughout this Report as SCSS. More specifically, the above Report provided the following design criteria with regard to stormwater:

Water Quantity

<u>Peak Flow</u> Post-development peak flows must be controlled to pre-development levels for storm events ranging from a 1:2 year to a 1:100 year recurrence.

<u>Infiltration</u> Section 5.5 of the SCSS recommends that the quantity and quality of groundwater infiltration be maintained to pre-development rates.

<u>Erosion</u> The stormwater management strategy for the proposed HIP must be developed to maintain the erosion potential to current levels.

Water Quality

The proposed stormwater management strategy for HIP must be developed to meet a Normal Level of Protection (as per the MOE's publication entitled "Stormwater Management Planning and Design Manual, March, 2003", referred throughout this Report as SWMPDM, which corresponds to a standard approach used in urban development to obtain a targeted total suspended solids (TSS) removal rate of 70%.

2.0 STORM DRAINAGE

2.1 General

Storm servicing for the HIP was designed using the dual drainage concept, also known as the minor/major drainage system. The minor drainage system is mainly comprised of an on-site open ditch and culvert system. The minor system was designed to capture and convey runoff during frequent storm events up to a 1:10 year recurrence. The major system formed by swales/ditches, streets, etc. was sized to accommodate runoff during storm events exceeding 1:10 year up to the 1:100 year recurrence.

The open ditches, culverts and swales were sized using the Rational Method. An inlet time of 15 minutes and runoff coefficients (C-factors) ranging from 0.20 to 0.90 were used in the sizing of the conveyance systems. It should be noted, however, that C-factors used were increased by 10% for the 1:25 year peak flow calculations and by 25% for the 1:100 year recurrence, as per Section 5.4.5.2.1 of the City of Ottawa's Sewer Design Guidelines (November 2004). Rainfall intensities (i.e., Intensity-Duration-Frequency curves (IDF)) required by the Rational Method were also extracted from the City of Ottawa's Sewer Design Guidelines. Peak flow rates for the HIP and Hawthorne Road and Rideau Road are summarized in Table 1 (refer to Appendix 'A' for copies of the Rational Method Design Sheets for the 1:10 year and 1:100 year storm events).

Table 1 - Summary of Peak Flow Rates

Description	Peak Flows (L/s)	
	10 Year	100 Year
Hawthorne Industrial Park (HIP)	5,422	12,814
Hawthorne Road / Rideau Road	3,192	5,417

2.2 Design Criteria

The municipal infrastructure associated with the HIP was designed using the following criteria:

- The HIP open ditch system was sized with sufficient capacity to convey, under free-flowing conditions, the 1:100 year peak flow rate, as calculated by the Rational Method (refer to Appendix 'A' for a copy of the 1:100 year Design Sheet).

- The Hawthorne Road open ditch system was sized with sufficient capacity to convey, under free-flowing conditions, the 1:100 year peak flow rate, as calculated by the Rational Method (refer to Appendix 'A' for a copy of the 1:100 year Design Sheet).

- The existing downstream ditch system along Rideau Road was evaluated to ensure sufficient capacity to convey, under free-flowing conditions, the 1:100 year peak flow rate, as calculated by the Rational Method (refer to Appendix 'A' for a copy of the 1:100 year Design Sheet).

- The culverts included in the HIP and along Hawthorne Road/Rideau Road were sized with sufficient capacity to convey the 1:10 year peak flow rate without overtopping the roadway embankment (refer to Appendix 'A' for a copy of the 1:10 year Design Sheet).

- Given that the receiving watercourse was found to shelter fisheries, the SCSS recommended that a "normal" level of protection be achieved for quality control. To fulfill this requirement, industrial sites must direct runoff to an appropriately sized oil/grit separator unit before stormwater can be conveyed off site to the open roadside ditch/culvert system. To achieve quality control for the internal roads, it is proposed to provide infiltration storage volume in the roadside open ditch system, as per the requirements presented in Table 3.2 of the SWMPDM.

- The SCSS recommended that the erosion potential be maintained to current levels for the receiving water course. To fulfill the above requirement, the two year post-development peak flow will be controlled to 50% of the pre-development peak flow rate.

- Storage volume is to be implemented for the control of the post-development peak flows to pre-development levels for storm events ranging from a 1:2 year to a 1:100 year recurrence to comply with the recommendations of the SCSS.

This Stormwater Management Report (SWMR) has been written to demonstrate that the subject land could be developed in compliance with the above surface water criteria and also prepared in accordance with the SWMPDM. The proposed stormwater management strategy for the HIP was developed to meet a "normal" level of protection, which corresponds to a standard approach used in land development to obtain a targeted TSS removal rate of 70%.

3.0 STORM SERVICING

3.1 General

Peak flow estimation is an important task that is carried out for any proposed development. There are several reasons that explain why flood flow rates are computed as part of site development. The main purpose of these calculations, however, is to allow for the proper configuration and sizing of the proposed conveyance systems to minimize the risk of flooding.

Drainage works are designed for a real or hypothetical storm event that may or may not happen during the lifetime of the facilities. At the onset of the design process, design criteria are adopted that may vary with the type of project, in recognition of the impacts of failure. For this particular project, the level of protection adopted (storm events up to a 1:100 year recurrence) was based on design storm characteristics of an infrequent storm event having a low probability to occur.

3.2 Description of Conveyance Systems and Design Basis

Flowing water can be conveyed to an outlet by either open-channel flow or pipe flow. Storm runoff generated by the subject lands is to be collected and conveyed by a roadside ditch/culvert system before discharging to Findlay Creek via an end-of-pipe stormwater management facility (SWMF).

Sizing of the conveyance systems was carried out using various levels of service. The open ditch system was sized with sufficient capacity to convey, under free-flowing conditions, storm runoff up to the 1:100 year recurrence, while roadway culverts were sized to provide conveyance of the 1:10 year peak flow rates without overtopping the roadway embankments.

As part of this sizing exercise, Storm Drainage Area Plans were prepared and included in this Report (refer to Drawing D-ST1 for the HIP and Drawing D-ST2 for Hawthorne and Rideau Road) that show the delineated area for each of the conveyance segments (i.e., from node location to node location), along with its assigned runoff coefficient (C-factor) based on the type of surface. Since the final development of Hawthorne Industrial Park is unknown at this time, a conservative on-site runoff coefficient (C-factor) of 0.70 was used. Table 2 illustrates the breakdown of a typical site that would generate a weighted runoff coefficient of 0.70.

Table 2 - Typical Potential Land Use Breakdown

Type of Surface	Area (%)	C-Factor
Building	10	1.0
Asphalt Parking	35	0.90
Gravel	35	0.70
Grass	20	0.20
Overall	100	**0.70**

It should be noted that the C-factors shown on the Storm Drainage Area Plans denote those associated with 1:10 year peak flow calculations. As recommended in Section 5.4.5.2.1 of the City of Ottawa's Sewer Design Guidelines, C-factors shown on drawings were increased by 10% and 25% for the 1:25 year and 1:100 year peak flow calculations, respectively (refer to Appendix 'A' for copies of the Rational Method Design Sheets).

3.2.1 Open Ditch System

An open ditch channel is a conduit used to convey flowing water from one location to another, with a free surface. A channel can be classified as either artificial (i.e., manmade) or natural. Artificial channels are those constructed or developed as a result of human activity. This type of conveyance system is usually implemented as a long and mild-sloped channel built in the ground, which provides conveyance of water between two points, with sections of regular geometry and shape. An open ditch system is generally designed to follow site topography and the vertical profile of the adjacent roadway. The most commonly used shapes for open channel ditches are trapezoidal and triangular, with the latter shape utilized mainly for ditches servicing small drainage areas.

The open ditches associated with the HIP and Hawthorne Road were sized with sufficient capacity to convey 1:100 year peak flow rates. As previously noted, the Rational Method Design Sheets (refer to Appendix 'A' for copy of the 1:100 year design sheet) were used to quantify the 1:100 year peak flow rates. The open ditch configuration was carried out utilizing Manning's relationship, along with the proposed geometry and slope of the channel. Two Storm Drainage Area Plans were prepared (refer to Drawings D-ST1 and D-ST2) showing proposed ditch inverts that match those shown on the Rational Method Design Sheets. Based on the ditch sizing exercise, it was determined that triangular shape ditches with 3:1 side slopes and variable depths provided the necessary conveyance of the 1:100 year peak flow rate. The Site Servicing and Grading Plan (refer to Drawing SG) was developed to provide the configuration of open ditch segments.

The existing open ditches along Rideau Road were also evaluated to ensure sufficient capacity was able to convey the 1:100 year peak flow rates resulting from upstream construction works (i.e., construction of Hawthorne Road). The Rational Method Design Sheets (refer to Appendix 'A' for copy of the 1:100 year design sheet) were used to quantify the 1:100 year peak flow rates. An existing 900 mm diameter culvert crossing under Hawthorne Road conveys flow along the north side of Rideau Road (refer to Drawing D-ST2). The capacity of this existing culvert was estimated at 1,400 L/s under a 1.5 m headwater (refer to Appendix 'B' for Culvert Design Summary Table). Upon the review of existing topography, any headwater depths greater than 1.5 m resulted in runoff being directed northerly along Hawthorne Road towards Findlay Creek. In light of the above, the existing open ditches along Rideau Road were evaluated using a conservative plug flow of 1,400 L/s in addition to surface runoff generated by the contributing areas.

3.2.2 Culvert System

The principal function of a culvert is to convey water through an embankment while, at the same time, supporting the weight of the overlying fill and vehicular movement. Culverts can be made of many different materials; steel, polyvinylchloride (PVC), high density polyethylene (HDPE) and concrete. Culverts selected for the HIP and Hawthorne Road are made of corrugated steel, in either round or arch shape. Field observations have shown that there are two major types of culvert flow conditions: inlet control and outlet control.

1. Flow Under Inlet Control

Flow with inlet control means that the discharge capacity of a culvert is controlled at the culvert entrance by the depth of headwater and by the entrance geometry, including the barrel shape, cross sectional area and the type of inlet edge. The roughness and length of the culvert barrel, and the outlet conditions are not factors in determining the culvert capacity. The longitudinal slope reduces headwater only to a small degree and can normally be neglected for conventional culverts flowing in inlet control.

2. Flow Under Outlet Control

Flow with outlet control means that the discharge capacity of a culvert is controlled by the depth of tailwater, including the velocity head within the barrel, the entrance and friction losses. The roughness, length of the culvert barrel, and slope are factors in determining the culvert capacity; the inlet geometry is of lesser importance.

To avoid having to conduct detailed hydraulic computations that would determine the type of flow under which a culvert will probably operate, the procedure recommended by the MTO (refer to MTO's Drainage Management Manual) was utilized. This methodology, referred to as the Conventional Culvert Design procedure, requires that MTO's Design Charts and Design Nomographs be used for both inlet and outlet control conditions. The higher headwater depth that is calculated from those two operating conditions would indicate the type of control and would provide the governing headwater depth. This methodology was utilized to size each culvert crossing, along with the 1:10 year peak flow rates calculated by the Rational Method Design Sheets (refer to Appendix 'A') for each of the conveyance segments. Furthermore, this calculation sheet also provides proposed culvert sizes, along with the type of control and governing depth found when using the conventional culvert design procedure. A summary of the various parameters estimated using MTO's nomographs at each of the culverts has been tabulated using MTO's Form D4-I (refer to Appendix 'B' for Conventional Culvert Design Sheet). This analysis shows that the proposed culvert crossings within the HIP and along Hawthorne Road are capable of conveying the 1:10 year peak flow rates as a minimum, without overtopping any of the roadway embankments. The hydraulic calculations were carried out assuming a roughness coefficient of 0.024 for any of the CSP and CSPA culverts. The Site Servicing and Grading Plan (Drawing SG) shows proposed culvert sizes, lengths and invert elevations at each of the crossings.

The proposed 1030 x 740 mm CSPA culvert crossing under the entrance of the pond access road was of concern due to the high flow rate during the 1:100 year storm event.

There was a possibility that the excess flow overtopping this culvert could short circuit into SWMF via the pond access road. Therefore, an analysis of the flow overtopping the proposed entrance culvert was conducted and the results confirmed that the residual flow would indeed be contained within the right-of-way corridor (refer to Appendix 'J' for desktop calculation).

4.0 WATER BALANCE

Water balance analyses are typically carried out to assess any changes in infiltration to subsurface water-bearing zones as a result of the urbanization (i.e., increase of hard surfaces) of land. The SCSS has identified the need to maintain a necessary level of quantity and quality groundwater recharge via infiltration. Groundwater recharge is required to maintain subsurface base flow to streams and wetlands in addition to maintaining groundwater levels for private and municipal wells. The Hydrogeological Study completed by Golder Associates Limited in 2008 for the HIP identified the site as being underlain by a shallow and deep aquifer separated by an impermeable rock layer. The upper aquifer provided subsurface groundwater flow to streams, while the lower aquifer was the main source for well water supply. Therefore, groundwater recharge for this site was intended to provide subsurface base flow into the receiving Findlay Creek.

Construction fill operations have been active for the HIP since 1994. The results of the geotechnical field investigation conducted by Inspec-Sol Incorporated in 2008 indicates that as much as 5.5 m of fill material (MW7-08) has been placed on parts of the site. The non-native heterogenous fill material is comprised mainly of silty clay and contains trace amounts of road and construction materials. Although the soil component of the fill material exhibits the characteristics of silty clay, the varying composition and density of the remaining portion of the fill affects its permeability in localized areas. Given the above existing conditions, it is difficult to determine how groundwater recharge will behave as subsurface flow in the existing fill matrix, particularly from individual sites within the HIP. The MOE expressed concerns about the use of infiltration strategies on the individual sites given the past history as a construction fill site. Furthermore, the MOE SWMPDM does not endorse the use of infiltration basins on lands zoned for industrial use as there is an increased risk of groundwater contamination should a spill occur on site.

An option was considered to provide infiltration for the entire site at the base of the end-of-pipe Dry Pond facility. Upon further investigation, the geotechnical report indicated that there was a high groundwater table at the proposed pond location. In addition, in-situ soils in the area exhibited poor drainage properties which would have resulted in long retention times at the base of the pond, making it difficult to meet the water balance deficit requirements for the entire site while attempting to mimic the pre-development hydrological cycle.

Representatives from the City and SNC were consulted, and it was concluded that the SCSS groundwater balance targets for this site would be difficult to meet. It was also recognized that on-site infiltration strategies for this industrial subdivision could have a detrimental effect on groundwater quality and jeopardize the natural ecological integrity of receiving waters. In light of the above, it was decided by the approval authorities that the requirement for the water balance would be waived for the HIP development.

5.0 WATER QUALITY

5.1 General

Urbanization has been found to modify the hydrological regime of a receiving stream if inadequate stormwater management measures are implemented. The potential impacts associated with runoff arise primarily from the amount of urban area that is impervious to rain and snowmelt water. These impervious surfaces increase the amount of direct surface runoff that is generated and is conveyed more efficiently to the receiving stream. As part of the SCSS, fisheries resources have been inventoried along this watercourse, along with its associated tributaries. Given that the receiving watercourses were found to shelter fisheries, the approved document recommended that a "normal" level of protection be achieved. To fulfil this requirement, it is proposed that each individual site provide an oil/grit separator and infiltration storage be provided within the roadside open ditch system, as per the requirements presented in the SWMPDM.

5.2 Water Quality Requirement

Stormwater servicing for the HIP has been developed in accordance with the water quality recommendations of the SCSS (70% TSS removal). To fulfil this requirement, individual sites will be required to provide an oil/grit separator be installed to provide quality treatment (i.e., 70% TSS removal) of surface runoff before entering the roadside open ditch/culvert system. In addition, the oil/grit separator will be able to capture and contain hydrocarbons in the event of an on-site accidental spill.

To fulfill the water quality objectives for the paved portion of the HIP internal roads, it is proposed to provide infiltration within the open roadside ditch system to meet the storage volume requirements presented in Table 3.2 of the SWMPDM. Based on the normal level of service required and an imperviousness of 100% for the internal roads, Table 3.2 yields an extrapolated storage volume requirement of 35 m^3/ha. To achieve this storage volume, a clear stone envelope complete with a 200 mm diameter perforated pipe will be installed at the base of the roadside ditches to meet the required storage volume (Refer to Appendix C for calculations).

The following table presents the calculated infiltration volume required for water quality control and those provided by the roadside open ditch system to meet the recommended MOE Design Guidelines.

Table 3 - Water Quality Infiltration Requirements

Phase	Area (ha)	Infiltration Volume Requirement (m^3)	Infiltration Method	Length of 200 mm diameter Perf. Pipe (m)	Infiltration Volume Provided (m^3)
1	1.58	55.1	Open Ditch	1760	55.3
2	0.21	7.4	Open Ditch	240	7.5
Total	1.79	62.5	Open Ditch	2000	62.8

As shown in the above Table, the infiltration volume provided by the proposed open roadside ditch network (62.8 m^3) exceeds that obtained from Table 3.2 (62.5 m^3) of the SWMPDM. It should be noted that additional storage within the void space of the clear stone envelope was not accounted for and would increase the actual infiltration storage volume shown in Table 3.

6.0 HYDROLOGICAL ANALYSIS

6.1 General

To satisfy the surface water objectives presented in Subsections 1.3 and 2.2, a hydrological analysis was carried out to quantify peak flow rate variations resulting from the development of the proposed HIP. To quantify this variation, the SWMHYMO Stormwater Management Hydrological Model (Version 4.02, July, 1999) was utilized to calculate peak flows during severe storm events.

To carry out the hydrological analysis, three storm drainage plans were developed; one representing the pre-development drainage conditions, one representing the post-development conditions for the current study area, Phase 1, and the other for the post-development drainage conditions, including future development, Phase 2. For each of these plans, subwatershed boundaries were delineated based on existing topography of the site and the proposed overland flow direction following development of the site (refer to Figures 2, 3 and 4 for details).

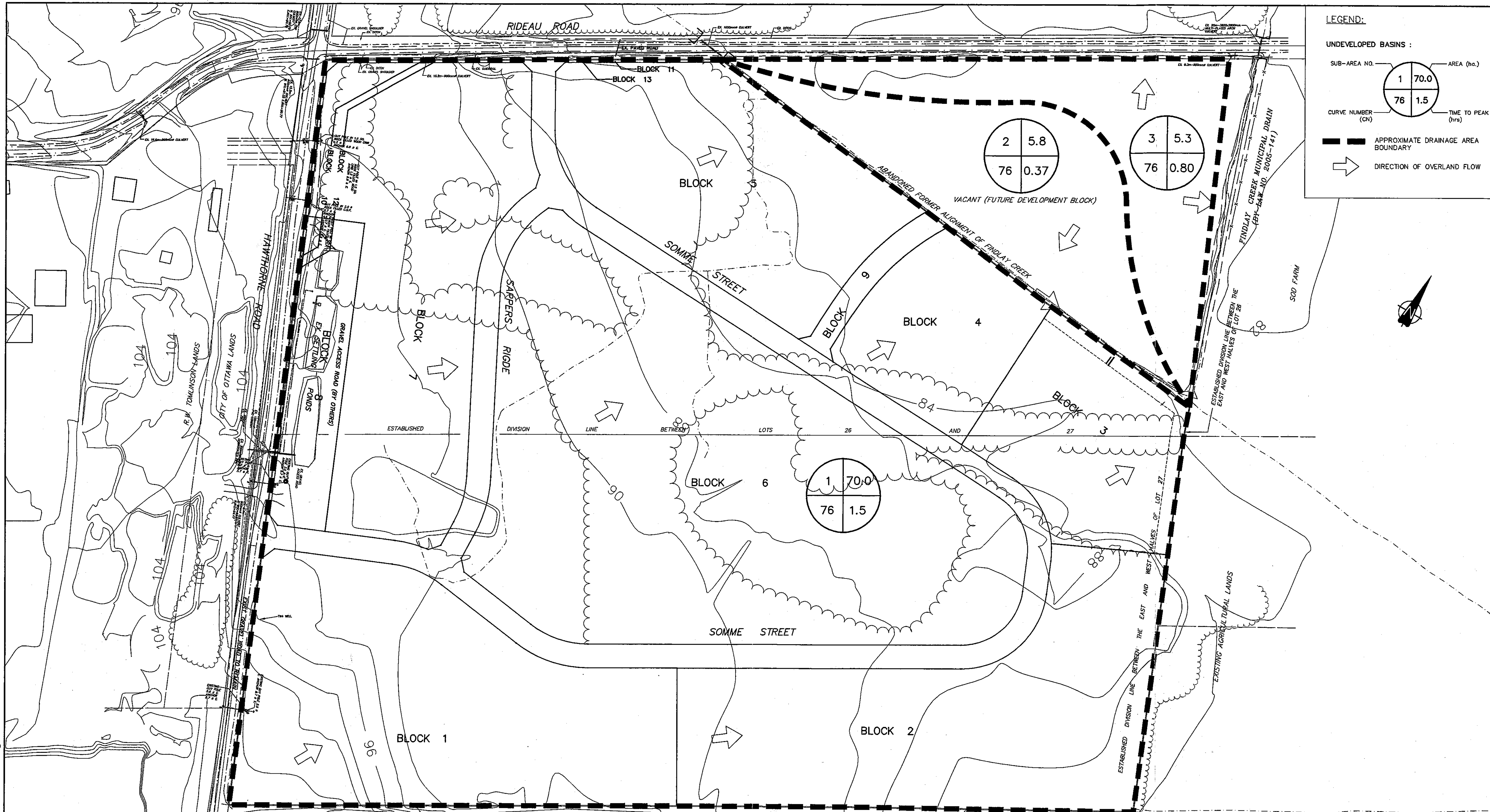
6.2 Synthetic Design Storm Simulation and Hydrological Parameters

Peak runoff rates were calculated for both pre- and post-development conditions using synthetic design storm event modelling. Peak flow rates were estimated using the 3-hour Chicago Design Storm Event, as this synthetic storm event has been recognized as the most critical event for urban runoff applications (refer to Section 5.4.3.1 of the City of Ottawa's Sewer Design Guidelines). The design storm analysis was completed using volumes derived from the Intensity-Duration-Frequency (IDF) curve equation shown in Section 5.4.2 of the City of Ottawa Sewer Design Guidelines compiled using data from 1967 to 1997.

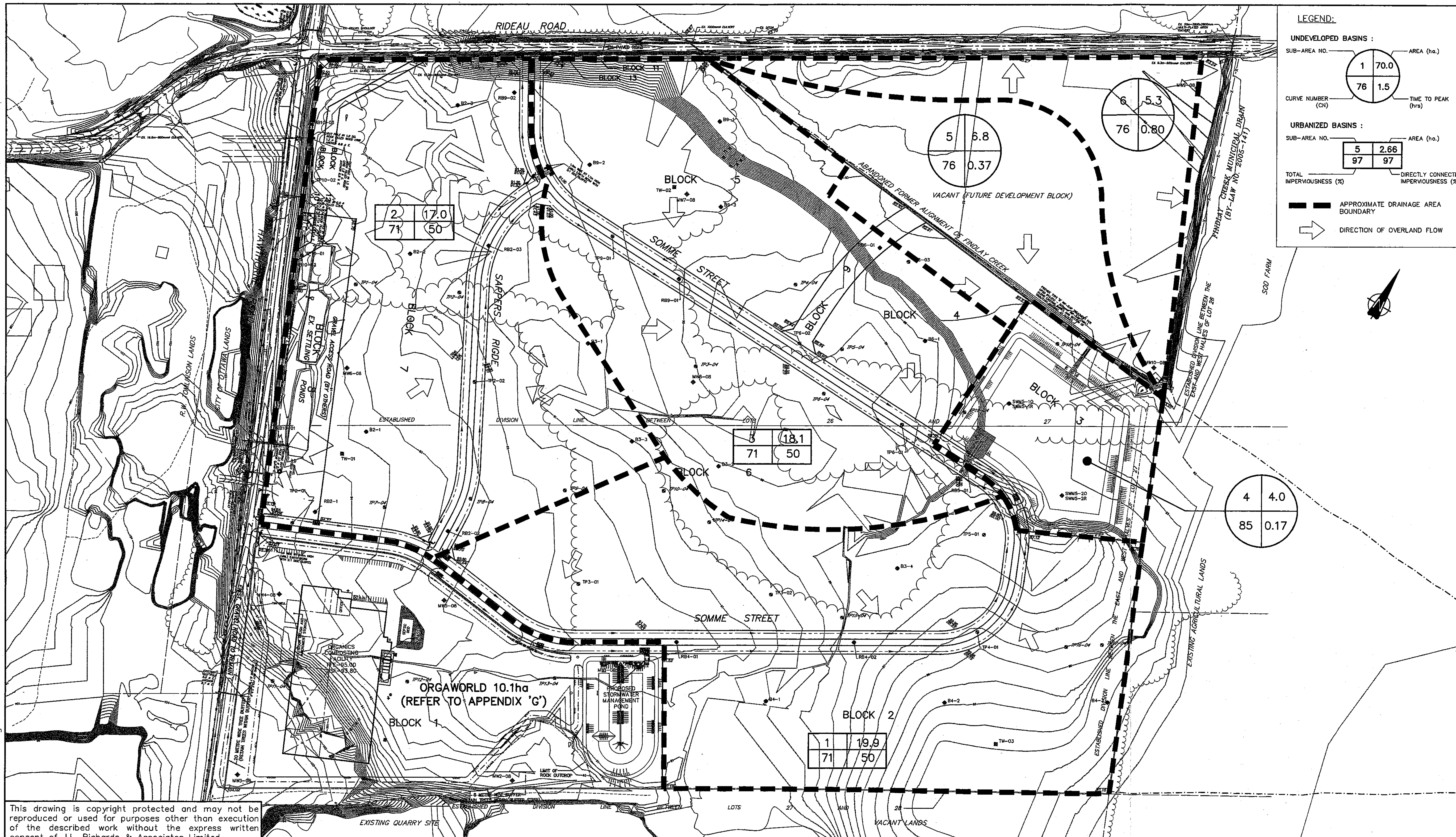
A SWMHYMO data file was developed to represent both pre- and post-development conditions of the subject area. Simulation of surficial runoff generated from undeveloped subwatersheds was carried out using the "DESIGN NASHYD" command along with the SCS procedure to compute rainfall losses. The SCS procedure uses the Curve Number (CN) method to compute rainfall losses and the Nash unit hydrograph to simulate the hydrological response from undeveloped watersheds. To simulate surface runoff from urban subwatersheds, the "CALIB STANDHYD" command was utilized. Hydrological parameter selection and methodology is described below:

Curve Number (CN)

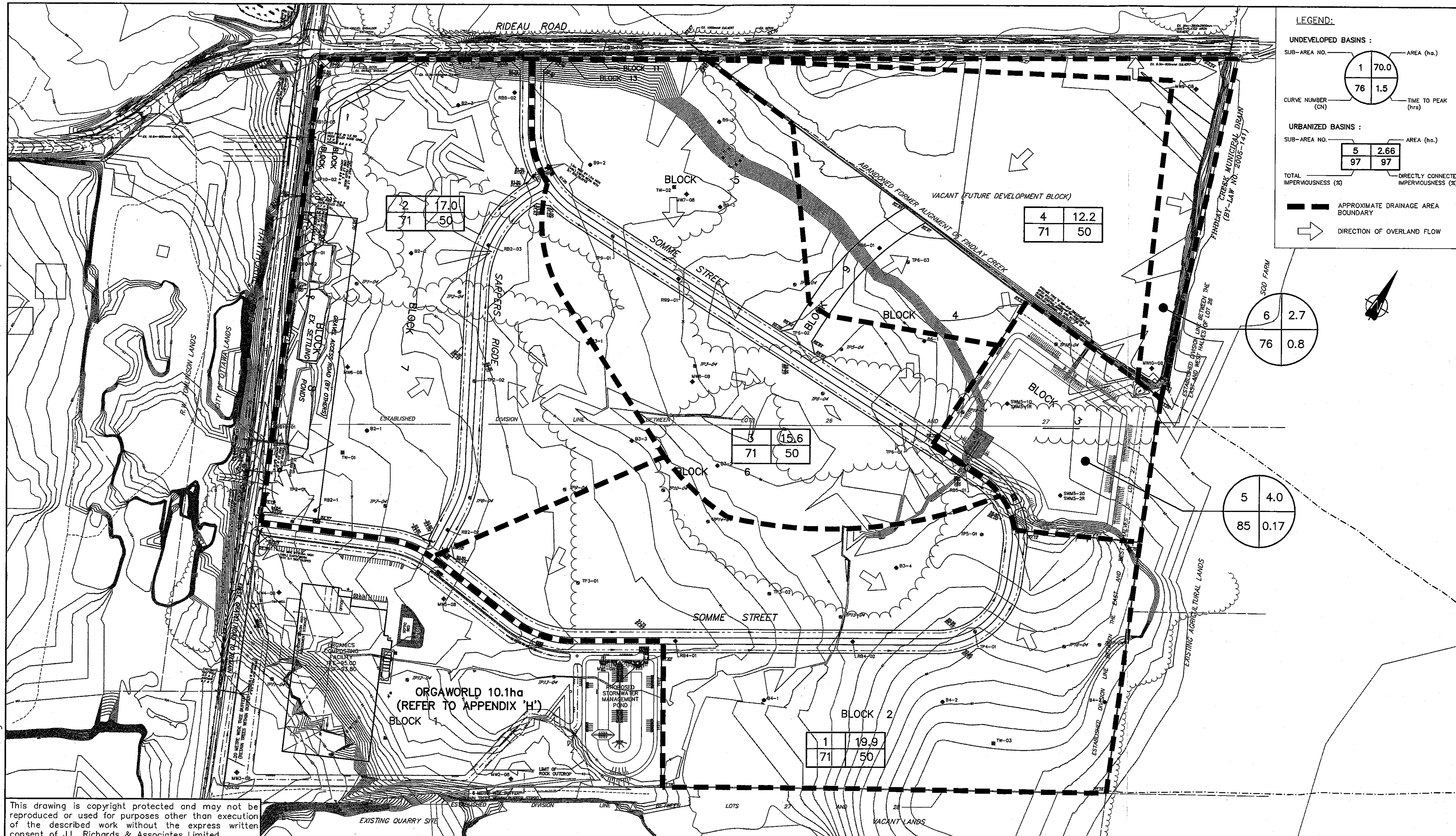
In order to estimate a Curve Number that represents pre-development conditions, the geotechnical investigation completed by Inspec-Sol, entitled "Geotechnical Study Subdivision Plan, Hawthorne Industrial Park, Lots 26 and 27 Concession 6, Southeast of Hawthorne and Rideau Roads, Ottawa, Ontario" dated December 19, 2008 was used. At the time of this investigation, large amounts of fill material were encountered over the majority of the site, which does not reflect the pre-development conditions. As such, only native soils encountered below fill material were used to establish pre-development condition Curve Numbers. The review of the geotechnical investigation shows native



PROJECT:	DRAWING:			DRAWING NO.:
HAWTHORNE INDUSTRIAL PARK	PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN	J.L.Richards ENGINEERS·ARCHITECTS·PLANNERS J.L. Richards & Associates Limited 864 Lady Ellen Place Ottawa, ON Canada K1Z 5M2 Tel: 613 728 3571 Fax: 613 728 6012	DESIGN: M.B. DRAWN: ARM CHECKED: G.F. PLOTTED: Apr 30, 2009	FIGURE 2 JLR NO: 20983



PROJECT:	DRAWING:		DESIGN: M.B.	DRAWING NO.:
HAWTHORNE INDUSTRIAL PARK	POST DEVELOPMENT – PHASE 1 STORM DRAINAGE AREA PLAN	J.L.Richards ENGINEERS·ARCHITECTS·PLANNERS	DRAWN: ARM	FIGURE 3
		J.L. Richards & Associates Limited 864 Lady Ellen Place Ottawa, ON Canada K1Z 5M2 Tel: 613 728 3571 Fax: 613 728 6012	CHECKED: G.F.	JLR NO:
			PLOTTED: Apr 30, 2009	20983



PROJECT:	DRAWING:		DESIGN: M.B.	DRAWING NO.:
HAWTHORNE INDUSTRIAL PARK	POST DEVELOPMENT – PHASE 2 STORM DRAINAGE AREA PLAN	J.L.Richards ENGINEERS·ARCHITECTS·PLANNERS	DRAWN: ARM	FIGURE 4
		J.L. Richards & Associates Limited 864 Lady Ellen Place Ottawa, ON Canada K1Z 5M2 Tel: 613 728 3571 Fax: 613 728 6012	CHECKED: G.F.	JLR NO: 20983
			PLOTTED: Apr 30, 2009	

soils ranging from silty sand in Blocks 4 and 5, to silty clay in Blocks 3, 5, 7 and 8, to sandstone and limestone in parts of Blocks 2 and 3. These soils have been classified by Inspec-Sol as being associated with hydrologic soil groups (HSG), ranging from "B" to "D" for silty sand to silty clay, respectively. Areas where rock was encountered (i.e., Sandstone and Limestone) were classified as "Rockland." Based on this information and current land usage, as interpreted from aerial photography, a pre-development Curve Number (CN) of 76 has been calculated using the Ministry of Transportation of Ontario (MTO) Chart H2-8. Detailed calculations for the HIP have been included in Appendix 'D'.

Under post-development conditions, it is proposed to provide sufficient grade differential to allow for positive drainage to meet City of Ottawa Design Standards. As the subject lands are to be developed as an Industrial Park with a significant increase in hard surfaces (i.e., buildings, asphalt and gravel), the post-development conditions were, therefore, analysed taking into consideration the low potential of these surfaces to infiltrate storm runoff.

Imperviousness

Surface runoff under post-development conditions is greatly impacted by the imperviousness of its tributary area. Since the final development of the HIP is unknown, a conservative assumption for typical surfaces encountered in similar industrial parks was developed, as illustrated in Table 2. To determine the imperviousness based on the assumed breakdown presented in Table 2, an imperviousness calculation was carried out and is presented in Appendix 'D'. The imperviousness calculation was based on the following assumptions:

- an imperviousness of 100% was assigned for building footprints;
- an imperviousness of 100% was assigned for all asphalt parking surfaces.
- an imperviousness of 70% was assigned for all gravel surfaces; and
- it was assumed that 50% of the total imperviousness (TIMP) 50 % was modelled as directly connected imperviousness (XIMP).

Based on the above, a total imperviousness of 70% was calculated, which is equivalent to a runoff coefficient of 0.7. The hydrological analysis was, therefore, carried out using a total imperviousness of 70%, consistent with the runoff coefficient used for sizing the open ditch/culvert system.

Time to Peak (T_p)

Time to peak calculations were carried out under pre-development conditions. Time of concentration was first estimated using the Uplands Method Chart based on the various flow paths. Once calculated, the times to peak were set to 67% (i.e., 2/3) of the time of concentration (T_c). Under pre-development conditions, a 90 minute time to peak was calculated (refer to Appendix 'D' for calculations). When modelling post-development conditions, the "CALIB STANDHYD" command was used to calculate the time to peak associated with the proposed site surfaces and grades (refer to Appendix 'E' for SWMHYMO outputs).

6.3 Simulation of Pre- and Post-Development (Uncontrolled) Conditions

The hydrological analysis was carried over the entire HIP under both the pre- and post-development conditions. As stated in Section 6.1, two post-development conditions were investigated, namely, Phase 1 and Phase 2. Phase 1 evaluates servicing for the current Study area, while Phase 2 includes the current Study area along with servicing of an additional 11.2 ha of land to the north east, shown on drawings as "Future Development Block."

Peak flow rates were computed with SWMHYMO using the procedure and parameters described in Subsection 6.2. Table 4 presents the simulated peak runoff rates under a 3 hour Chicago design storm event for both the pre- and post- (uncontrolled) development conditions for the HIP (refer to Appendix 'E' for SWMHYMO data input and output files), along with those under a 4 hour - 25 mm storm.

Table 4 - SWMHYMO Simulation Results

Return Period or Storm Depth	Peak Flow Rates (L/s)		
	Pre-Development	Phase 1 Post-Development (Uncontrolled)	Phase 2 Post-Development (Uncontrolled)
25 mm	252	1,941	2,231
2	467	3,077	3,548
5	826	4,812	5,554
10	1,097	6,135	7,029
25	1,468	7,772	9,013
50	1,767	9,240	10,588
100	2,093	10,662	12,132

Simulation results presented in the above table show that uncontrolled post-development peak flows substantially exceed those obtained under pre-development conditions. Based on the design criterion for water quantity (refer to Subsections 1.3 and 2.2 for details), post-development peak flows should be maintained to their pre-development levels for storm events ranging from a 1:5 year to a 1:100 year recurrence. In addition, the 2-year post-development peak flow should be controlled to 50% of the 2-year pre-development peak flow to satisfy the erosion criterion. Water quantity control measures were, therefore, found to be necessary for the development of this site. Details and stormwater servicing approaches proposed to fulfil the design criteria listed in Subsections 1.3 and 2.2 are presented in the following Subsections.

6.4 Simulation of Phase 1 Post-Development (Controlled) Conditions

Development of the subject lands (i.e., 70 ha, as illustrated on Figure 3) will increase the imperviousness of the subject area. To achieve the surface water objectives listed in Subsections 1.3 and 2.2, it is proposed that an end-of-pipe facility be constructed that would provide storage volume for retention of runoff.

The stormwater management criteria for the development of the HIP consist of maintaining erosion potential and peak flow rates at the pre-development levels. Storm servicing of the Subdivision was, therefore, developed such that all of these requirements were fulfilled, along with the achievement of a "normal" protection level. It is proposed to implement the following stormwater management servicing approach for the development of the HIP:

End-of-Pipe SWMF (Block 3)

Based on the proposed grading, the end-of-pipe facility was found to generate a volume of 37,240 m^3 (3.25 m depth). A low flow ditch sized for 2 year storm events was also included in the bottom of the end-of-pipe facility to convey flows to the outlet structure. The configuration of the outlet structure would be as follows:

- 1 x 150 mm diameter orifice within a 200 mm diameter Polyvinyl Chloride (PVC) pipe at elevation 82.90 m, which serves as outlet to the facility;

- 2 x 600 mm diameter Corrugated Steel Pipe culvert at elevation 84.80 m, which also serves as outlet to the facility;

- One (1) emergency overflow spillway (6.0 m wide) at elevation 86.15 m, which serves as outlet to the facility during a storm event greater than 1:100 year.

The above configuration was used to develop a Stage-Storage-Discharge relationship that relates the storativity and outlet capabilities of the proposed facility at various geodetic elevations (refer to Appendix 'F' for copy of this Table). This data (storage-discharge table) was then used as input to the SWMHYMO's ROUTE RESERVOIR command.

A SWMHYMO file, representing the post-development controlled conditions of the HIP, was developed incorporating the storage volume and the outflow capability of the proposed end-of-pipe facility. The following table presents the simulated peak runoff rates for the three (3) hour Chicago design storm under the post-development controlled conditions (refer to Appendix 'G' for SWMHYMO data input and output files), along with those under the four (4) hour - 25 mm storm.

Table 5 - SWMHYMO Simulation Results
(Post-Development - Phase 1 Controlled Conditions)

Return Period or Storm Depth	Peak Flow Rates (L/s)	
	Pre-Development	Phase 1 Post-Development (Controlled)(1)
25 mm	252	127
2 year	467	194(2)
5 year	826	359
10 year	1,097	589
25 year	1,468	939
50 year	1,767	1,191
100 year	2,093	1,531

Note: (1) Post-development flow is the sum of flows from the end-of-pipe facility and two uncontrolled Sub-Areas totalling 12.1 ha.

(2) 2 year post-development peak flow less than half the 2-year pre-development peak flow (233 L/s).

Simulation results presented in Table 5 show that the Phase 1 post-development controlled peak flows will be maintained below pre-development levels for the HIP. Consequently, the water quantity objective defined in Subsections 1.3 and 2.2 will be met under Phase 1.

6.5 Simulation of Phase 2 Post-Development (Controlled) Conditions

Development of Phase 2, as depicted on Figure 4, includes the Future Development Block located in the northeast corner of the HIP. This additional land could be serviced by the previously proposed end-of-pipe facility, without any modifications to facility size or outlet structure. However, a second inlet would be required in the northeast corner of the facility, which could be designed during the detailed design stage of the Future Development Block.

A SWMHYMO file, representing the Phase 2 post-development controlled conditions of the HIP, was developed incorporating the storage volume and the outflow capability of the proposed end-of-pipe facility. The following table presents the simulated peak runoff rates for the three (3) hour Chicago design storm under the Phase 2 post-development controlled conditions (refer to Appendix 'H' for SWMHYMO data input and output files), along with those under the four (4) hour - 25 mm storm.

Table 6 - SWMHYMO Simulation Results
(Post-Development - Phase 2 Controlled Conditions)

Return Period or Storm Depth	Peak Flow Rates (L/s)	
	Pre-Development	Phase 2 Post-Development (Controlled)(1)
25 mm	252	73
2 year	467	156(2)
5 year	826	457
10 year	1,097	729
25 year	1,468	1,051
50 year	1,767	1,348
100 year	2,093	1,515

Note: (1) Post-development flow is the sum of flows from the end-of-pipe facility and one uncontrolled Sub-Area totalling 2.7 ha.

(2) 2-year post-development peak flow less than half the 2 year pre-development peak flow (233 L/s).

Simulation results presented in Table 6 show that the Phase 2 post-development controlled peak flows will be maintained below pre-development levels for the HIP. Consequently, the water quantity objective defined in Subsections 1.3 and 2.2 will also be met under Phase 2.

6.6 Simulation of the July 1, 1979 Historical Storm Event and Flood Potential

6.6.1 Simulation of the July 1, 1979 Historical Storm Event

In addition to designing the major drainage system to convey the 1:100 year storm event, the performance of both the open ditch system and SWMF was also assessed under the July 1, 1979 historical storm event. This historical storm event is defined as a high volume / low intensity storm event (when compared to the 1:100 year event) which occurred mostly over a three hour period (refer to Table 5.6 in the Ottawa Sewer Design Guidelines). As shown in Table 5.6, the maximum intensity of 106.7 mm/hr only occurred for a 10 minute period (i.e, between the 85 to 95 minute time interval). The 1:100 year storm event intensities used to size the open ditch system were found to exceed the highest intensity of 106.7 mm/hr (refer to Appendix 'A' for 1:100 year Rational Method Sheet) with the exception of the most downstream ditch section (i.e., from Node 19 to Pond) where an intensity of 101.69 mm/hr was rather utilized. If an intensity of 106.7 mm/hr was used, the overall peak flow would increase from 12,814 L/s to 13,430 L/s substantially less than the free-flowing capacity of 52,735 L/s for the proposed ditch configuration. Consequently, the proposed open ditch system has the ability to convey flows generated by the July 1, 1979 storm event.

To supplement the above open ditch analysis, a hydrological analysis was also conducted to assess the performance of the SWMF under the July 1, 1979 storm event. A SWMHYMO file was, therefore, developed for the controlled Phase 2 post-development conditions of the HIP. Simulation results show that the Phase 2 post-development runoff during the July 1, 1979 storm event will be contained within the SWMF with all three of the outlet culverts flowing full in addition to approximately 210 mm of flow depth over the emergency overflow channel (refer to Appendix 'K' for SWMHYMO data input and output files). Therefore, the outlet of the SWMF has sufficient capacity to convey the July 1, 1979 historical storm event via the designated overland flow route without overtopping the banks.

6.6.2 Flood Potential

Draft approval Condition 12 of the draft subdivision conditions by the former Region of Ottawa-Carleton requires that "The owner shall complete a study indicating the extent of potential flooding on the property from Findlay Creek. The study including all models and assumptions shall be to the satisfaction of the South Nation River Conservation Authority." This condition was included as part of the original February 10, 1998 draft conditions (Gloucester File: S-RU-94-03).

Many changes have occurred on-site and adjacent to the site since Condition 12 was included in the draft approval for this site. Improvements to the roadside ditch were made along Rideau Road, immediately adjacent to the site. Surface runoff generated by the lands north of Rideau Road and conveyed to the small tributary located within the HIP site has now been re-directed toward the northeast corner of the site where the existing 3.8 m wide x 2.8 m high multi plate arch culvert crosses Rideau Road. A municipal drainage report was prepared by Stantec Consulting in 2004 for this section of Findlay Creek which assessed the overall geomorphological conditions and provided recommendations for future maintenance. In addition, the SCSS conducted a flood hazard analysis. The 100 year flows from the Stantec model were plotted along the creeks modelled. Floodlines were shown in Figure 6.2.3 of the report. No floodlines were indicated for the section of Findlay Creek adjacent to the HIP site.

As indicated previously in the Section 4 of this Report, as much as 5.5 m of construction fill has been added to the site since 1994. The placed fill material on the site has eliminated the natural low lying areas and raised the site grade approximately 4.5 m above the top of creek bank. The current site grades will be maintained as a minimum for the development of the HIP subdivision. Therefore, we have no concerns about flooding on the property from Findlay Creek given the above changes to the site and improvements to the adjacent drainage network. Consequently, Condition 12 of the draft approval should be considered as being satisfied on the basis that this condition is out of date based on the current site conditions.

7.0 EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION

During construction of the roadway, the collection systems (i.e., ditches, culverts, sewers, etc.) and end-of-pipe facility, appropriate erosion and sediment control measures, as outlined in MNR's "Guidelines on Erosion and Sediment Control for Urban Construction Sites," will be implemented to trap sediment on site. To ensure proper implementation, the proposed measures have been incorporated onto Drawing ESC (Drawing entitled "Erosion and Sedimentation Control Plan"). The measures shown on this Drawing were developed based on topography and site constraints. As a minimum, the following measures will be implemented during construction:

- Supply and installation of straw bale flow check dams (as per OPSD 219.180) at the upstream end of each culvert. Proposed locations of straw bale barriers are indicated on Drawing ESC.

- Supply and installation of topsoil and hydroseed along the entire open ditch system once grading has been completed for a section. Mulching will be carried out immediately after hydroseeding. This will allow for immediate bank stabilization of the system and will prevent sediment ladden from occurring from exposed ditch surfaces.

- Supply and installation of light duty silt fences (as per OPSD 219.110) at the toe of slope surrounding the proposed stormwater management pond (refer to Drawing ESC for details). It is recommended that silt fences also be used to enclose borrow and stockpile areas resulting from topsoil stripping activities or any excavating activities; locations to be determined in the field during grading operations.

- If dewatering and pumping operations become necessary, filtration is proposed using sediment dewatering bags prior to discharge off-site.

All control measures will be carried out in accordance with the following documents:

i) "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs and Housing, and Transportation and Communication, Association of Construction Authorities of Ontario, and Urban Development Institute, Ontario, May 1987.

ii) "Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.

iii) Applicable Regulations and Guidelines of the Ministry of Natural Resources. As a minimum, during the construction of the conveyance systems, the following Stormwater Management Practices will be used:

Any stockpiled material will be kept on flat areas during construction, well away from any natural flow paths. In the event that the stockpile is placed in other areas where potential washoff to the conveyance system is expected, silt fences will be installed to enclose the materials and prevent any washoff to the conveyance system.

8.0 SUMMARY AND CONCLUSION

1. This Stormwater Management Report has been prepared to present a complete approach in achieving the stormwater criteria developed as part of the approved document entitled "Shields Creek Subwatershed Study."

2. Stormwater servicing for the proposed HIP has been designed using the dual drainage concept. Storm servicing will be carried out with the use of an open ditch/culvert system. The open ditch system has been designed to convey the 1:00 year peak flow rates. Similarly, the culverts have been sized to convey the 1:10 year flow without any overtopping.

3. To fulfil the design criteria associated with water quality (as per the SCSS), it is proposed to provide both on-site oil/grit separators and infiltration storage volume within the roadside open ditch system. As per the requirements set out in Table 3.2 of the MOE SWMPDM, a total infiltration volume of 62.5 m^3 is required under Phase 2 to achieve a "normal" level of protection (i.e., TSS removal of 70%).

4. Water balance and infiltration requirements were not implemented due to existing site conditions and proposed industrial use development.

5. The 2-year post-development peak flow will be controlled to 50% of the 2-year pre-development peak flow. Therefore, meeting the SCSS recommendations associated with erosion potential.

6. Simulation results presented in Tables 5 and 6 show that proposed infrastructure will maintain peak flows below pre-development levels for both Phase 1 and Phase 2 of the HIP. Consequently, this design criterion (peak flow control) will be fulfilled.

7. A detailed Erosion and Sedimentation Control Plan has been prepared to reduce the impact of construction activities on Findlay Creek.

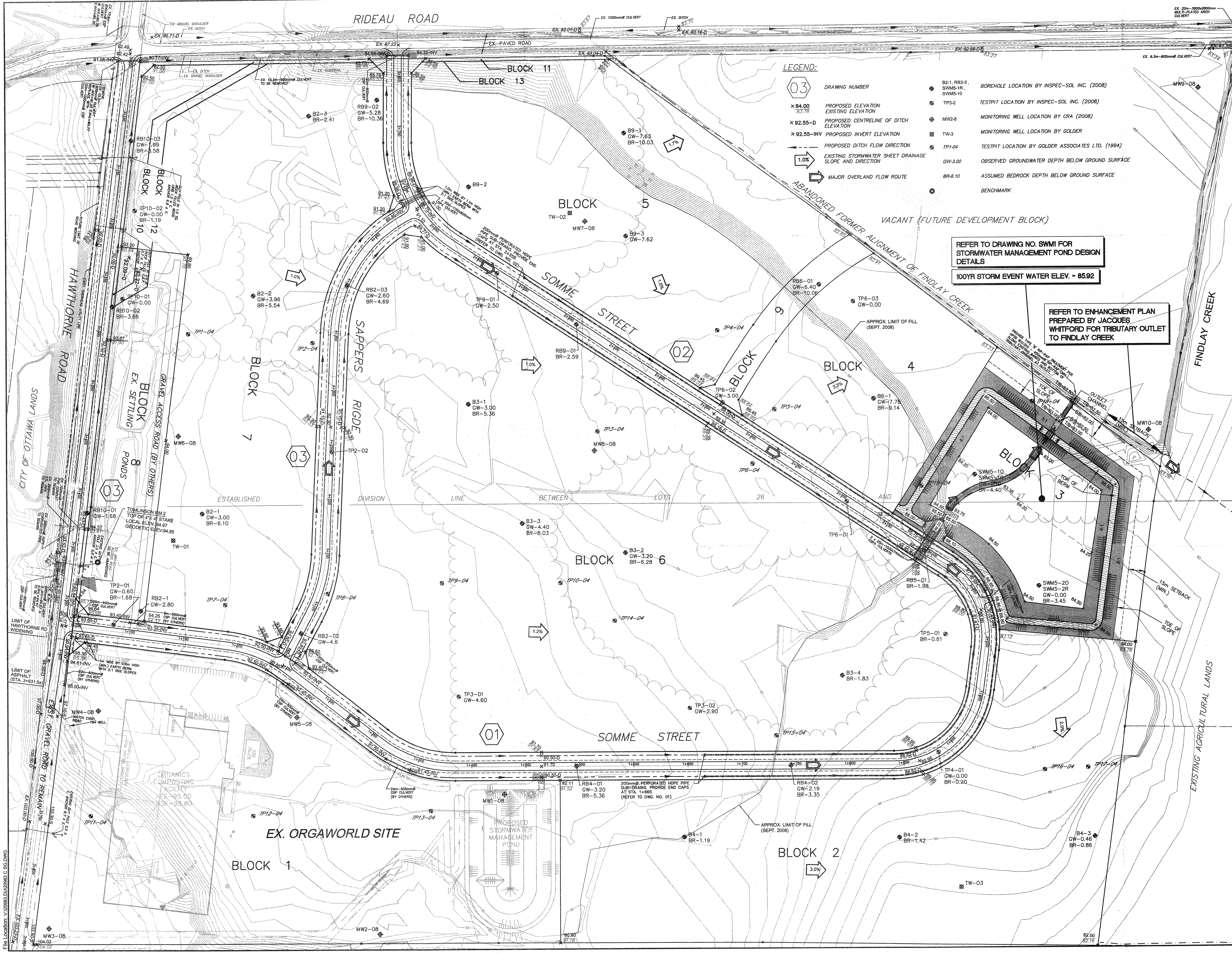
Prepared by: ______________________
Mark Buchanan, E.I.T.

LICENSED PROFESSIONAL ENGINEER
May 29/09
J. S. G. FORGET
PROVINCE OF ONTARIO

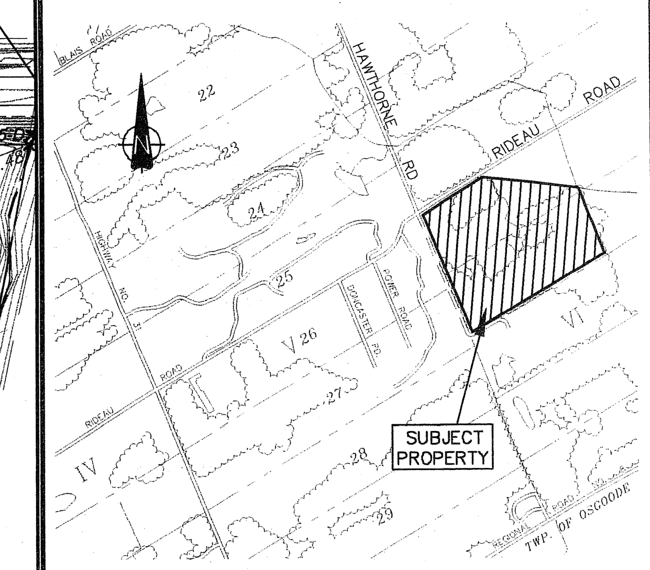
Reviewed by: ______________________
J.S. Guy Forget, P.Eng.

LICENSED PROFESSIONAL ENGINEER
D. P. UPTON
PROVINCE OF ONTARIO

Reviewed by: ______________________
Derrick Upton, P.Eng.



Key Map



NOT TO SCALE

GENERAL NOTES:

1. HAWTHORNE INDUSTRIAL PARK DRAWINGS TO BE READ IN CONJUNCTION WITH THE GEOTECHNICAL INVESTIGATION REPORT No. T020556–A1 PREPARED BY INSPEC–SOL DATED JANUARY 30, 2009.
2. A GEOTECHNICAL ENGINEERED LICENSED IN THE PROVINCE OF ONTARIO IS TO INSPECT ALL SUBGRADE SURFACES FOR FOOTINGS AND PAVEMENT STRUCTURES PRIOR TO CONSTRUCTION.
3. ALL MATERIAL AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS) AND CITY OF OTTAWA GUIDELINES.

NO.	ISSUE	DATE
3	ISSUED FOR M.O.E. APPROVAL	28/05/09
2	REVISED PER CITY COMMENTS	30/04/09
1	ISSUED FOR CITY APPROVAL	12/02/09

SCALE: 1:1500

0 25 50 75 100

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PROJECT NORTH

PROJECT:

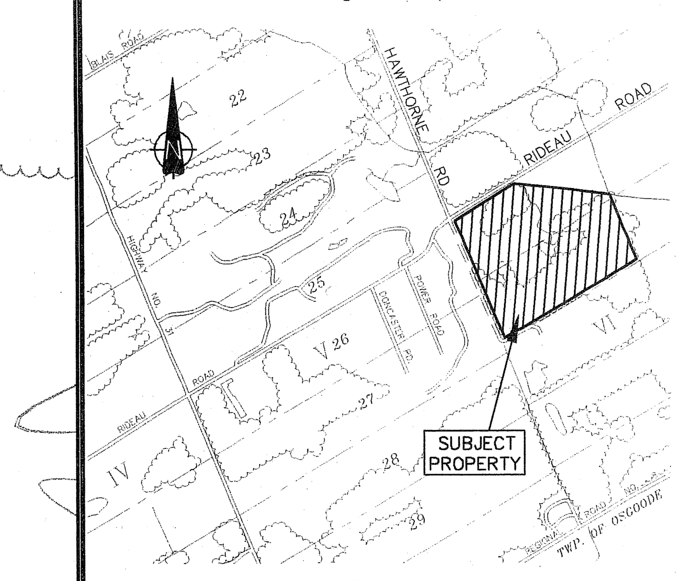
HAWTHORNE INDUSTRIAL PARK

DRAWING:

SITE SERVICING AND GRADING

DESIGN:	M.B.	DRAWING NO.:	SG
DRAWN:	T.S.		
CHECKED:	D.U.	JLR NO:	20983
PLOTTED:	May 28, 2009		

Key Map



NOT TO SCALE

LEGEND

- - - -	DRAINAGE BOUNDARY
2.91 / 0.70	AREA IN HECTARES * RUNOFF COEFFICIENT (C)
10.14 / 132.0 / 283.0 / ORGAWORLD	DRAINAGE AREA (ha) 10 YEAR PEAK FLOW (l/s) 100 YEAR PEAK FLOW (l/s) ORGAWORLD SITE
28	NODE LOCATION NUMBER
◄- - -	PROPOSED DITCH AND FLOW DIRECTION

* NOTE: RUNOFF COEFFICIENT (C) FOR DEVELOPMENT AREA IS BASED ON A WEIGHTED AVERAGE OF 0.70, WHILE ROADWAYS ARE 0.90.

NO.	ISSUE	DATE
03	ISSUED FOR M.O.E. APPROVAL	28/05/09
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0 25 50 100 150

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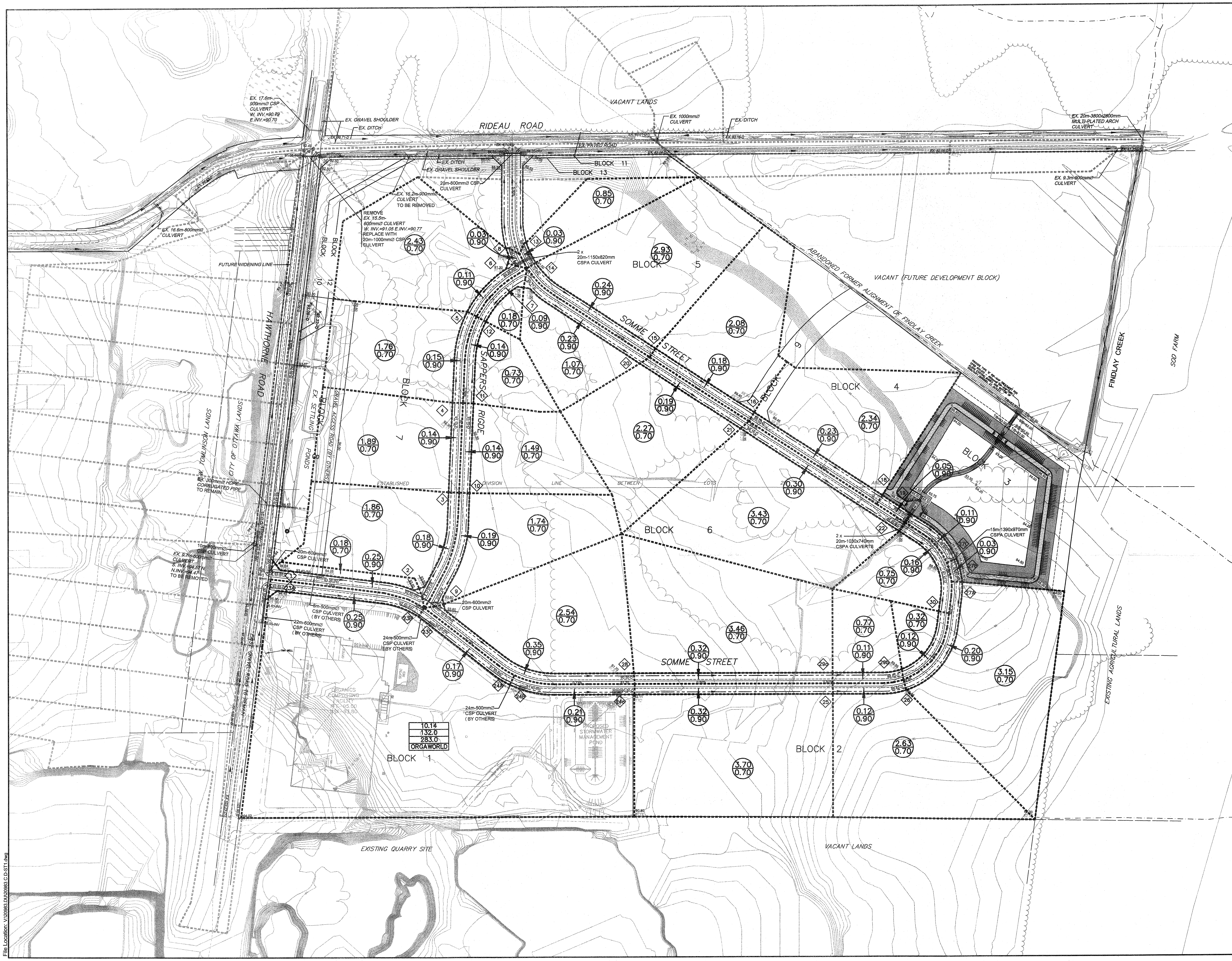
PROJECT NORTH

PROJECT:

HAWTHORNE INDUSTRIAL PARK

DRAWING:

STORM DRAINAGE AREA PLAN



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PLOTTED:	May 28, 2009		

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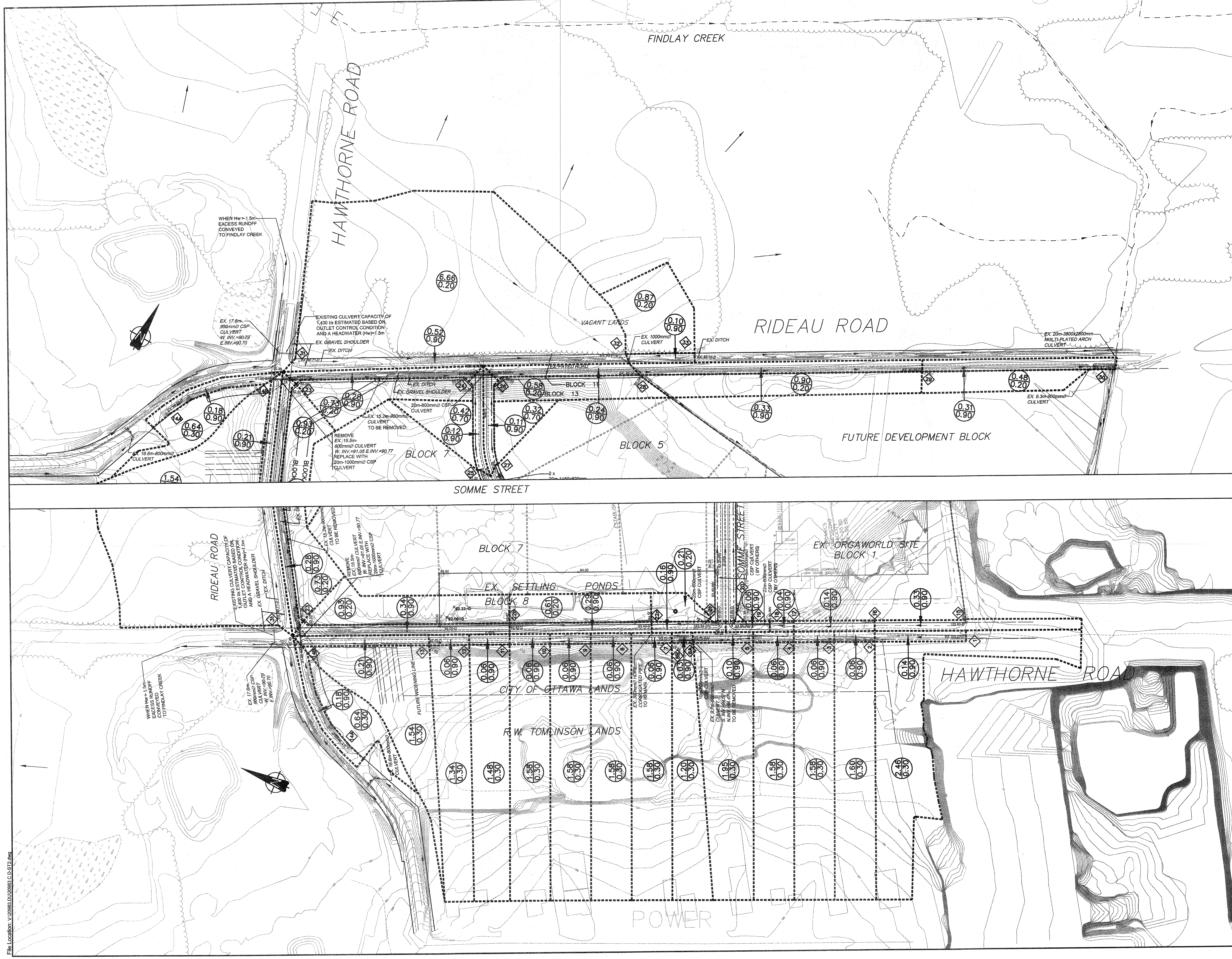

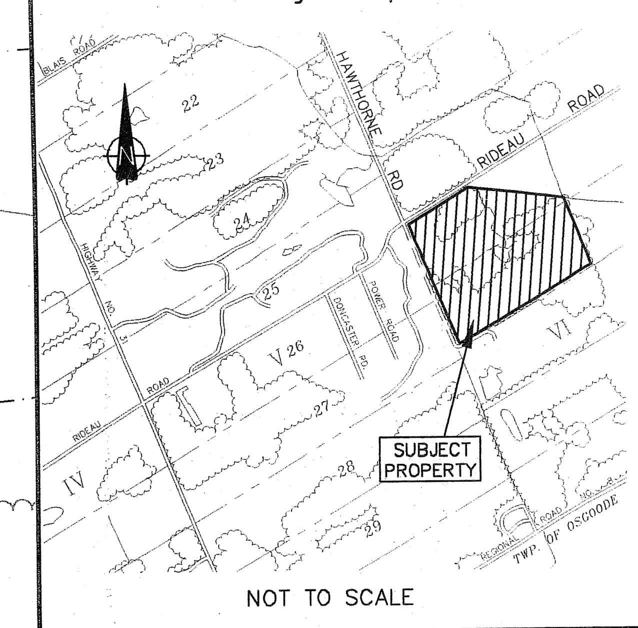

LEGEND

- DRAINAGE BOUNDARY
- 2.91 / 0.70 — AREA IN HECTARES * RUNOFF COEFFICIENT (C)
- 28 — NODE LOCATION NUMBER
- PROPOSED DITCH AND FLOW DIRECTION
- EXISTING SURFACE FLOW DIRECTION

* NOTE: RUNOFF COEFFICIENT (C) FOR DEVELOPMENT AREA IS BASED ON A WEIGHTED AVERAGE OF 0.70, WHILE ROADWAYS ARE 0.90.

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PROJECT NORTH

PROJECT:

HAWTHORNE INDUSTRIAL PARK

DRAWING:

STORM DRAINAGE AREA PLAN

DESIGN:	M.B.	DRAWING NO.:	D-ST2
DRAWN:	T.S.		
CHECKED:	D.U.	JLR NO:	20983
PLOTTED:	May 28, 2009		

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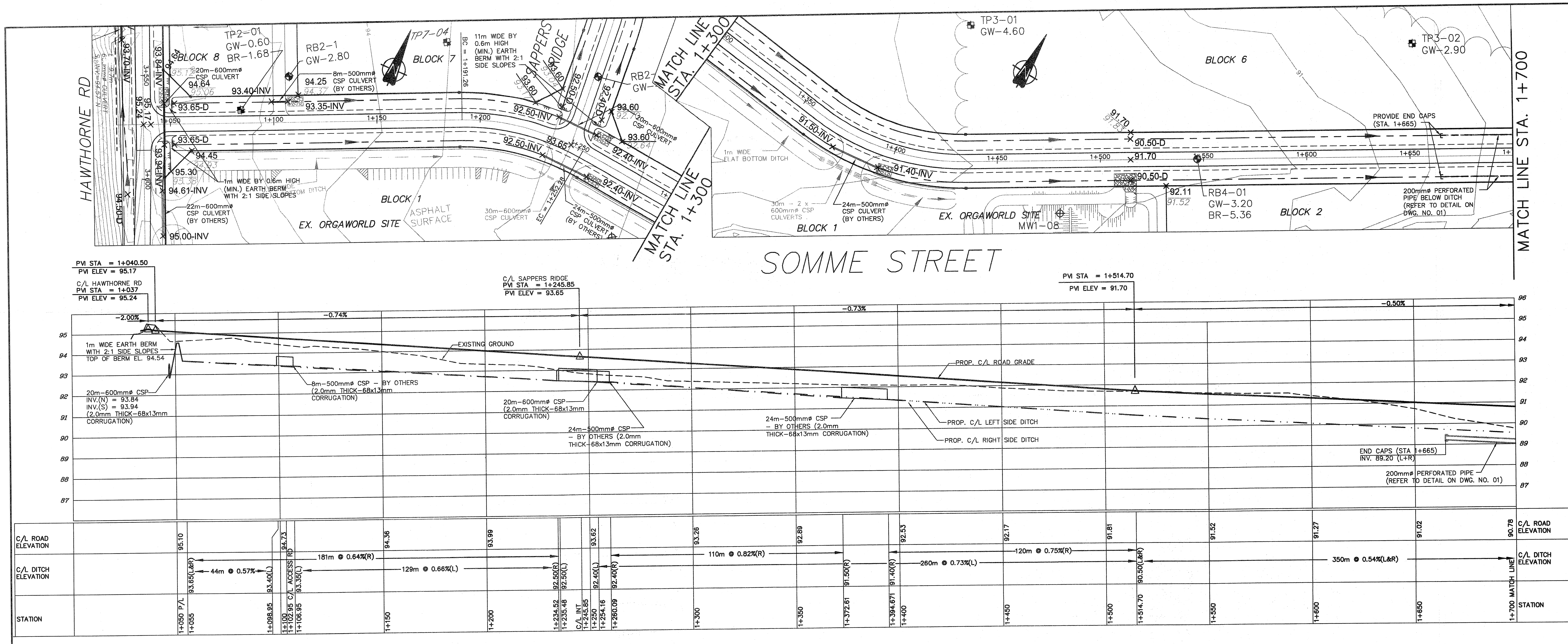

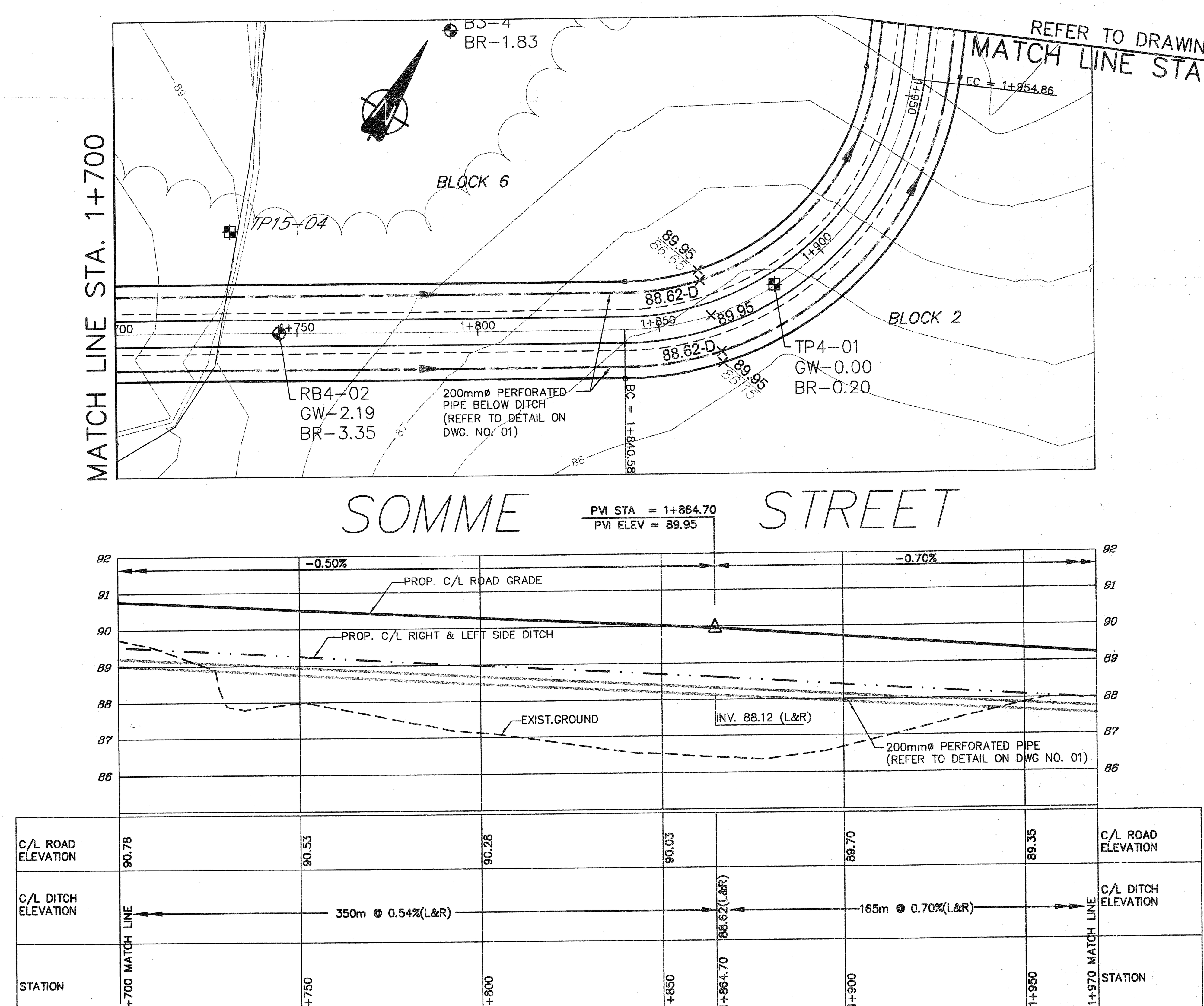

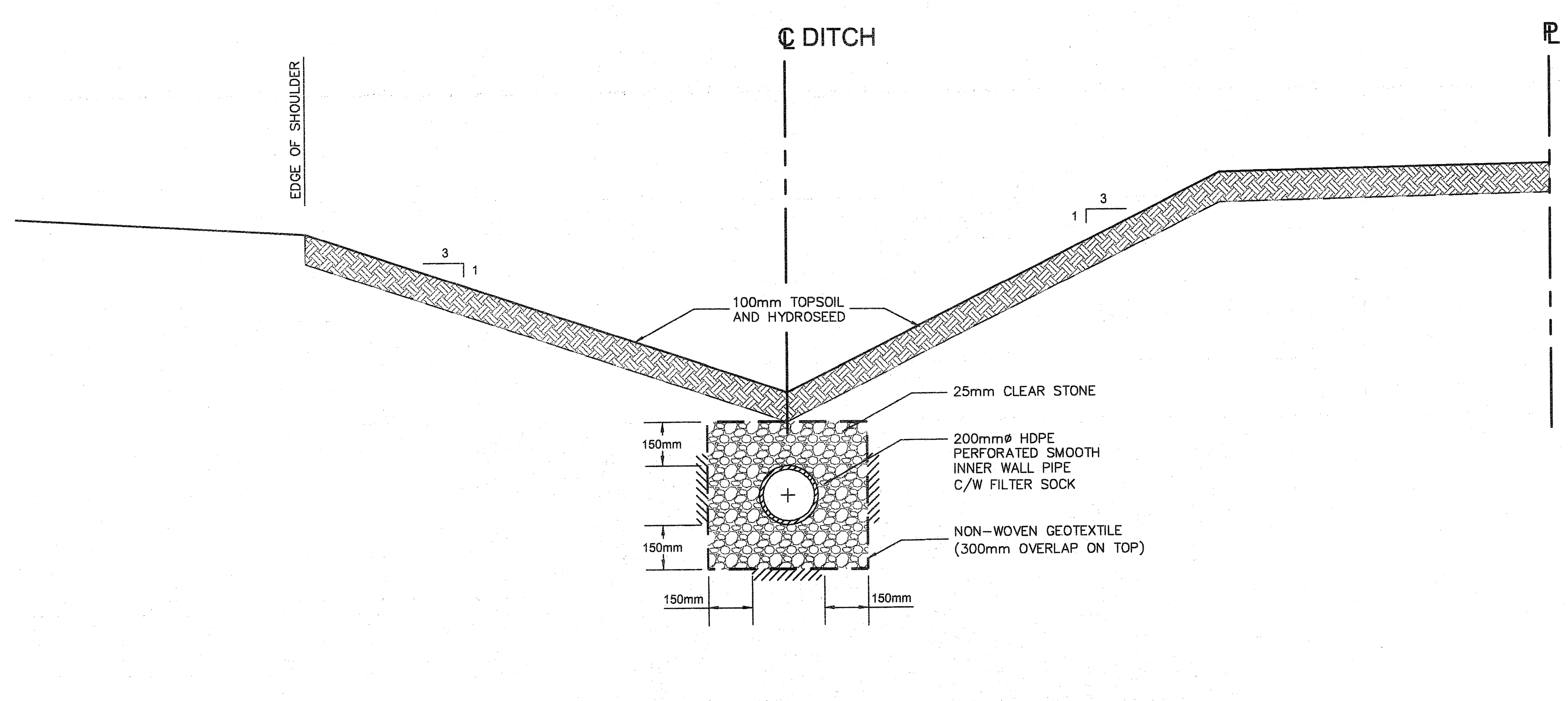

ROADSIDE DITCH PERFORATED PIPE INSTALLATION (TYPICAL)

N.T.S.

NOTE:

1. SUB-DRAIN TO BE NON-PERFORATED PIPE UNDER CULVERTS.

2. WORKS TO BE CONSTRUCTED AS PER CITY OF OTTAWA DETAIL DRAWING NO.s S9 AND S26.

LEGEND:

- PROPOSED DITCH AND FLOW DIRECTION
- PROPOSED CULVERT
- PROPOSED RIP-RAP
- ×93.50 PROPOSED C/L ELEVATION
- ×92.55-D PROPOSED DITCH ELEVATION
- ×92.55-INV PROPOSED INVERT
- 89.45 / 88.90 PROPOSED ELEVATION / EXISTING ELEVATION
- B2-1, RB2-3, SWM5-1R, SWM5-10 BOREHOLE LOCATION BY INSPEC-SOL INC. (2008)
- TP3-2 TESTPIT LOCATION BY INSPEC-SOL INC. (2008)
- MW2-8 MONITORING WELL LOCATION BY CRA (2008)
- TW-3 MONITORING WELL LOCATION BY GOLDER ASSOCIATES LTD.
- TP1-04 TESTPIT LOCATION BY GOLDER ASSOCIATES LTD. (1994)
- GW-3.00 OBSERVED GROUNDWATER DEPTH BELOW GROUND SURFACE
- BR-6.10 ASSUMED BEDROCK DEPTH BELOW GROUND SURFACE

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3	ISSUED FOR M.O.E. APPROVAL	28/05/09
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SCALE:
1:1000 (HORIZ.)
1:100 (VERT.)

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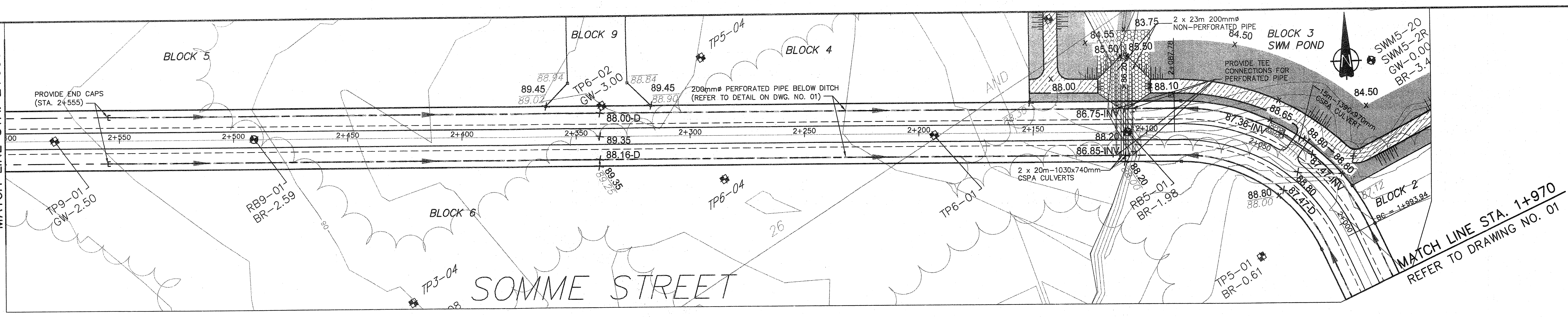
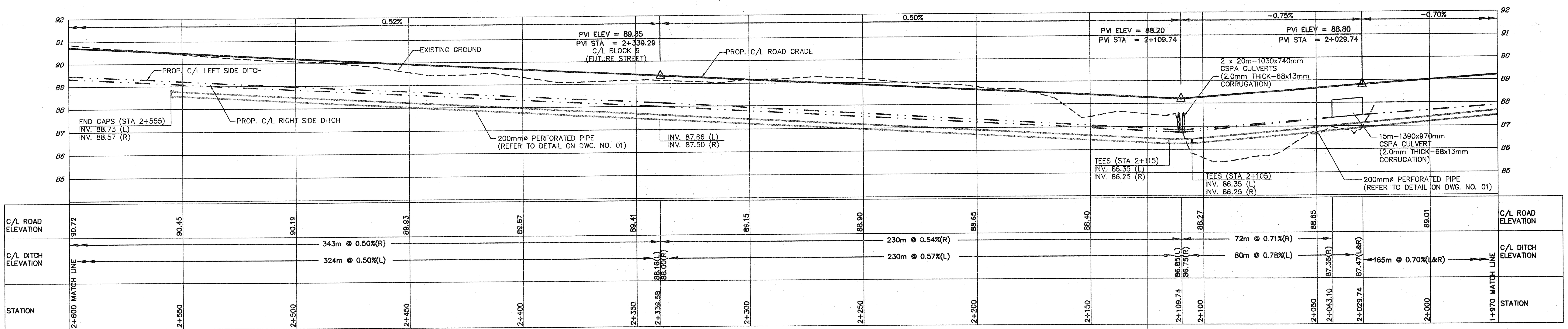
PROJECT NORTH

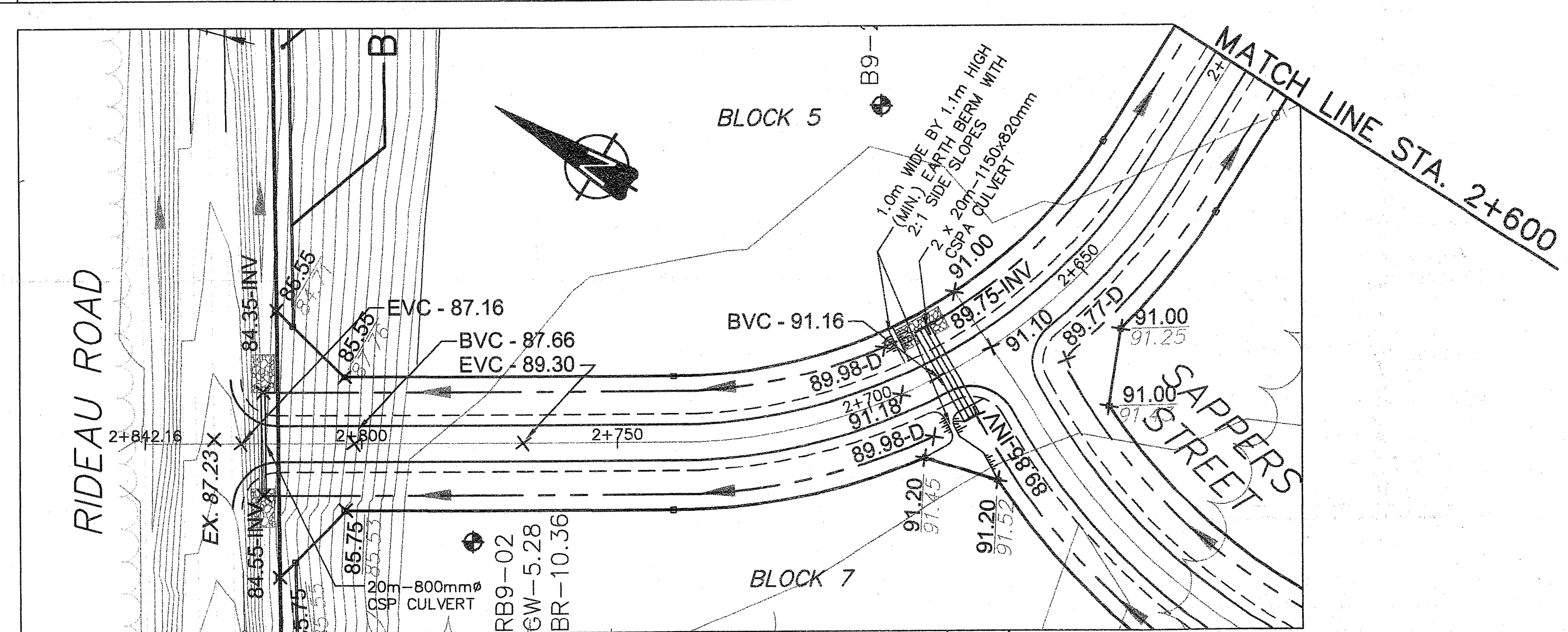
PROJECT:
HAWTHORNE INDUSTRIAL PARK

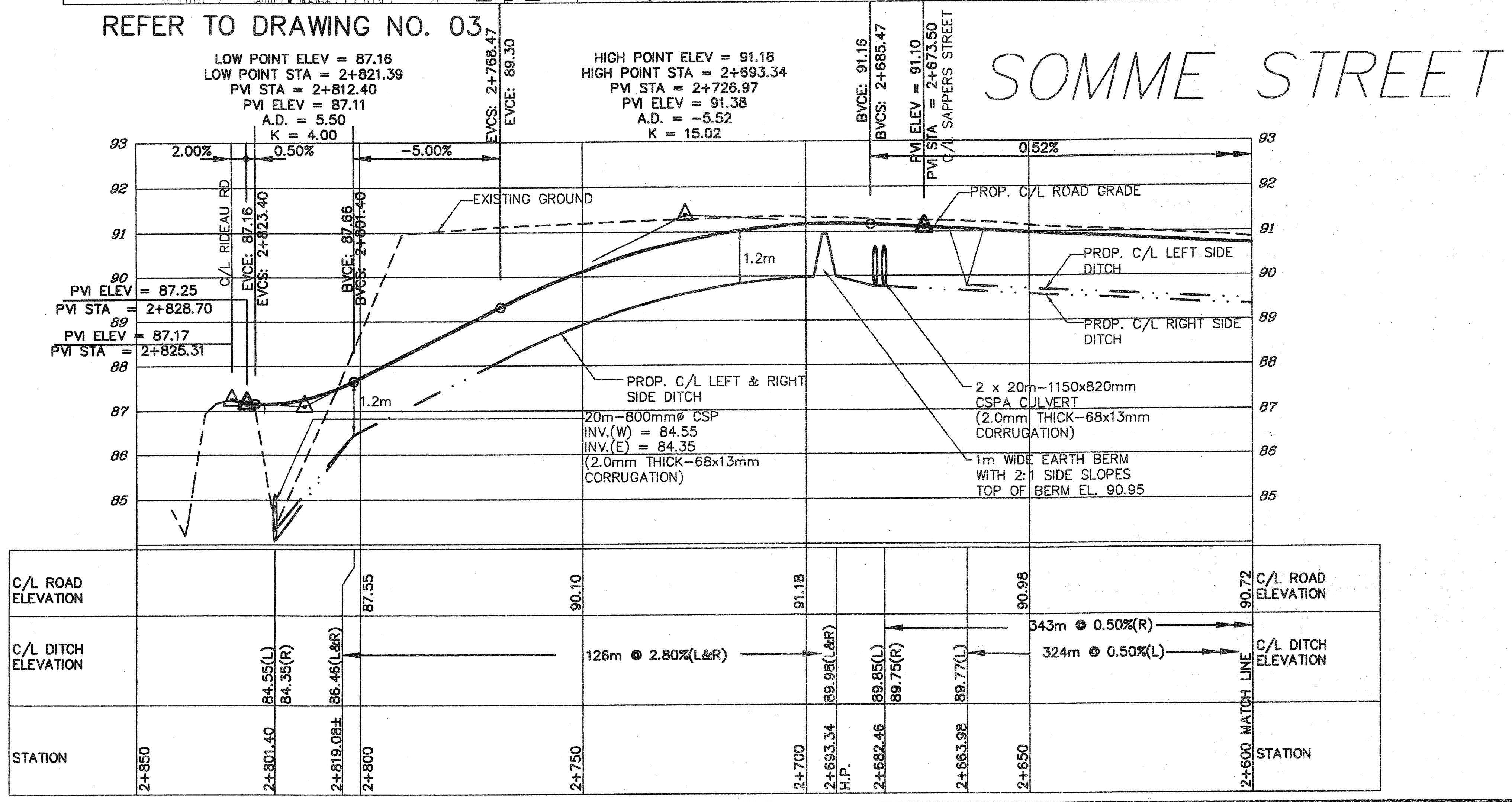
DRAWING:
PLAN & PROFILE
SOMME STREET
HAWTHORNE RD TO STA. 1+970

DESIGN: M.B.	DRAWING NO.: 01
DRAWN: T.S.	
CHECKED: D.U.	JLR NO: 20983
PLOTTED: May 28, 2009	









LEGEND:

— — —	PROPOSED DITCH AND FLOW DIRECTION
——	PROPOSED CULVERT
	PROPOSED RIP-RAP
×93.50	PROPOSED C/L ELEVATION
×92.55-D	PROPOSED DITCH ELEVATION
×92.55-INV	PROPOSED INVERT
× 89.45 / 88.90	PROPOSED ELEVATION / EXISTING ELEVATION
B2-1, RB2-3, SWM5-1R, SWM5-10	BOREHOLE LOCATION BY INSPEC-SOL INC. (2008)
TP3-2	TESTPIT LOCATION BY INSPEC-SOL INC. (2008)
MW2-8	MONITORING WELL LOCATION BY CRA (2008)
TW-3	MONITORING WELL LOCATION BY GOLDER ASSOCIATES LTD.
TP1-04	TESTPIT LOCATION BY GOLDER ASSOCIATES LTD. (1994)
GW-3.00	OBSERVED GROUNDWATER DEPTH BELOW GROUND SURFACE
BR-6.10	ASSUMED BEDROCK DEPTH BELOW GROUND SURFACE

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1	ISSUED FOR CITY APPROVAL	12/02/09

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1:1000 (HORIZ.) 0 10 20 50
1:100 (VERT.) 0 1 2 5

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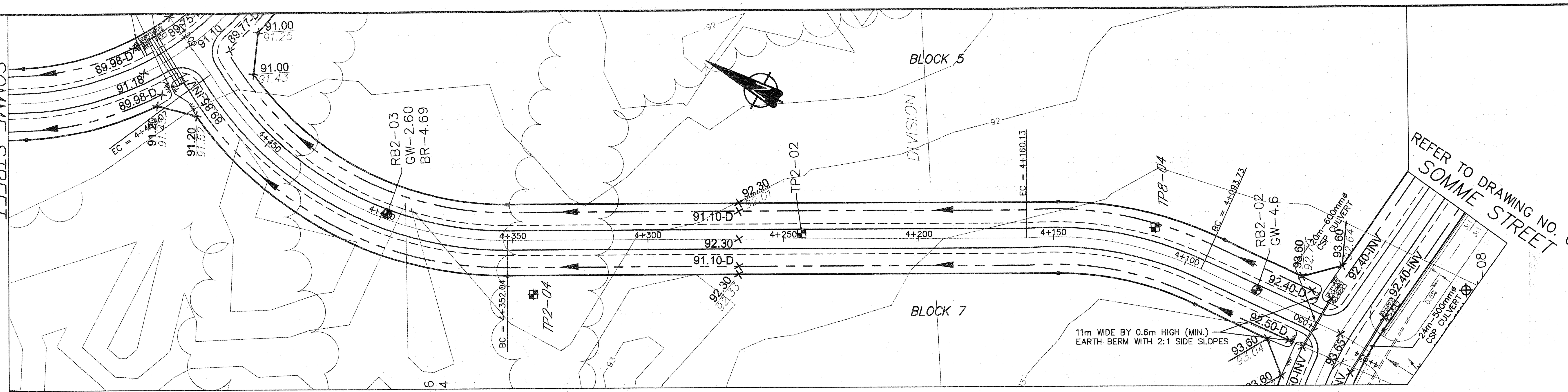
PROJECT NORTH

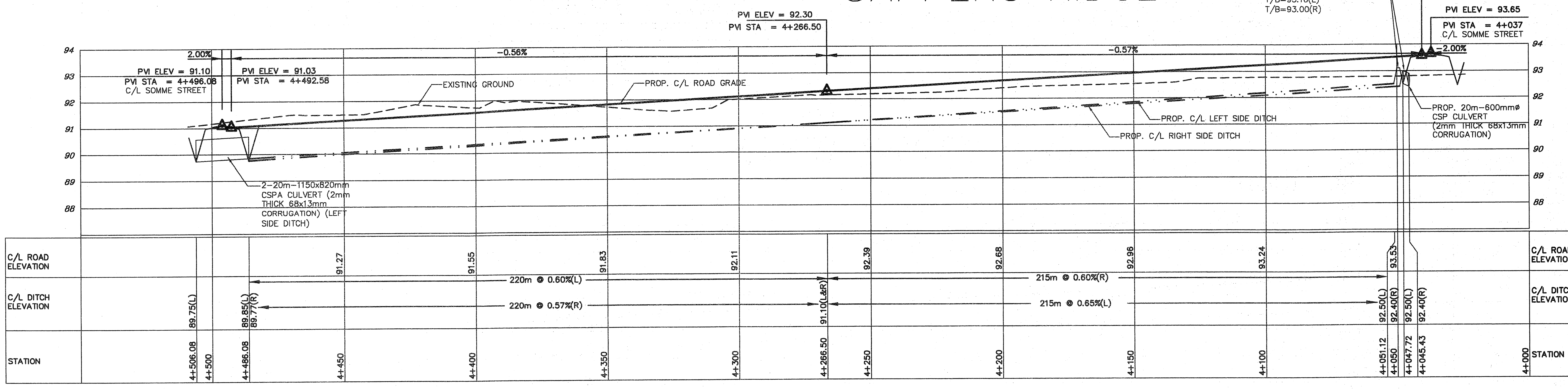
PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
PLAN & PROFILE
SOMME STREET
STA. 1+970 TO RIDEAU ROAD

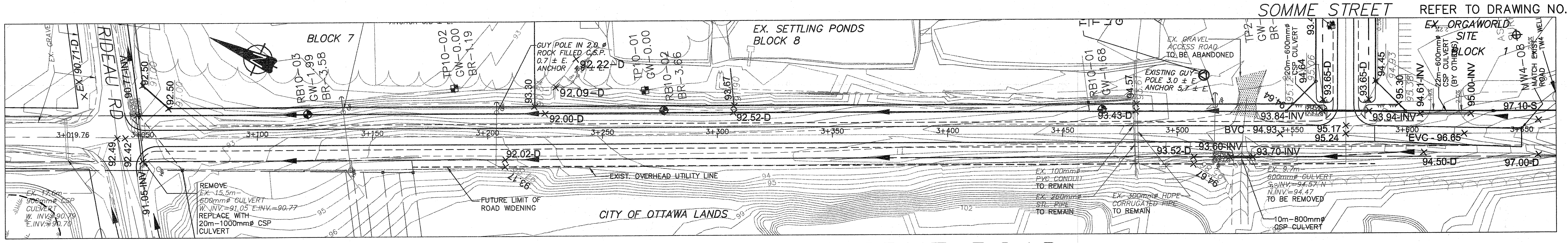
DESIGN:	M.B.	DRAWING NO.:	02
DRAWN:	T.S.		
CHECKED:	D.U.	JLR NO:	20983
PLOTTED:	May 28, 2009		



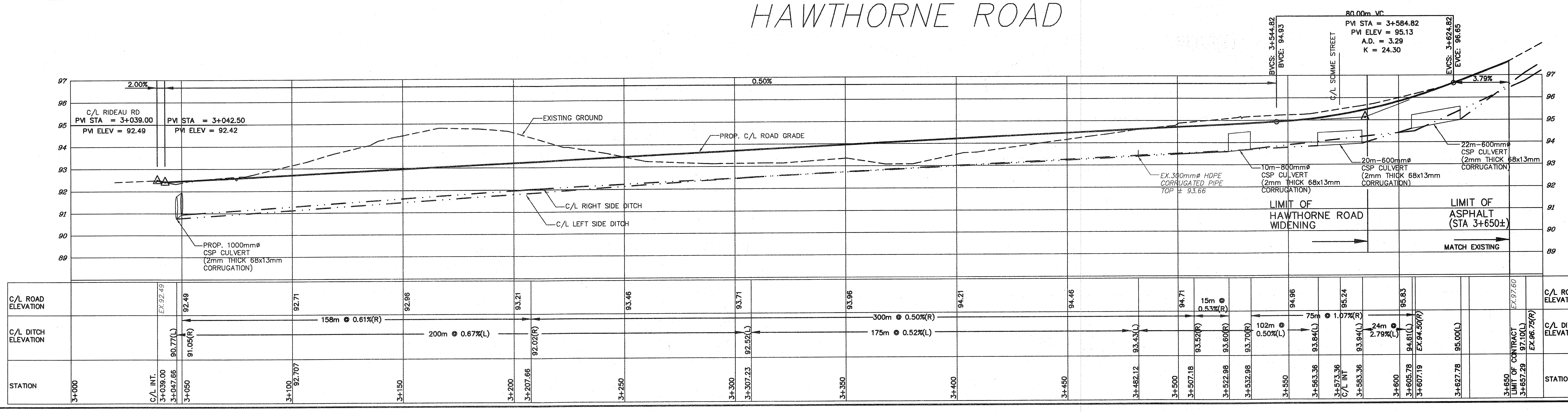
SAPPERS RIDGE



SOMME STREET REFER TO DRAWING NO. 01



HAWTHORNE ROAD



LEGEND:

— — — ►	PROPOSED DITCH AND FLOW DIRECTION
———	PROPOSED CULVERT
	PROPOSED RIP-RAP
×93.50	PROPOSED C/L ELEVATION
×92.55-D	PROPOSED DITCH ELEVATION
×92.55-INV	PROPOSED INVERT
× 89.45 / 88.90	PROPOSED ELEVATION / EXISTING ELEVATION
B2-1, RB2-3, SWM5-1R, SWM5-10	BOREHOLE LOCATION BY INSPEC-SOL INC. (2008)
TP3-2	TESTPIT LOCATION BY INSPEC-SOL INC. (2008)
MW2-8	MONITORING WELL LOCATION BY CRA (2008)
TW-3	MONITORING WELL LOCATION BY GOLDER ASSOCIATES LTD.
TP1-04	TESTPIT LOCATION BY GOLDER ASSOCIATES LTD. (1994)
GW-3.00	OBSERVED GROUNDWATER DEPTH BELOW GROUND SURFACE
BR-6.10	ASSUMED BEDROCK DEPTH BELOW GROUND SURFACE

NO.	ISSUE	DATE
3	ISSUED FOR M.O.E. APPROVAL	28/05/09
2	REVISED PER CITY COMMENT	30/04/09
1	ISSUED FOR CITY APPROVAL	12/02/09

SCALE:
1:1000 (HORIZ.) 0 10 20 50
1:100 (VERT.) 0 1 2 5

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PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER D. P. UPTON PROVINCE OF ONTARIO

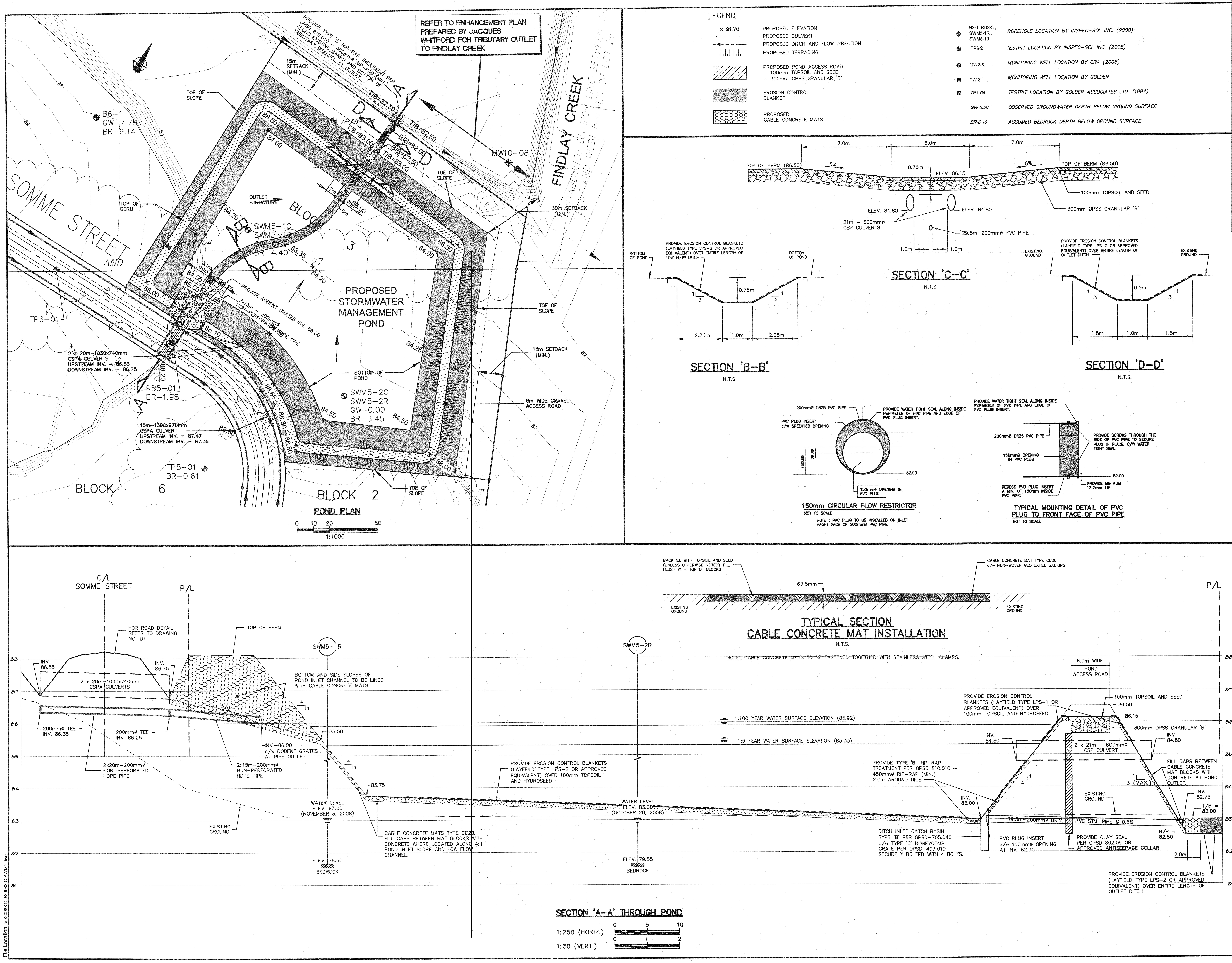
PROJECT NORTH

PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
PLAN & PROFILE SAPPERS RIDGE AND HAWTHORNE ROAD EXTENSION

DESIGN: M.B.	DRAWING NO.: 03
DRAWN: T.S.	
CHECKED: D.U.	JLR NO:
PLOTTED: May 28, 2009	20983

File Location: V:\20983.DU\20983 C 03.dwg



NO.	ISSUE	DATE
3	ISSUED FOR M.O.E. APPROVAL	28/05/09
2	REVISED PER CITY COMMENTS	30/04/09
1	ISSUED FOR CITY APPROVAL	12/02/09

SCALE: AS SHOWN

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PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER D. P. UPTON PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT: HAWTHORNE INDUSTRIAL PARK

DRAWING: STORMWATER MANAGEMENT POND PLAN AND SECTIONS

DESIGN:	M.B.	DRAWING NO.:	SWM1
DRAWN:	T.S.		
CHECKED:	D.U.	JLR NO:	20983
PLOTTED:	May 28, 2009		

GENERAL NOTES FOR EROSION AND SEDIMENTATION CONTROL MEASURES DURING CONSTRUCTION :

During construction activities appropriate erosion and sediment control measures, as outlined in MNR's "Guidelines on Erosion and Sediment Control for Urban Construction Sites", shall be implemented to trap sediment on-site.

As a minimum, the following erosion and sedimentation control measures will be provided during construction:

- supply and install straw bale flow check dams (per OPSD 219.180) upstream of all culvert installations at locations shown on Drawing NO. ESC. Do not remove straw bale barriers until the upstream vegetation has been established;
- supply and install silt fence barrier (per OPSD 219.110) at locations shown on Drawing NO. ESC; and
- supply and install silt fence barrier (per OPSD 219.110) to enclose all borrow and stockpile areas resulting from topsoil stripping activities or any excavating activities (i.e. exact location to be determined during construction).

Furthermore, if dewatering and pumping operations become necessary, sediment dewatering bags shall be used to filter sediment prior to releasing groundwater into the receiving stream.

All control measures will be carried out in accordance with the following documents:

1) "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs, and Transportation & Communication, Association of Construction Authorities of Ontario and Urban Development Institute, Ontario, May 1987.

2) "Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.

3) Applicable Regulations and guidelines of the Ministry of Natural Resources. As a minimum, during the construction of municipal services,the following Stormwater Management Practices will be used:

- Any stockpiled material will be kept on flat areas during construction, well away from any natural flow paths. In the event that the stockpile is placed in other areas where potential washoff to the conveyance system is expected, silt fences (per OPSD 219.110) will be installed to enclose the materials and prevent any washoff to the conveyance system.
- All pumped stormwater/groundwater will be filtered through sediment dewatring bags prior to its release to the receiving stream.

Sediment and Erosion control measures shall be implemented prior to work and maintained during the work phase by the general contractor to prevent entry of sediment into the receiving stream. All sediment and erosion control measures shall be inspected daily by the general contractor to ensure that they are functioning properly and are being maintained and/or upgraded as required. If the sediment and erosion control measures are not functioning properly, no further work shall occur until the problem has been addressed and rectified.

All materials and equipment used for the purpose of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substances (i.e. petroleum products, silt, etc.) from entering the receiving stream. Vehicle and equipment re-fuelling and maintenance shall be conducted away from drainage channels. Any part of equipment entering drainage channels shall be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substances from entering the receiving stream.

GENERAL NOTES :

1. ALL STOCKPILED EXCAVATED MATERIAL IS TO BE LOCATED A MINIMUM OF 10m FROM ALL WATERCOURSES AND IS TO BE ENCLOSED WITH A SILT SCREEN (PER OPSD 219.110) OR LIGHT-DUTY STRAW BALE BARRIER (PER OPSD 219.100).

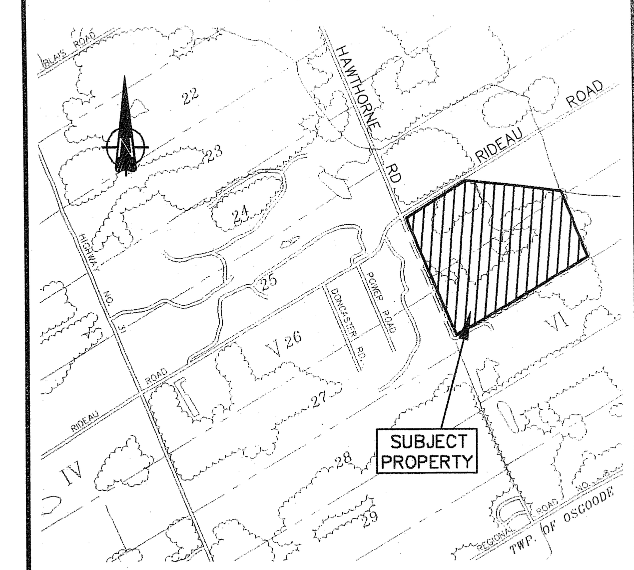
2. ALL SILT CONTROL MEASURES ARE TO BE INSPECTED ONCE PER MONTH AND AFTER EACH SIGNIFICANT RAINFALL EVENT TOTALLING 10mm OR GREATER. GENERAL CONTRACTOR TO REPAIR AS REQUIRED.

3. HYDROSEEDING OF ALL DITCHES IS TO BE PROVIDED IMMEDIATELY FOLLOWING FINAL SHAPING/GRADING.

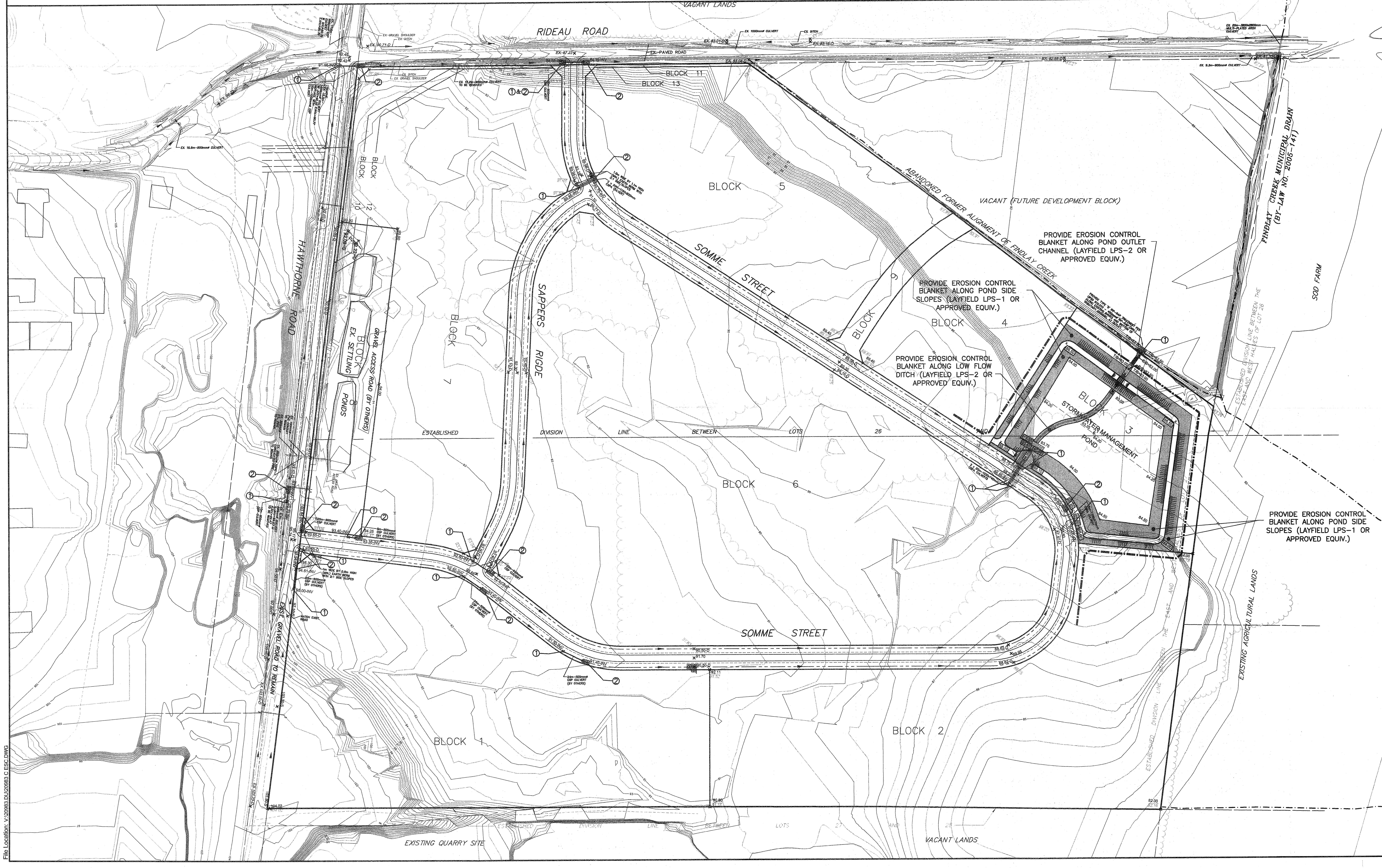
4. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION OF THE RECEIVING WATERCOURSE DURING ALL PHASES OF CONSTRUCTION.

5. SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR AND/OR THE LOCAL CONSERVATION AUTHORITY.

Key Map



NOT TO SCALE



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LEGEND

× 91.70	PROPOSED ELEVATION
	PROPOSED CULVERT
	PROPOSED DITCH AND FLOW DIRECTION
	PROPOSED TERRACING
	LIGHT-DUTY SILT FENCE BARRIER TO OPSD-219.110
	PROPOSED EROSION CONTROL BLANKET
	PROPOSED CABLE CONCRETE MATS
①	PROPOSED LOCATION OF STRAW BALE FLOW CHECK DAM TO OPSD-219.180
②	PROPOSED RIP-RAP TREATMENT TYPE 'B' TO OPSD-810.010

NO.	ISSUE	DATE
03	ISSUED FOR M.O.E. APPROVAL	28/05/09
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SCALE: 1:2000

0 25 50 100 150

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PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER
D. P. UPTON
PROVINCE OF ONTARIO

PROJECT NORTH

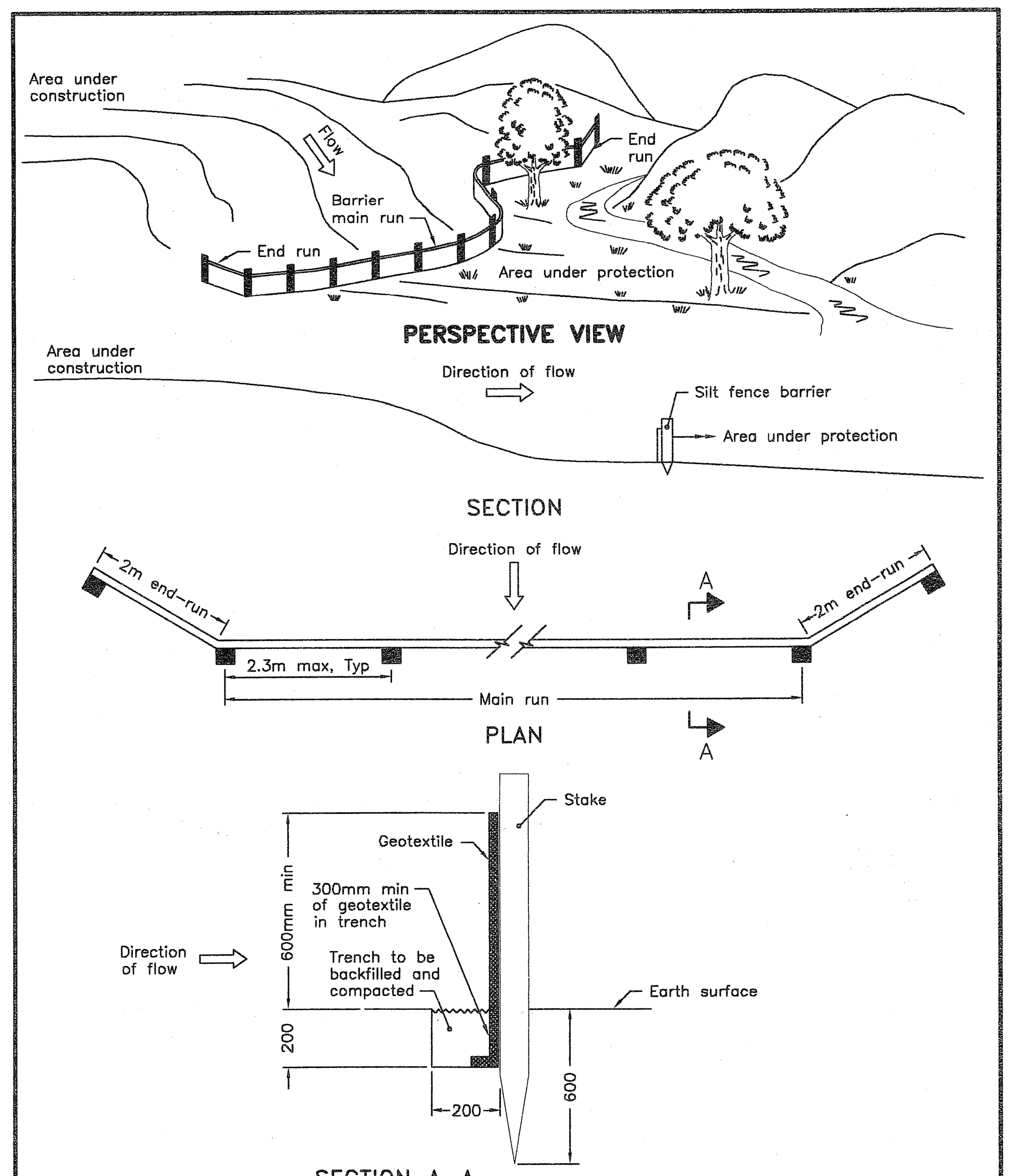
PROJECT:

HAWTHORNE INDUSTRIAL PARK

DRAWING:

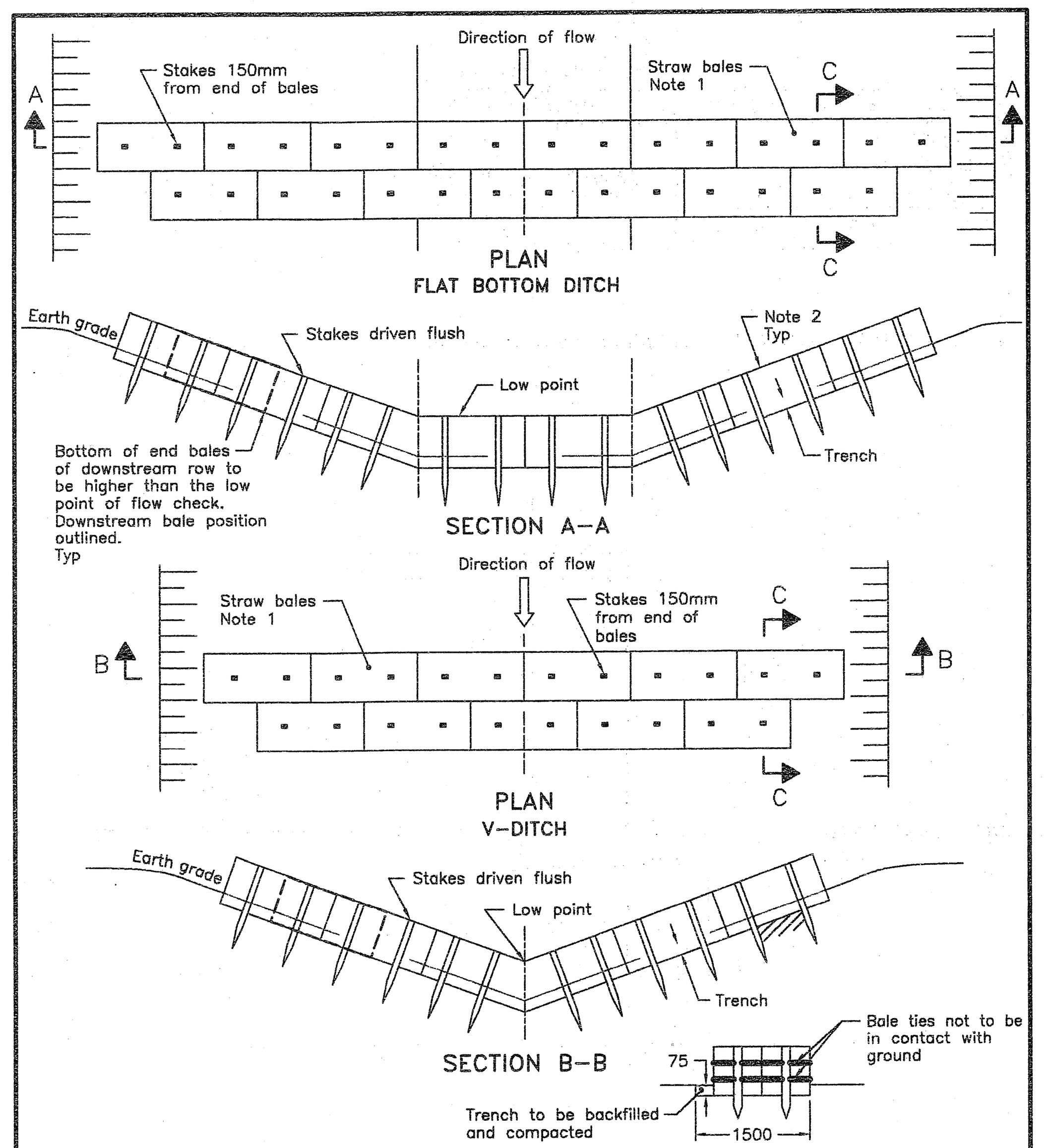
EROSION AND SEDIMENT CONTROL PLAN

DESIGN: M.B.	DRAWING NO.: ESC
DRAWN: T.S.	
CHECKED: D.U.	JLR NO: 20983
PLOTTED: May 28, 2009	



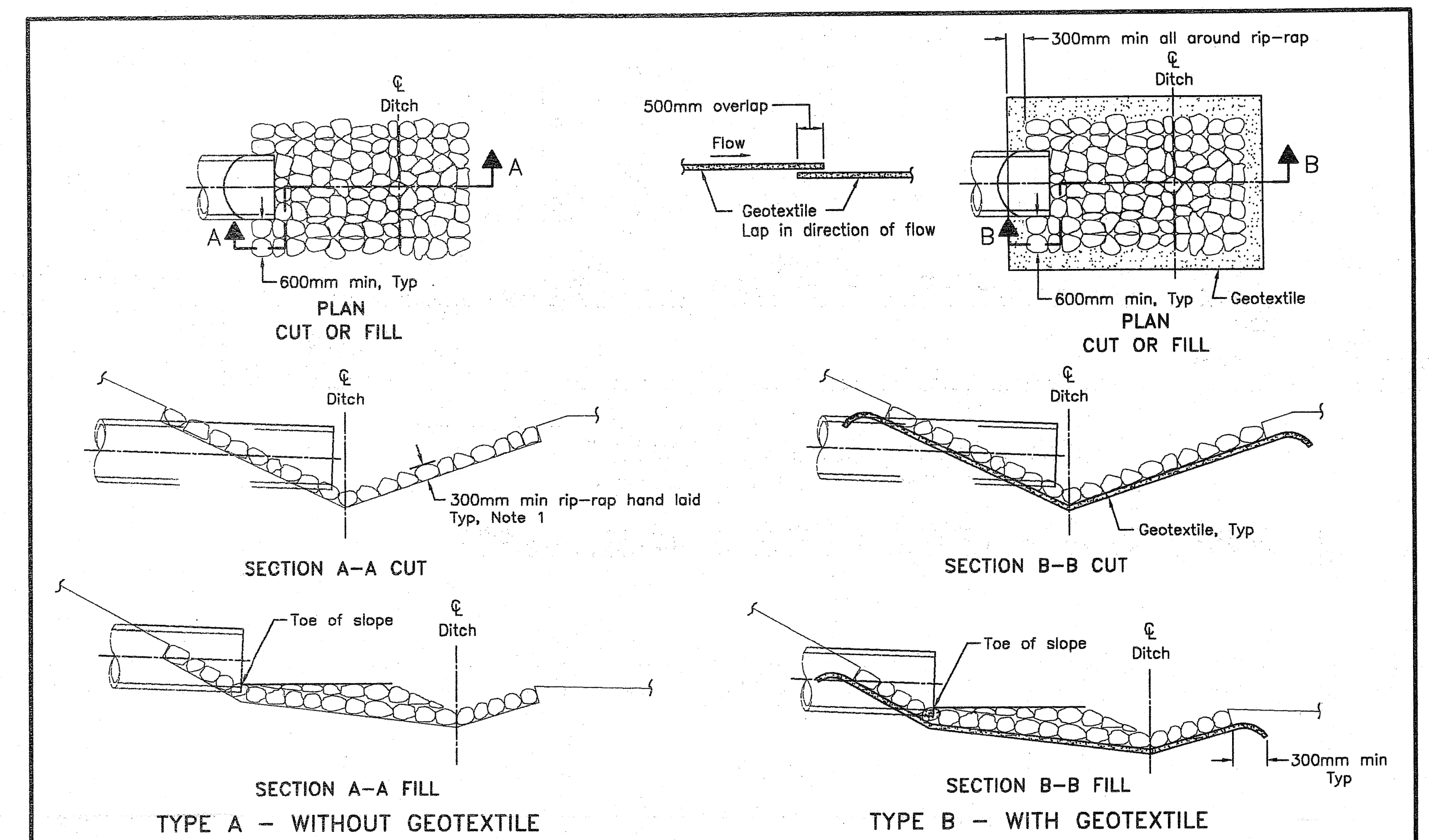
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
LIGHT-DUTY SILT FENCE BARRIER	OPSD 219.110	



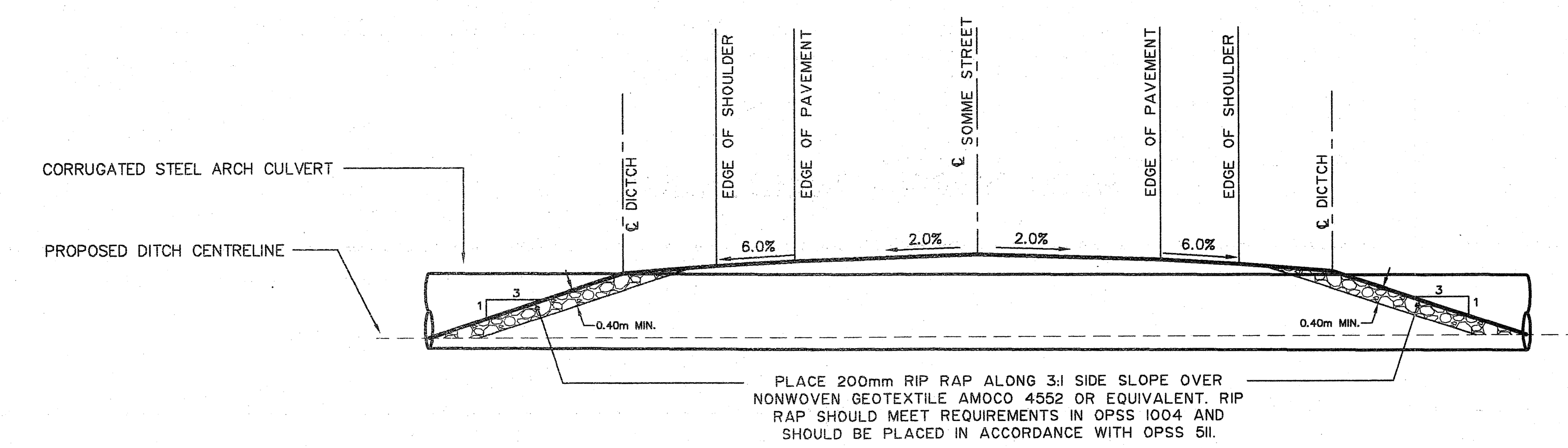
NOTES:
1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
STRAW BALE FLOW CHECK DAM	OPSD 219.180	

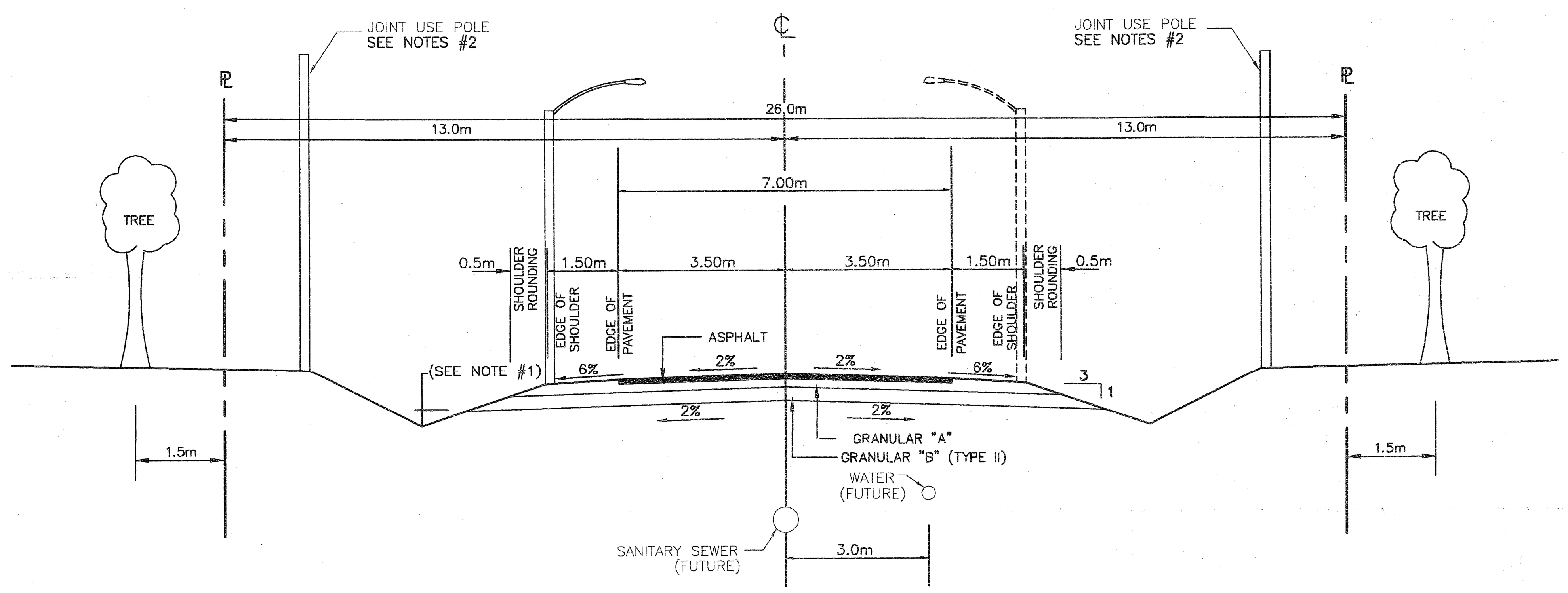


NOTES:
1 The thickness of the rip-rap layer shall be at least 1.5 times the rip-rap mean diameter.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2007	Rev 1
RIP-RAP TREATMENT FOR SEWER AND CULVERT OUTLETS	OPSD 810.010	



TYPICAL SECTION THRU CULVERT ROAD CROSSING
N.T.S



26.0 METER ROAD ALLOWANCE
RURAL SECTION

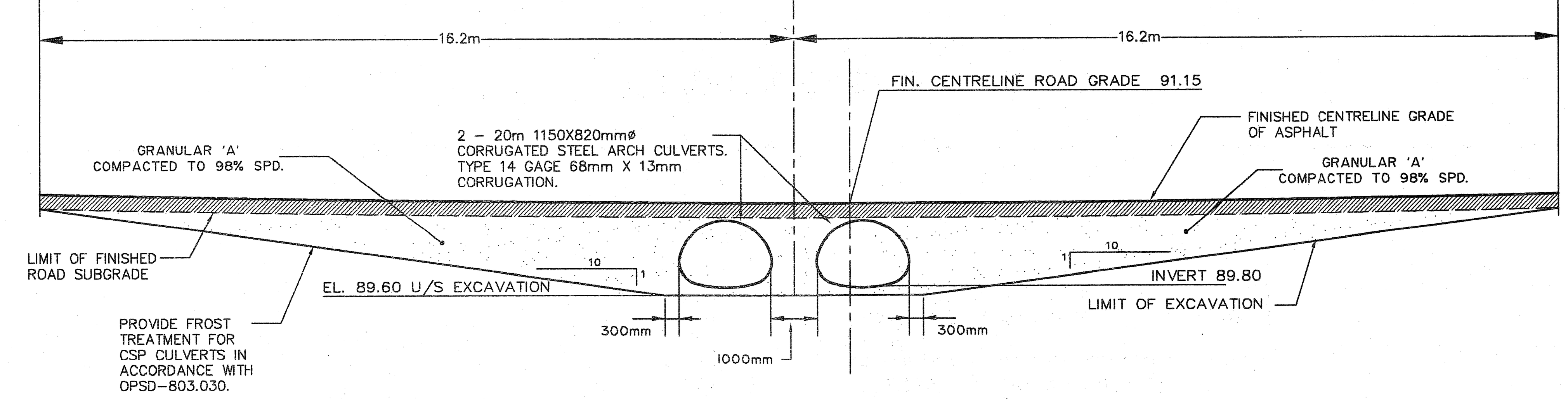
PAVEMENT STRUCTURE SCHEDULE

HAWTHORNE ROAD:
- 50mm HL3 SURFACE COURSE (SUPERPAVE 12.5mm – PG58-34 LEVEL 3)
- 100mm HL8 BINDER COURSE (SUPERPAVE 19.0mm – PG58-34 LEVEL 3)
- 150mm OPSS GRANULAR "A" BASE
- 300mm OPSS GRANULAR "B" TYPE II SUB-BASE

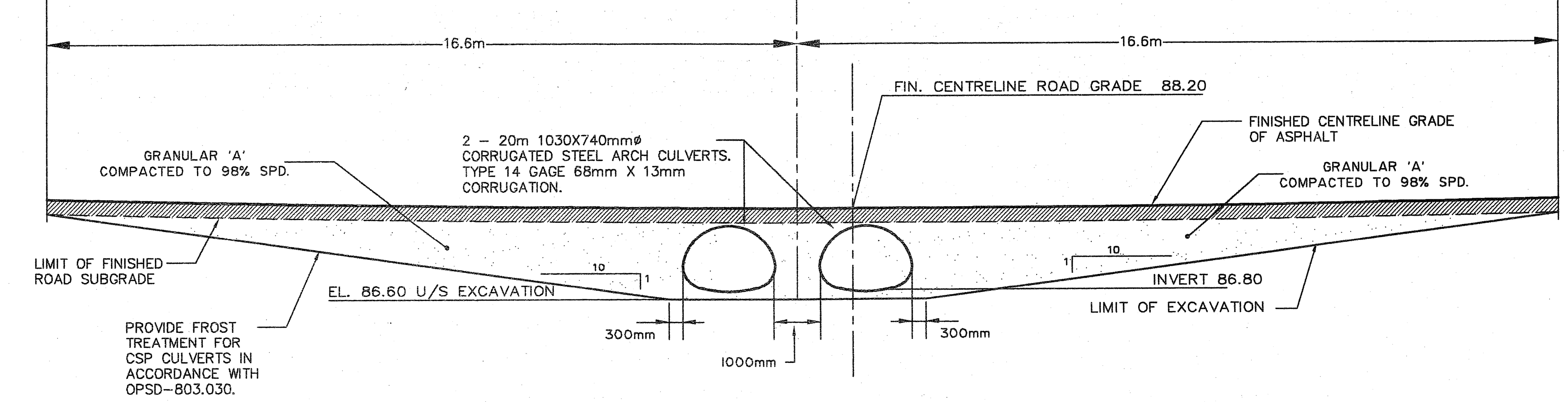
INTERNAL ACCESS ROADS:
- 50mm HL3 SURFACE COURSE (SUPERPAVE 12.5mm – PG58-34 LEVEL 2)
- 75mm HL8 BINDER COURSE (SUPERPAVE 19.0mm – PG58-34 LEVEL 2)
- 150mm OPSS GRANULAR "A" BASE
- 300mm OPSS GRANULAR "B" TYPE II SUB-BASE

NOTES:

1. DITCHES SHALL BE CONSTRUCTED TO A MINIMUM OF 500mm BELOW SUBGRADE ELEVATION.
2. JOINT USE POLES WILL BE USED FOR OVERHEAD UTILITIES. THE POLES SHALL BE LOCATED 1.0m FROM PROPERTY LINE..
3. SHOULDER ON COLLECTOR STREET TO BE SURFACE TREATED, WHERE REQUIRED BY CITY ENGINEER.
4. SUB-EXCAVATE SOFT AREAS IN SUBBASE AND FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.
5. ALL MATERIALS TO BE SUPPLIED AND PLACED AS PER O.P.S.S. STANDARDS AND SPECIFICATIONS.
6. DEPTH OF GRANULAR 'B' TO BE INCREASED AS REQUIRED BY SOIL CONDITIONS.
7. AREA FROM THE EDGE OF SHOULDER TO THE PROPERTY LINE IS TO BE SODDED OR SEEDED.
8. ALL SERVICES INDICATED MAY NOT NECESSARILY APPLY AT THIS TIME.
9. LIGHT STANDARDS TO BE LOCATED 1.5m FROM EDGE OF ASPHALT.
10. TYPE II GRANULAR 'B' IS CRUSHED ROCK.
11. ALL DRIVEWAY CULVERTS TO BE 500mm DIA CSP UNLESS OTHERWISE NOTED.
12. ALL INTERSECTION RADII TO BE PAVED PER OPSD 304.01
13. ROADWAY CONSTRUCTION IS TO BE AS PER THE GEOTECHNICAL RECOMMENDATIONS PROVIDED BY INSPEC-SOL INC. (REPORT NO. T020556-A1 DATED JAN. 30, 2009)



CULVERT ROAD CROSSING DETAIL 1
N.T.S



CULVERT ROAD CROSSING DETAIL 2
N.T.S

NO.	ISSUE	DATE
03	ISSUED FOR M.O.E. APPROVAL	28/05/09
02	REVISED PER CITY COMMENTS	30/04/09
01	ISSUED FOR CITY APPROVAL	12/02/09

SCALE: N.T.S.

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Kingston, ON Canada
K7L 5N4
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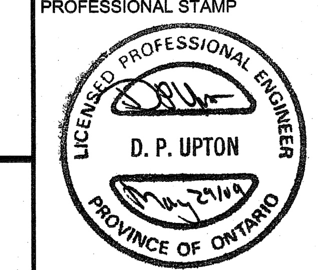
PROFESSIONAL STAMP



PROJECT NORTH

PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
DETAILS

DESIGN: M.B.	DRAWING NO.: DT
DRAWN: T.S.	
CHECKED: D.U.	JLR NO: 20983
PLOTTED: May 29, 2009	

File Location: V:\20983.DU\20983 C DT.dwg

APPENDIX 'A'

RATIONAL METHOD DESIGN SHEETS
(1:10 year and 1:100 year Design Sheets)

DATE : 5/27/2009

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

1:10 year Ottawa International Airport IDF Curve

February 2009 (Revised April 2009)

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA									CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT						FLOW	U/S	D/S
	FROM	TO	Area at C of 0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)	TIME (min)	Inv (m)	Inv (m)
NORTHERN CATCHMENT AREA																														
WEST SIDE SAPPERS RIDGE	2	3	1.86	0.18	2.04	1.46	1.46	4.07	4.07	15.00	97.85	398.2	0.00	0.42	1.20	3.00	0.50	424.2	6973.0	0.80	136.80							2.84	92.50	91.82
WEST SIDE SAPPERS RIDGE	3	4	1.89	0.14	2.03	1.45	2.92	4.04	8.11	17.84	88.22	715.4	0.00	0.51	1.20	3.00	0.80	904.2	8856.1	1.16	111.00							1.60	91.82	90.93
WEST SIDE SAPPERS RIDGE	4	5	1.76	0.15	1.91	1.36	4.28	3.79	11.90	19.44	83.68	995.9	0.00	0.58	1.20	3.00	0.51	1011.3	7029.1	1.00	112.85							1.88	90.93	90.36
WEST SIDE SAPPERS RIDGE	5	6	2.43	0.11	2.54	1.80	6.08	5.00	16.90	21.32	78.96	1334.4	0.00	0.65	1.20	3.00	0.62	1513.4	7762.6	1.19	82.79							1.16	90.36	89.85
										22.47																				
NORTH ENTRANCE TO SOMME STREET	8	6		0.03	0.03	0.03	0.03	0.08	0.08	15.00	97.85	7.3	0.00	0.20	1.20	3.00	1.30	94.9	11276.7	0.79	10.00							0.21	89.98	89.85
										15.21																				
CULVERT CROSSING	6	14		0.00	0.00	0.00	6.11	0.00	16.97	22.47	76.34	1295.8					0.50				20.00	2	-----	1.15 x 0.82	NO	YES	**0.75**	0.38	89.85	89.75
										22.85																				
NORTH PORTION SOMME STREET	13	14	0.85	0.03	0.88	0.62	0.62	1.73	1.73	15.00	97.85	169.2	0.00	0.30	1.20	3.00	2.30	372.0	14999.4	1.38	10.00							0.12	89.98	89.75
										15.12																				
NORTH PORTION SOMME STREET	14	15	2.93	0.24	3.17	2.27	8.99	6.30	25.00	22.85	75.52	1888.2	0.00	0.74	1.20	3.00	0.50	1926.6	6992.8	1.17	184.04							2.62	89.75	88.83
NORTH PORTION SOMME STREET	15	16	2.08	0.18	2.26	1.62	10.61	4.50	29.50	25.47	70.36	2075.4	0.00	0.77	1.20	3.00	0.57	2291.4	7480.8	1.29	145.08							1.88	88.83	88.00
NORTH PORTION SOMME STREET	16	18	2.34	0.23	2.57	1.85	12.46	5.13	34.63	27.35	67.11	2323.9	0.00	0.80	1.20	3.00	0.51	2399.6	7074.8	1.25	185.66							2.48	88.00	87.05
NORTH PORTION SOMME STREET	18	19	0.00	0.05	0.05	0.05	12.50	0.13	34.75	29.82	63.30	2199.9	0.00	0.76	1.20	3.00	0.72	2476.8	8372.8	1.43	41.86							0.49	87.05	86.75
										30.31																				
EAST SIDE SAPPERS RIDGE	9	10	1.74	0.19	1.93	1.39	1.39	3.86	3.86	15.00	97.85	378.0	0.00	0.41	1.20	3.00	0.50	399.2	6996.6	0.79	147.87							3.11	92.40	91.66
EAST SIDE SAPPERS RIDGE	10	11	1.49	0.14	1.63	1.17	2.56	3.25	7.11	18.11	87.42	622.0	0.00	0.49	1.20	3.00	0.66	735.9	8019.2	1.02	111.04							1.81	91.66	90.93
EAST SIDE SAPPERS RIDGE	11	12	0.73	0.14	0.87	0.64	3.20	1.77	8.88	19.92	82.40	732.0	0.00	0.52	1.20	3.00	0.55	785.5	7304.8	0.97	104.49							1.80	90.93	90.36
EAST SIDE SAPPERS RIDGE	12	7	0.18	0.09	0.27	0.21	3.40	0.58	9.46	21.72	78.02	738.2	0.00	0.49	1.20	3.00	0.81	818.5	8919.0	1.14	72.55							1.06	90.36	89.77
NORTH PORTION SOMME STREET	7	20	1.07	0.23	1.30	0.96	4.36	2.66	12.12	22.79	75.66	916.9	0.00	0.57	1.20	3.00	0.50	956.8	6966.1	0.98	177.39							3.01	89.77	88.89
NORTH PORTION SOMME STREET	20	21	2.27	0.19	2.46	1.76	6.12	4.89	17.01	25.80	69.76	1186.8	0.00	0.62	1.20	3.00	0.50	1200.1	6981.9	1.04	147.49							2.36	88.89	88.16
NORTH PORTION SOMME STREET	21	22	3.43	0.30	3.73	2.67	8.79	7.43	24.44	28.16	65.80	1608.1	0.00	0.70	1.20	3.00	0.56	1759.0	7404.4	1.20	232.84							3.24	88.16	86.85
										31.40																				
SOUTHERN CATCHMENT AREA																														
SOUTH PORTION SOMME STREET	23A	23B	0.00	0.25	0.25	0.23	0.23	0.63	0.63	15.00	97.85	61.2	0.00	0.20	1.20	3.00	0.64	66.3	7883.5	0.55	181.00							5.46	93.65	92.50
CULVERT CROSSING	23B	23C		0.00	0.00	0.00	0.23	0.00	0.63	20.46	81.05	50.7					0.42				24.00	1	500	-----	NO	YES	**0.33**	1.55	92.50	92.40
SOUTH PORTION SOMME STREET	23C	24A	0.00	0.17	0.17	0.15	0.38	0.43	1.05	22.00	77.38	81.3	0.00	0.22	1.20	3.00	0.82	97.0	8946.1	0.67	110.00							2.74	92.40	91.50
CULVERT CROSSING	24A	24B		0.00	0.00	0.00	0.38	0.00	1.05	24.75	71.70	75.3					0.42				24.00	1	500	-----	NO	YES	**0.34**	1.04	91.50	91.40
SOUTH PORTION SOMME STREET	24B	24C	0.00	0.21	0.21	0.19	0.57	0.53	1.58	25.79	69.78	110.0	0.00	0.25	1.20	3.00	0.70	126.0	8258.2	0.67	142.00							3.52	91.40	90.41
ORGAWORLD - SITE	U/S	24C	1:10 year peak flow = 132 L/s, see Table 4 of Orgaworld Stormwater Site Management Plan, Sept. 2008									132.0																		
SOUTH PORTION SOMME STREET	24C	25	3.70	0.32	4.02	2.88	3.44	8.00	9.58	29.31	64.05	745.3	0.00	0.52	1.20	3.00	0.54	783.8	7289.5	0.97	244.84							4.22	90.41	89.08
SOUTH PORTION SOMME STREET	25	26	2.63	0.12	2.75	1.95	5.39	5.42	14.99	33.53	58.41	1007.7	0.00	0.58	1.20	3.00	0.51	1013.1	7041.5	1.00	90.75							1.51	89.08	88.62
SOUTH PORTION SOMME STREET	26	27A	3.15	0.20	3.35	2.39	7.78	6.63	21.63	35.04	56.65	1357.2	0.00	0.62	1.20	3.00	0.65	1370.0	7970.4	1.19	157.06							2.20	88.62	87.60
SOUTH PORTION SOMME STREET	27A	27B	0.00	0.03	0.03	0.03	7.81	0.08	21.70	37.24	54.29	1310.1	0.00	0.61	1.20	3.00	0.65	1312.4	7973.8	1.18	20.00							0.28	87.60	87.47
CULVERT CROSSING	27B	27C		0.00	0.00	0.00	7.81	0.00	21.70	37.53	54.00	1303.8					0.73				15.00	1	-----	1.39 X 0.97	YES	NO	**0.87**	0.20	87.47	87.36
CORNER OF POND	27C	19	0.00	0.11	0.11	0.10	7.88	0.28	21.98	37.73	53.79	1314.2	0.00	0.65	1.20	3.00	0.71	1622.9	8324.0	1.28	72.00							0.94	87.36	86.85
										38.67																				

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009 (Revised April 2009)

1:10 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION				
	FROM	TO	Area at C of 0.70 (ha)	Area at C of 0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s
SW ENTRANCE TO SOMME STREET	1	2	0.18	0.25	0.43	0.35	0.35	0.97	0.97	15.00	97.85	94.6
CULVERT CROSSING	2	9		0.00	0.00	0.00	0.35	0.00	0.97	19.28	84.12	81.3
SOUTH PORTION SOMME STREET	9	28	2.54	0.35	2.89	2.10	2.44	5.83	6.80	20.44	81.10	551.2
SOUTH PORTION SOMME STREET	28	29A	3.46	0.32	3.78	2.71	5.15	7.53	14.33	24.77	71.65	1026.7
SOUTH PORTION SOMME STREET	29A	29B	0.77	0.11	0.88	0.64	5.79	1.78	16.11	28.58	65.15	1049.5
SOUTH PORTION SOMME STREET	29B	30	0.32	0.12	0.44	0.33	6.13	0.92	17.03	29.92	63.16	1075.8
SOUTH PORTION SOMME STREET	30	22	0.75	0.16	0.91	0.67	6.80	1.86	18.89	31.25	61.31	1158.5
										32.74		
CULVERT CROSSING	22	19		0.00	0.00	0.00	15.59	0.00	43.33	32.74	59.38	2573.1
										32.82		
POND INLET	19	POND		0.00	0.00	0.00	35.97	0.00	100.06	38.67	52.87	5422.6
POND OUTLET DITCH	POND	DITCH	1:10 year controlled post development peak flow = 696 l/s, see SWMHYMO output of this Report									696.0

DETAILS	OPEN DITCH/SWALE DATA									CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT						FLOW	U/S	D/S
	BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)	TIME (min)	Inv (m)	Inv (m)
SW ENTRANCE TO SOMME STREET	0.00	0.32	1.20	3.00	0.61	226.9	7702.7	0.74	189.60							4.28	93.65	92.50
CULVERT CROSSING					0.50				20.00	1	600	-----	NO	**YES**	**0.52**	1.16	92.50	92.40
SOUTH PORTION SOMME STREET	0.00	0.47	1.20	3.00	0.73	694.0	8450.7	1.05	272.58							4.34	92.40	90.41
SOUTH PORTION SOMME STREET	0.00	0.61	1.20	3.00	0.54	1198.8	7283.5	1.07	245.24							3.81	90.41	89.08
SOUTH PORTION SOMME STREET	0.00	0.62	1.20	3.00	0.53	1239.6	7212.0	1.07	86.51							1.34	89.08	88.62
SOUTH PORTION SOMME STREET	0.00	0.58	1.20	3.00	0.70	1191.6	8282.1	1.18	94.12							1.33	88.62	87.96
SOUTH PORTION SOMME STREET	0.00	0.58	1.20	3.00	0.97	1402.6	9748.4	1.39	124.55							1.49	87.96	86.75
CULVERT CROSSING					0.50				20.00	2	-----	1.03 X 0.74	**YES**	NO	**1.30**	0.08	86.85	86.75
POND INLET	3.09	0.38	1.20	3.00	5.68	5629.1	13135.2	3.50	22.00							0.10	86.75	85.50
POND OUTLET DITCH	1.00	0.27	0.38	3.00	2.08	750.9	1506.6	1.54	24.00							0.26	82.50	82.00

Note: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009 (Revised April 2009)

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA							CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
	FROM	TO	Area at C of 0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL			
NORTHERN CATCHMENT AREA																											
WEST SIDE SAPPERS RIDGE	2	3	1.86	0.18	2.04	1.81	1.81	5.02	5.02	15.00	142.89	718.0	0.00	1.20	3.00	0.50	6973.0	1.61	136.80						1.41	92.50	91.82
WEST SIDE SAPPERS RIDGE	3	4	1.89	0.14	2.03	1.80	3.61	5.00	10.02	16.41	135.47	1357.9	0.00	1.20	3.00	0.80	8856.1	2.05	111.00						0.90	91.82	90.93
WEST SIDE SAPPERS RIDGE	4	5	1.76	0.15	1.91	1.69	5.29	4.69	14.71	17.31	131.16	1929.7	0.00	1.20	3.00	0.51	7029.1	1.63	112.85						1.16	90.93	90.36
WEST SIDE SAPPERS RIDGE	5	6	2.43	0.11	2.54	2.23	7.53	6.21	20.92	18.47	126.06	2637.5	0.00	1.20	3.00	0.62	7762.6	1.80	82.79						0.77	90.36	89.85
										19.24																	
NORTH ENTRANCE TO SOMME STREET	8	6		0.03	0.03	0.03	0.03	0.08	0.08	15.00	142.89	11.9	0.00	1.20	3.00	1.30	11276.7	2.61	10.00						0.06	89.98	89.85
										15.06																	
CULVERT CROSSING	6	14		0.00	0.00	0.00	7.56	0.00	21.01	19.24	122.91	2581.8				0.50			20.00	2	-----	1.15 x 0.82	NO	YES	0.19	89.85	89.75
										19.43																	
NORTH PORTION SOMME STREET	13	14	0.85	0.03	0.88	0.77	0.77	2.15	2.15	15.00	142.89	307.4	0.00	1.20	3.00	2.30	14999.4	3.47	10.00						0.05	89.98	89.75
										15.05																	
NORTH PORTION SOMME STREET	14	15	2.93	0.24	3.17	2.80	11.13	7.79	30.95	19.43	122.15	3780.5	0.00	1.20	3.00	0.50	6992.8	1.62	184.04						1.89	89.75	88.83
NORTH PORTION SOMME STREET	15	16	2.08	0.18	2.26	2.00	13.13	5.56	36.51	21.32	115.16	4204.4	0.00	1.20	3.00	0.57	7480.8	1.73	145.08						1.40	88.83	88.00
NORTH PORTION SOMME STREET	16	18	2.34	0.23	2.57	2.28	15.41	6.33	42.84	22.72	110.55	4736.0	0.00	1.20	3.00	0.51	7074.8	1.64	185.66						1.89	88.00	87.05
NORTH PORTION SOMME STREET	18	19	0.00	0.05	0.05	0.05	15.46	0.14	42.98	24.61	104.93	4509.7	0.00	1.20	3.00	0.72	8372.8	1.94	41.86						0.36	87.05	86.75
										24.97																	
EAST SIDE SAPPERS RIDGE	9	10	1.74	0.19	1.93	1.71	1.71	4.76	4.76	15.00	142.89	680.4	0.00	1.20	3.00	0.50	6996.6	1.62	147.87						1.52	92.40	91.66
EAST SIDE SAPPERS RIDGE	10	11	1.49	0.14	1.63	1.44	3.16	4.02	8.78	16.52	134.93	1184.3	0.00	1.20	3.00	0.66	8019.2	1.86	111.04						1.00	91.66	90.93
EAST SIDE SAPPERS RIDGE	11	12	0.73	0.14	0.87	0.78	3.94	2.16	10.94	17.52	130.23	1424.7	0.00	1.20	3.00	0.55	7304.8	1.69	104.49						1.03	90.93	90.36
EAST SIDE SAPPERS RIDGE	12	7	0.18	0.09	0.27	0.25	4.18	0.69	11.63	18.55	125.73	1462.2	0.00	1.20	3.00	0.81	8919.0	2.06	72.55						0.59	90.36	89.77
NORTH PORTION SOMME STREET	7	20	1.07	0.23	1.30	1.17	5.35	3.24	14.87	19.13	123.33	1834.1	0.00	1.20	3.00	0.50	6966.1	1.61	177.39						1.83	89.77	88.89
NORTH PORTION SOMME STREET	20	21	2.27	0.19	2.46	2.18	7.53	6.05	20.92	20.97	116.41	2435.6	0.00	1.20	3.00	0.50	6981.9	1.62	147.49						1.52	88.89	88.16
NORTH PORTION SOMME STREET	21	22	3.43	0.30	3.73	3.30	10.83	9.18	30.10	22.49	111.29	3350.0	0.00	1.20	3.00	0.56	7404.4	1.71	232.84						2.26	88.16	86.85
										24.75																	
SOUTHERN CATCHMENT AREA																											
SOUTH PORTION SOMME STREET	23A	23B	0.00	0.25	0.25	0.25	0.25	0.70	0.70	15.00	142.89	99.3	0.00	1.20	3.00	0.64	7883.5	1.82	181.00						1.65	93.65	92.50
CULVERT CROSSING	23B	23C		0.00	0.00	0.00	0.25	0.00	0.70	16.65	134.29	93.3				0.42			24.00	1	500	-----	NO	YES	0.84	92.50	92.40
SOUTH PORTION SOMME STREET	23C	24A	0.00	0.17	0.17	0.17	0.42	0.47	1.17	17.49	130.34	152.2	0.00	1.20	3.00	0.82	8946.1	2.07	110.00						0.89	92.40	91.50
CULVERT CROSSING	24A	24B		0.00	0.00	0.00	0.42	0.00	1.17	18.38	126.45	147.6				0.42			24.00	1	500	-----	NO	YES	0.53	91.50	91.40
SOUTH PORTION SOMME STREET	24B	24C	0.00	0.21	0.21	0.21	0.63	0.58	1.75	18.91	124.24	217.6	0.00	1.20	3.00	0.70	8258.2	1.91	142.00						1.24	91.40	90.41
ORGAWORLD - SITE	U/S	24C	1:100 year peak flow = 283 l/s, see Table 4 of Orgaworld Stormwater Site Management Plan, Sept. 2008									283.0															
SOUTH PORTION SOMME STREET	24C	25	3.70	0.32	4.02	3.56	4.19	9.89	11.64	20.15	119.40	1672.8	0.00	1.20	3.00	0.54	7289.5	1.69	244.84						2.42	90.41	89.08
SOUTH PORTION SOMME STREET	25	26	2.63	0.12	2.75	2.42	6.61	6.73	18.37	22.57	111.05	2323.0	0.00	1.20	3.00	0.51	7041.5	1.63	90.75						0.93	89.08	88.62
SOUTH PORTION SOMME STREET	26	27A	3.15	0.20	3.35	2.96	9.57	8.22	26.59	23.49	108.17	3159.5	0.00	1.20	3.00	0.65	7970.4	1.84	157.06						1.42	88.62	87.60
SOUTH PORTION SOMME STREET	27A	27B	0.00	0.03	0.03	0.03	9.60	0.08	26.67	24.91	104.09	3059.5	0.00	1.20	3.00	0.65	7973.8	1.85	20.00						0.18	87.60	87.47
CULVERT CROSSING	27B	27C		0.00	0.00	0.00	9.60	0.00	26.67	25.09	103.59	3046.2				0.73			15.00	1	-----	1.39 X 0.97	YES	NO	0.09	87.47	87.36
CORNER OF POND	27C	19	0.00	0.11	0.11	0.11	9.71	0.31	26.98	25.18	103.36	3071.7	0.00	1.20	3.00	0.71	8324.0	1.93	72.00						0.62	87.36	86.85
										25.80																	

J.L. RICHARDS AND ASSOCIATES LIMITED, Consulting Engineers, Architects and Planners

DATE : 5/27/2009

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009 (Revised April 2009)

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION				
	FROM	TO	Area at C of 0.70 (ha)	Area at C of 0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s
SW ENTRANCE TO SOMME STREET	1	2	0.18	0.25	0.43	0.40	0.40	1.12	1.12	15.00	142.89	160.5
CULVERT CROSSING	2	9		0.00	0.00	0.00	0.40	0.00	1.12	16.77	133.71	150.2
SOUTH PORTION SOMME STREET	9	28	2.54	0.35	2.89	2.58	2.98	7.16	8.29	17.40	130.77	1083.6
SOUTH PORTION SOMME STREET	28	29A	3.46	0.32	3.78	3.35	6.33	9.31	17.59	19.72	121.01	2128.9
SOUTH PORTION SOMME STREET	29A	29B	0.77	0.11	0.88	0.79	7.11	2.19	19.78	22.15	112.40	2223.0
SOUTH PORTION SOMME STREET	29B	30	0.32	0.12	0.44	0.40	7.51	1.11	20.89	23.01	109.65	2290.7
SOUTH PORTION SOMME STREET	30	22	0.75	0.16	0.91	0.82	8.33	2.27	23.16	23.83	107.18	2482.3
										24.75		
CULVERT CROSSING	22	19		0.00	0.00	0.00	19.16	0.00	53.26	24.75	104.53	5567.5
										24.79		
POND INLET	19	POND		0.00	0.00	0.00	44.32	0.00	123.22	25.80	101.69	12813.8
POND OUTLET DITCH	POND	DITCH	1:100 year controlled post development peak flow = 1,432 l/s, see SWMHYMO output of this Report									1432.0

DETAILS	OPEN DITCH/SWALE DATA							CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW	U/S	D/S
	BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	TIME (min)	Inv (m)	Inv (m)
SW ENTRANCE TO SOMME STREET	0.00	1.20	3.00	0.61	7702.7	1.78	189.60						1.77	93.65	92.50
CULVERT CROSSING				0.50			20.00	1	600	-----	NO	YES	0.63	92.50	92.40
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.73	8450.7	1.96	272.58						2.32	92.40	90.41
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.54	7283.5	1.69	245.24						2.42	90.41	89.08
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.53	7212.0	1.67	86.51						0.86	89.08	88.62
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.70	8282.1	1.92	94.12						0.82	88.62	87.96
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.97	9748.4	2.26	124.55						0.92	87.96	86.75
CULVERT CROSSING				0.50			20.00	2	-----	1.03 X 0.74	YES	NO	0.04	86.85	86.75
POND INLET	3.09	0.55	5.00	5.68	13135.2	4.09	22.00						0.09	86.75	85.50
POND OUTLET DITCH	1.00	0.38	3.00	2.08	1506.6	1.85	24.00						0.22	82.50	82.00

Note: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009

10 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0% up C = 1.0

DETAILS	NODES		DRAINAGE AREA							PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA									CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT						FLOW TIME	U/S Inv	D/S Inv
	FROM	TO	AREA (A) at C of 0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)	(min)	(m)	(m)
WEST CATCHMENT AREA																																
WEST SIDE HAWTHORNE ROAD	1	2		2.46		0.14	2.60	0.86	0.86	2.40	2.40	15.00	97.85	235.0	0.00	0.41	0.50	3.00	0.20	250.1	424.5	0.50	112.00							3.76	103.22	103.00
WEST SIDE HAWTHORNE ROAD	2	3		1.60		0.06	1.66	0.53	1.40	1.48	3.89	18.76	85.54	332.5	0.00	0.25	0.50	3.00	5.00	337.3	2141.9	1.80	50.00							0.46	103.00	100.50
WEST SIDE HAWTHORNE ROAD	3	4		1.58		0.06	1.64	0.53	1.93	1.47	5.35	19.23	84.26	451.1	0.00	0.27	0.50	3.00	7.00	490.1	2534.3	2.24	50.00							0.37	100.50	97.00
WEST SIDE HAWTHORNE ROAD	4	5		1.58		0.06	1.64	0.53	2.45	1.47	6.82	19.60	83.26	568.0	0.00	0.34	0.50	3.00	5.00	765.9	2141.9	2.21	50.00							0.38	97.00	94.50
WEST SIDE HAWTHORNE ROAD	5	6a		1.95		0.10	2.05	0.68	3.13	1.88	8.70	19.98	82.27	715.6	0.00	0.45	0.65	3.00	1.07	747.0	1991.5	1.23	75.00							1.02	94.50	93.70
CULVERT CROSSING	6a	6b				0.00	0.00	0.00	3.13	0.00	8.70	20.99	79.73	693.6					1.00				10.00	1	800	------	YES	NO	**0.84**	0.12	93.70	93.60
WEST SIDE HAWTHORNE ROAD	6b	7		1.20		0.03	1.23	0.39	3.52	1.08	9.77	21.11	79.45	776.5	0.00	0.53	1.15	3.00	0.53	817.1	6447.9	0.97	15.00							0.26	93.60	93.52
WEST SIDE HAWTHORNE ROAD	7	8		1.58		0.06	1.64	0.53	4.04	1.47	11.24	21.37	78.83	886.3	0.00	0.56	1.15	3.00	0.50	916.3	6243.2	0.97	50.00							0.86	93.52	93.27
WEST SIDE HAWTHORNE ROAD	8	9		1.58		0.06	1.64	0.53	4.57	1.47	12.71	22.23	76.88	977.2	0.00	0.58	1.15	3.00	0.50	1006.2	6243.2	1.00	50.00							0.84	93.27	93.02
WEST SIDE HAWTHORNE ROAD	9	10		1.58		0.06	1.64	0.53	5.10	1.47	14.18	23.06	75.07	1064.4	0.00	0.60	1.15	3.00	0.50	1101.4	6243.2	1.02	50.00							0.82	93.02	92.77
WEST SIDE HAWTHORNE ROAD	10	11		1.58		0.06	1.64	0.53	5.63	1.47	15.65	23.88	73.39	1148.3	0.00	0.62	1.15	3.00	0.50	1202.1	6243.2	1.04	50.00							0.80	92.77	92.52
WEST SIDE HAWTHORNE ROAD	11	12		1.48		0.06	1.54	0.50	6.13	1.38	17.03	24.68	71.83	1223.3	0.00	0.63	1.15	3.00	0.50	1254.5	6243.2	1.05	50.00							0.79	92.52	92.27
WEST SIDE HAWTHORNE ROAD	12	13		1.34		0.06	1.40	0.46	6.58	1.27	18.30	25.47	70.35	1287.3	0.00	0.64	1.15	3.00	0.50	1308.3	6243.2	1.06	50.00							0.78	92.27	92.02
WEST SIDE HAWTHORNE ROAD	13	14b		1.54		0.21	1.75	0.65	7.23	1.81	20.11	26.25	68.96	1386.6	0.00	0.64	1.15	3.00	0.61	1449.7	6918.0	1.18	158.00							2.23	92.02	91.05
												28.49																				
SW RIDEAU & HAWTHORNE	14a	14b		0.64		0.18	0.82	0.35	0.35	0.98	0.98	15.00	97.85	96.3	0.00	0.20	1.30	3.00	4.06	167.6	24661.5	1.40	140.00							1.67	96.73	91.05
												16.67																				
CULVERT CROSSING	14b	23				0.00	0.00	0.00	7.59	0.00	21.09	28.49	65.29	1377.2					1.40				20.00	1	1000	------	YES	NO	**1.14**	0.19	91.05	90.77
												28.68																				
EAST CATCHMENT AREA																																
EAST SIDE HAWTHORNE ROAD	15	16				0.33	0.33	0.30	0.30	0.83	0.83	15.00	97.85	80.8	0.00	0.25	0.30	3.00	0.45	101.7	165.4	0.54	110.00							3.38	103.80	103.30
EAST SIDE HAWTHORNE ROAD	16	17				0.14	0.14	0.13	0.42	0.35	1.18	18.38	86.64	101.9	0.00	0.16	0.30	3.00	6.20	114.3	610.8	1.49	100.00							1.12	103.30	97.10
EAST SIDE HAWTHORNE ROAD	17	18				0.04	0.04	0.04	0.46	0.10	1.28	19.50	83.52	106.6	0.00	0.16	1.20	3.00	6.36	115.8	24949.6	1.51	33.00							0.36	97.10	95.00
CULVERT CROSSING	18	19				0.00	0.00	0.00	0.46	0.00	1.28	19.86	82.56	105.3					1.77				22.00	1	600	------	YES	NO	**0.30**	0.98	95.00	94.61
EAST SIDE HAWTHORNE ROAD	19	20				0.06	0.06	0.05	0.51	0.15	1.43	20.85	80.08	114.2	0.00	0.21	0.70	3.00	2.79	158.3	3925.7	1.20	24.00							0.33	94.61	93.94
CULVERT CROSSING	20	21				0.00	0.00	0.00	0.51	0.00	1.43	21.18	79.28	113.1					0.50				20.00	1	600	------	NO	YES	**0.37**	0.83	93.94	93.84
EAST SIDE HAWTHORNE ROAD	21	22a	0.21			0.16	0.37	0.19	0.70	0.52	1.94	22.02	77.35	150.3	0.00	0.29	0.80	3.00	0.50	158.5	2372.0	0.63	82.00							2.18	93.84	93.43
EAST SIDE HAWTHORNE ROAD	22a	22b	0.61			0.29	0.90	0.38	1.08	1.06	3.01	24.19	72.77	218.9	0.00	0.33	1.17	3.00	0.52	228.1	6666.4	0.70	175.00							4.18	93.43	92.52
EAST SIDE HAWTHORNE ROAD	22b	23	0.93			0.34	1.27	0.49	1.57	1.37	4.38	28.37	65.47	286.5	0.00	0.35	1.17	3.00	0.70	309.6	7734.6	0.84	260.00							5.14	92.59	90.77
												33.51																				
SOUTH CATCHMENT AREA																																
SOUTH SIDE RIDEAU ROAD	23	24	0.73			0.28	1.01	0.40	9.56	1.11	26.57	33.51	58.43	1552.8	0.00	0.51	1.74	3.00	2.65	1642.9	43339.8	2.11	235.00							1.86	90.77	84.55
												35.37																				
WEST SIDE SOMME STREET	25	24			0.42	0.12	0.54	0.40	0.40	1.12	1.12	15.00	97.85	109.4	0.00	0.18	1.20	3.00	2.80	105.1	16548.0	1.08	125.74							1.94	89.98	86.46
												16.94																				
CULVERT CROSSING	24	26				0.00	0.00	0.00	9.96	0.00	27.69	35.37	56.28	1558.5					1.00				20.00	1	800	------	NO	YES	**2.31**	0.11	84.55	84.35
												35.48																				
EAST SIDE SOMME STREET	27	26			0.32	0.11	0.43	0.32	0.32	0.90	0.90	15.00	97.85	87.9	0.00	0.17	1.20	3.00	2.80	90.3	16548.0	1.04	125.74							2.01	89.98	86.46
												17.01																				
SOUTH SIDE RIDEAU ROAD	26	28	0.58			0.24	0.82	0.33	10.62	0.92	29.51	35.48	56.16	1657.5	0.00	0.66	2.20	3.00	0.71	1695.7	42043.4	1.30	183.76							2.36	84.35	83.04
												37.84																				

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009

10 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0% up C = 1.0

DETAILS	NODES		DRAINAGE AREA							PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA									CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT						FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
	FROM	TO	AREA (A) at C of 0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)			
NORTH CATCHMENT AREA																																
			Existing 900 mm dia. culvert capacity before ditch flows to Findlay Creek											1400.0																		
NORTH SIDE RIDEAU ROAD	31	32	6.66			0.52	7.18	1.80	1.80	5.00	5.00	20.00	97.26	[redacted]	0.00	0.58	1.50	3.00	1.93	1974.3	24880.1	1.96	400.00							3.41	90.71	83.01
												23.41																				
	33	32	0.87			0.10	0.97	0.26	0.26	0.73	0.73	15.00	115.83	[redacted]	0.00	0.40	1.50	3.00	0.16	213.3	7240.8	0.44	92.00							3.45	83.16	83.01
												18.45																				
:XISTING CULVERT CROSSING	32	28				0.00	0.00	0.00	2.06	0.00	5.74	23.41	87.93	[redacted]					-0.15				20.00	1	1000					0.14	83.01	83.04
												23.55																				
SOUTH CATCHMENT AREA																																
SOUTH SIDE RIDEAU ROAD	28	29	0.90			0.33	1.23	0.48	13.16	1.33	36.58	37.84	53.68	3363.5	0.00	1.17	2.20	3.00	0.14	3437.1	18513.7	0.84	347.24							6.91	83.04	82.56
SOUTH SIDE RIDEAU ROAD	29	30	0.48			0.31	0.79	0.38	13.53	1.04	37.62	44.76	47.64	3192.1	0.00	0.90	2.20	3.00	0.51	3287.0	35640.2	1.35	236.20							2.91	82.56	81.35

ote: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

[redacted]

J.L. RICHARDS AND ASSOCIATES LIMITED, Consulting Engineers, Architects and Planners

DATE : 4/28/2009

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983
February 2009

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0% up C = 1.0

DETAILS	NODES		DRAINAGE AREA							PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA							CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW	U/S	D/S
	FROM	TO	AREA (A) at C of 0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	TIME (min)	Inv (m)	Inv (m)
WEST CATCHMENT AREA																													
WEST SIDE HAWTHORNE ROAD	1	2		2.46		0.14	2.60	1.06	1.06	2.95	2.95	15.00	142.89	422.1	0.00	0.50	3.00	0.20	424.5	0.57	112.00						3.30	103.22	103.00
WEST SIDE HAWTHORNE ROAD	2	3		1.60		0.06	1.66	0.66	1.72	1.83	4.79	18.30	126.80	607.2	0.00	0.50	3.00	5.00	2141.9	2.86	50.00						0.29	103.00	100.50
WEST SIDE HAWTHORNE ROAD	3	4		1.58		0.06	1.64	0.65	2.38	1.81	6.60	18.59	125.56	829.0	0.00	0.50	3.00	7.00	2534.3	3.38	50.00						0.25	100.50	97.00
WEST SIDE HAWTHORNE ROAD	4	5		1.58		0.06	1.64	0.65	3.03	1.81	8.42	18.84	124.54	1048.2	0.00	0.50	3.00	5.00	2141.9	2.86	50.00						0.29	97.00	94.50
WEST SIDE HAWTHORNE ROAD	5	6A		1.95		0.10	2.05	0.83	3.86	2.31	10.73	19.13	123.35	1323.2	0.00	0.65	3.00	1.07	1991.5	1.57	75.00						0.80	94.50	93.70
CULVERT CROSSING	6A	6B				0.00	0.00	0.00	3.86	0.00	10.73	19.92	120.24	1289.9				1.00			10.00	1	800	------	**YES**	NO	0.06	93.70	93.60
WEST SIDE HAWTHORNE ROAD	6B	7		1.20		0.03	1.23	0.48	4.34	1.33	12.06	19.99	119.99	1447.3	0.00	1.15	3.00	0.53	6447.9	1.63	15.00						0.15	93.60	93.52
WEST SIDE HAWTHORNE ROAD	7	8		1.58		0.06	1.64	0.65	4.99	1.81	13.88	20.14	119.42	1657.0	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	93.52	93.27
WEST SIDE HAWTHORNE ROAD	8	9		1.58		0.06	1.64	0.65	5.64	1.81	15.69	20.67	117.47	1843.0	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	93.27	93.02
WEST SIDE HAWTHORNE ROAD	9	10		1.58		0.06	1.64	0.65	6.30	1.81	17.50	21.20	115.59	2023.3	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	93.02	92.77
WEST SIDE HAWTHORNE ROAD	10	11		1.58		0.06	1.64	0.65	6.95	1.81	19.32	21.73	113.78	2197.9	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	92.77	92.52
WEST SIDE HAWTHORNE ROAD	11	12		1.48		0.06	1.54	0.62	7.56	1.71	21.03	22.26	112.03	2355.6	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	92.52	92.27
WEST SIDE HAWTHORNE ROAD	12	13		1.34		0.06	1.40	0.56	8.13	1.56	22.59	22.79	110.34	2492.6	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	92.27	92.02
WEST SIDE HAWTHORNE ROAD	13	14B		1.54		0.21	1.75	0.79	8.91	2.19	24.78	23.32	108.70	2693.6	0.00	1.15	3.00	0.61	6918.0	1.74	158.00						1.51	92.02	91.05
												24.83																	
SW RIDEAU & HAWTHORNE	14A	14B		0.64		0.18	0.82	0.42	0.42	1.17	1.17	15.00	142.89	166.8	0.00	1.30	3.00	4.06	24661.5	4.86	140.00						0.48	96.73	91.05
												15.48																	
CULVERT CROSSING	14B	23				0.00	0.00	0.00	9.33	0.00	25.95	24.83	104.32	2706.8				1.40			20.00	1	1000	------	**YES**	NO	0.10	91.05	90.77
												24.93																	
EAST CATCHMENT AREA																													
EAST SIDE HAWTHORNE ROAD	15	16				0.33	0.33	0.33	0.33	0.92	0.92	15.00	142.89	131.1	0.00	0.30	3.00	0.45	165.4	0.61	110.00						2.99	103.80	103.30
EAST SIDE HAWTHORNE ROAD	16	17				0.14	0.14	0.14	0.47	0.39	1.31	17.99	128.11	167.4	0.00	0.30	3.00	6.20	610.8	2.26	100.00						0.74	103.30	97.10
EAST SIDE HAWTHORNE ROAD	17	18				0.04	0.04	0.04	0.51	0.11	1.42	18.73	124.98	177.2	0.00	1.20	3.00	6.36	24949.6	5.78	33.00						0.10	97.10	95.00
CULVERT CROSSING	18	19				0.00	0.00	0.00	0.51	0.00	1.42	18.82	124.58	176.6				1.77			22.00	1	600	------	**YES**	NO	0.59	95.00	94.61
EAST SIDE HAWTHORNE ROAD	19	20				0.06	0.06	0.06	0.57	0.17	1.58	19.41	122.22	193.7	0.00	0.70	3.00	2.79	3925.7	2.67	24.00						0.15	94.61	93.94
CULVERT CROSSING	20	21				0.00	0.00	0.00	0.57	0.00	1.58	19.56	121.63	192.7				0.50			20.00	1	600	------	NO	**YES**	0.49	93.94	93.84
EAST SIDE HAWTHORNE ROAD	21	22A	0.21			0.16	0.37	0.21	0.78	0.59	2.18	20.05	119.76	260.5	0.00	0.80	3.00	0.50	2372.0	1.24	82.00						1.11	93.84	93.43
EAST SIDE HAWTHORNE ROAD	22A	22B	0.61			0.29	0.90	0.44	1.23	1.23	3.41	21.16	115.75	394.2	0.00	1.17	3.00	0.52	6666.4	1.62	175.00						1.80	93.43	92.52
EAST SIDE HAWTHORNE ROAD	22B	23	0.93			0.34	1.27	0.57	1.80	1.59	5.00	22.95	109.83	548.8	0.00	1.17	3.00	0.70	7734.6	1.88	260.00						2.30	92.59	90.77
												25.25																	
SOUTH CATCHMENT AREA																													
SOUTH SIDE RIDEAU ROAD	23	24	0.73			0.28	1.01	0.46	11.59	1.29	32.23	25.25	103.15	3324.7	0.00	1.74	3.00	2.65	43339.8	4.77	235.00						0.82	90.77	84.55
												26.08																	
WEST SIDE SOMME STREET	25	24			0.42	0.12	0.54	0.49	0.49	1.36	1.36	15.00	142.89	193.7	0.00	1.20	3.00	2.80	16548.0	3.83	125.74						0.55	89.98	86.46
												15.55																	
CULVERT CROSSING	24	26				0.00	0.00	0.00	12.08	0.00	33.59	26.08	100.99	3391.7				1.00			20.00	1	800	------	NO	**YES**	0.05	84.55	84.35
												26.12																	
EAST SIDE SOMME STREET	27	26			0.32	0.11	0.43	0.39	0.39	1.08	1.08	15.00	142.89	154.9	0.00	1.20	3.00	2.80	16548.0	3.83	125.74						0.55	89.98	86.46
												15.55																	
SOUTH SIDE RIDEAU ROAD	26	28	0.58			0.24	0.82	0.39	12.86	1.07	35.74	26.12	100.86	3604.7	0.00	2.20	3.00	0.71	42043.4	2.90	183.76						1.06	84.35	83.04
												27.18																	

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983
February 2009

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0% up C = 1.0

DETAILS	NODES FROM	NODES TO	DRAINAGE AREA: AREA (A) at C of 0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	PEAK FLOW GENERATION: 2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s
NORTH CATCHMENT AREA														
			Existing 900 mm dia. Culvert Capacity before ditch flows to Findlay Creek											1400.0
NORTH SIDE RIDEAU ROAD	31	32	6.66			0.52	7.18	2.19	2.19	6.07	6.07	20.00	119.95	2128.6
												21.81		
NORTH SIDE RIDEAU ROAD	33	32	0.87			0.10	0.97	0.32	0.32	0.88	0.88	15.00	142.89	126.1
												16.43		
EXISTING CULVERT CROSSING	32	28				0.00	0.00	0.00	2.50	0.00	6.96	21.81	113.52	2189.7
												21.93		
SOUTH CATCHMENT AREA														
SOUTH SIDE RIDEAU ROAD	28	29	0.90			0.33	1.23	0.56	15.91	1.54	44.24	27.18	98.22	5745.1
SOUTH SIDE RIDEAU ROAD	29	30	0.48			0.31	0.79	0.43	16.34	1.20	45.44	31.72	88.42	5417.3

DETAILS	OPEN DITCH/SWALE DATA: BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT: No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
NORTH CATCHMENT AREA															
NORTH SIDE RIDEAU ROAD	0.00	1.50	3.00	1.93	24880.1	3.69	400.00						1.81	90.71	83.01
NORTH SIDE RIDEAU ROAD	0.00	1.50	3.00	0.16	7240.8	1.07	92.00						1.43	83.16	83.01
EXISTING CULVERT CROSSING				-0.15			20.00	1	1000				0.12	83.01	83.04
SOUTH CATCHMENT AREA															
SOUTH SIDE RIDEAU ROAD	0.00	2.20	3.00	0.14	18513.7	1.28	347.24						4.54	83.04	82.56
SOUTH SIDE RIDEAU ROAD	0.00	2.20	3.00	0.51	35640.2	2.45	236.20						1.60	82.56	81.35

Note: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

HAWTHORNE INDUSTRIAL PARK

1:10 YEAR ROADSIDE CULVERT DESIGN

CONVENTIONAL CULVERT DESIGN

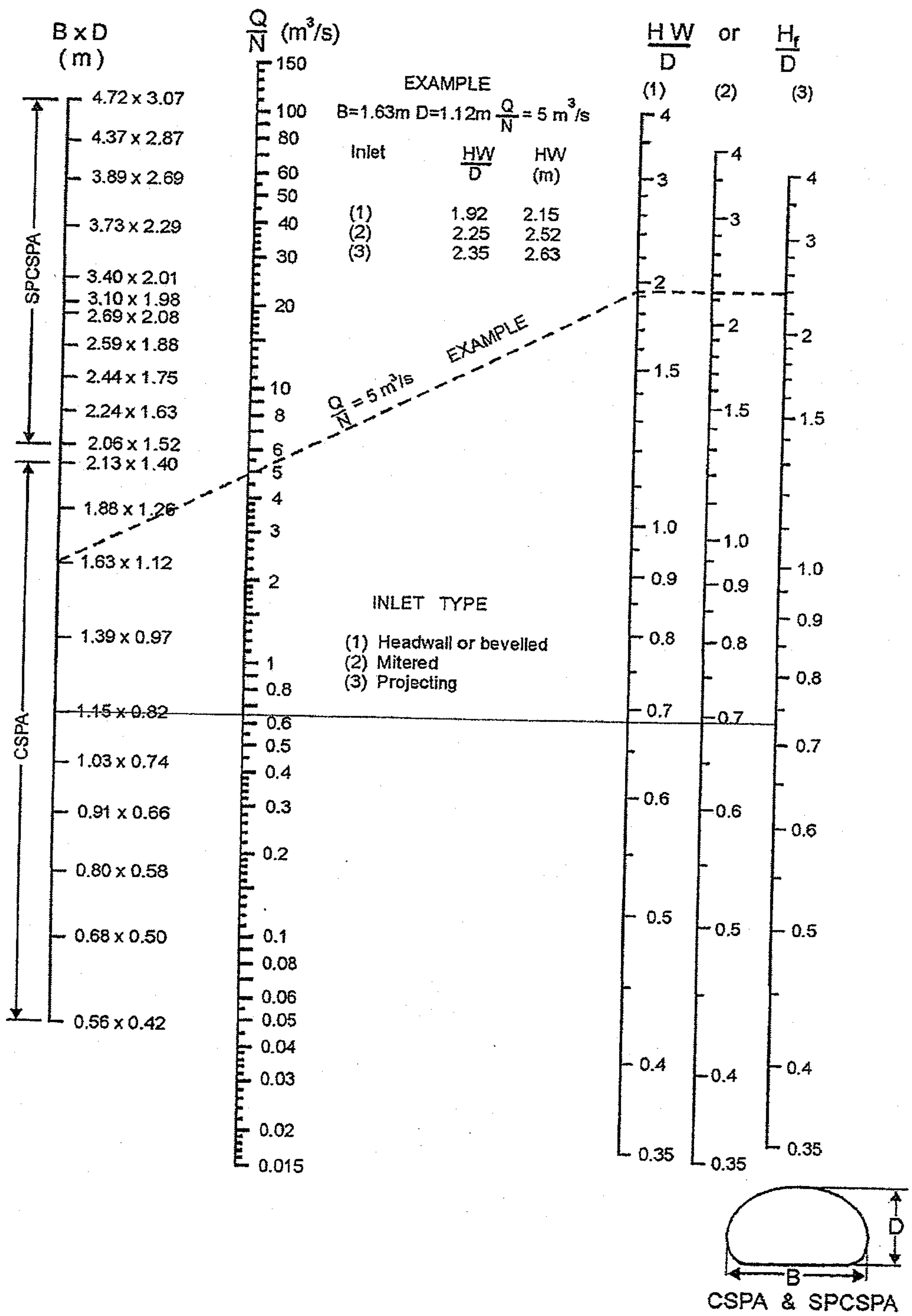
Prepared by: Mark Buchanan, E.I.T.
Reviewed by: Guy Forget, P.Eng.
Date: February 2009

Station	DESIGN DATA							CULVERT DATA						INLET CONTROL			OUTLET CONTROL								GOVERNING	VEL
	Q	d	d_e	AHW	Skew No.	L	S	Description	B	D or H	N	Q/N	A (each)	Q/NB	HW/D	HW	K_e	H	d_c	$(d_c + D)/2$	TW	h_o	LS	HW	HW	V_o
	(m^3/s)	(m)	(m)	(m)		(m)	(m/m)		(m)	(m)		(m^3/s)	(m^2)	($m^3/s/m$)		(m)		(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m/s)
1	2	3	4	5	6	7	8	9	10a	10b	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
6 to 14	1.296	0.67	0.05	1.1	0	20.0	0.005	CSPA 6	1.15	0.82	2	0.648	0.74	----	0.73	0.60	0.9	0.13	0.33	0.58	0.72	0.72	0.10	0.75	0.75	
23B to 23C	0.051	0.22	0.05	1.15	0	24.0	0.004	CSP 500	N/A	0.5	1	0.051	0.20	----	0.50	0.25	0.9	0.1	0.15	0.33	0.27	0.33	0.10	0.33	0.33	
24A to 24B	0.075	0.25	0.05	1.15	0	24.0	0.004	CSP 500	N/A	0.5	1	0.075	0.20	----	0.54	0.27	0.9	0.1	0.18	0.34	0.30	0.34	0.10	0.34	0.34	
2 to 9	0.081	0.47	0.05	1.15	0	20.0	0.005	CSP 600	N/A	0.6	1	0.081	0.28	----	0.50	0.30	0.9	0.1	0.19	0.40	0.52	0.52	0.10	0.52	0.52	
27B to 27C	1.304	0.61	0.05	1.23	0	15.0	0.007	CSPA 7	1.39	0.97	1	1.304	1.06	----	0.90	0.87	0.9	0.22	0.45	0.71	0.66	0.71	0.11	0.82	0.87	
22 to 19	2.573	0.38	0.05	1.35	0	20.0	0.005	CSPA 5	1.03	0.74	2	1.287	0.61	----	1.75	1.30	0.9	0.74	0.51	0.63	0.43	0.63	0.10	1.27	1.30	

2 From Form PH-D-533, col. 12
3 Flood Depth
4 Embedment below channel invert
5 Col. 3 + col. 4 + allowable backwater
7 Allowance for skew if applicable
8 Culvert Slope
10a/b D (circular) or B x H (arch)
11 Number of Barrels
13 Area per barrel
14 For box only
15 Charts D5-1A to C and E to J
16 HW = col. 15 x D (col. 10)
17 Chart D5-8
18 Charts D5-2A to G
19 Charts D5-3A to F: (d_c > D)
21 Col. 3 + col. 4
22 H_o = larger of cols. 20 and 21
23 Col. 7 x col. 8
24 HW = col. 18 + col. 22 - col. 23
25 Larger of cols 16 and 24
26 Outlet velocity if required (Subsection 3.2.3)

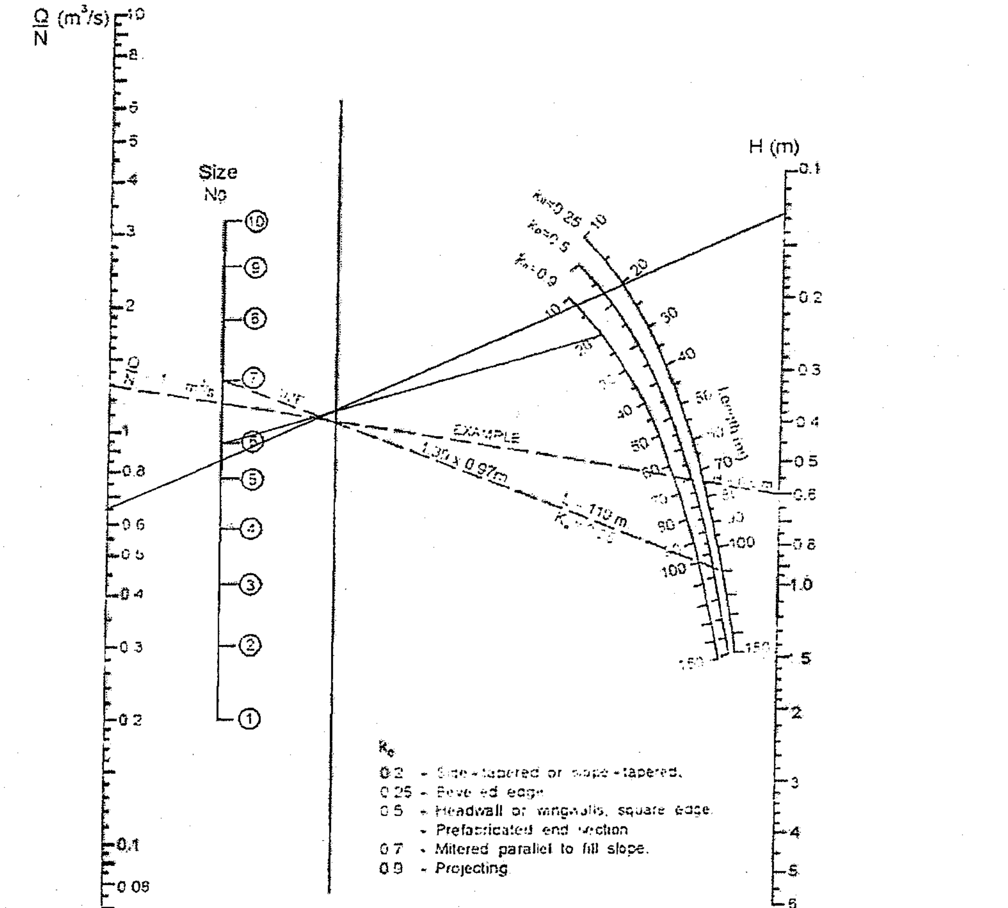
Culvert Crossing 6-14 2x1.15m x 0.82m

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts

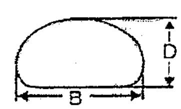


Source: Herr (1977)

Design Chart 5.47: Outlet Control: Pipe Arch CSP Culvert - Flowing Full



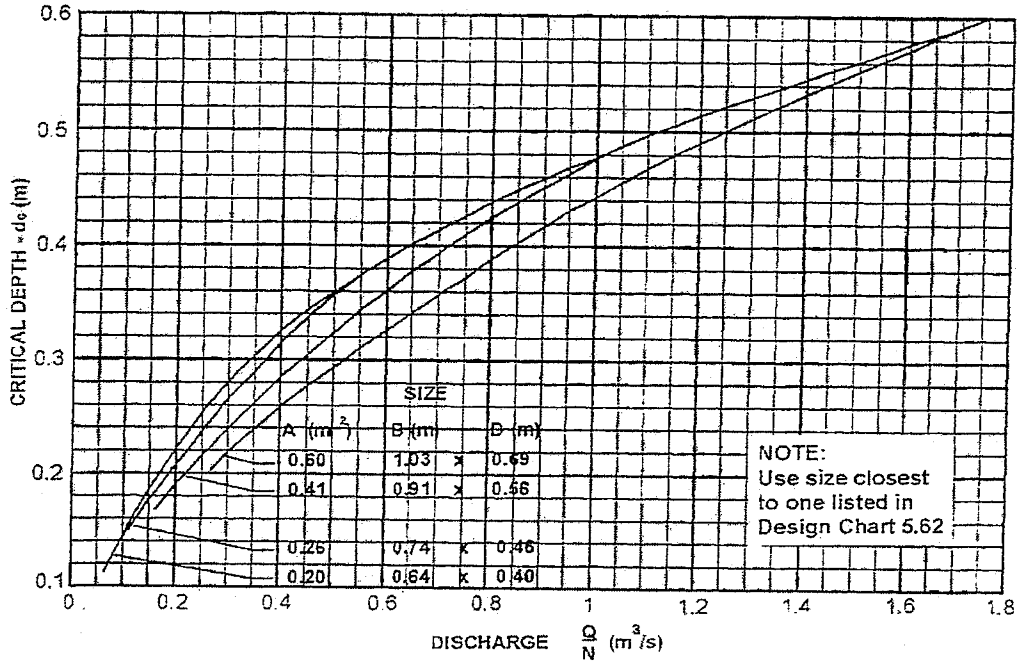
CSPA SIZES	
No	B(m) x D(m)
1	0.55 x 0.42
2	0.68 x 0.50
3	0.80 x 0.58
4	0.91 x 0.66
5	1.03 x 0.74
6	1.15 x 0.82
7	1.39 x 0.97
8	1.63 x 1.12
9	1.88 x 1.26
10	2.13 x 1.40

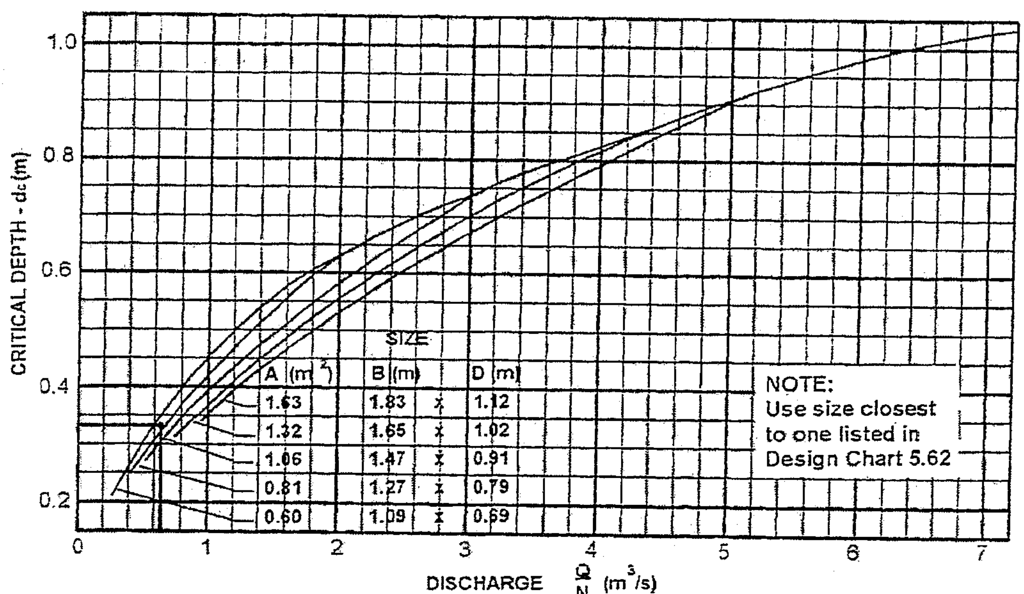


n = 0.024

Source: Herr (1977)

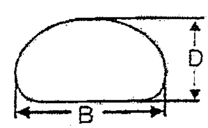
Design Chart 5.53: CSP Pipe Arch Culverts





($d_c \ngtr D$)

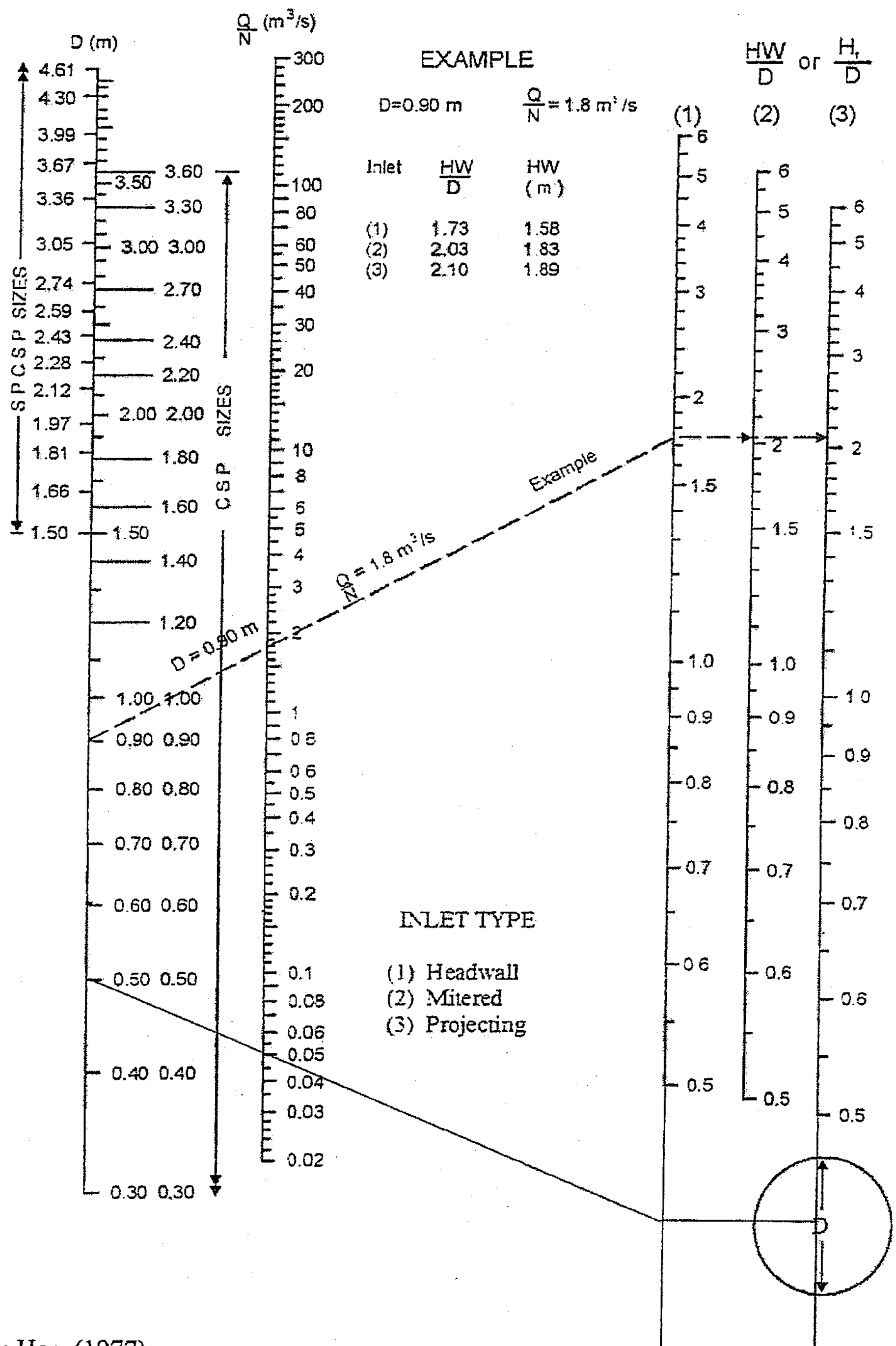
A = Cross-sectional area per barrel interpolated for other sizes



Source: Herr (1977)

Culvert Crossing 23b to 23c 500 mm Ø

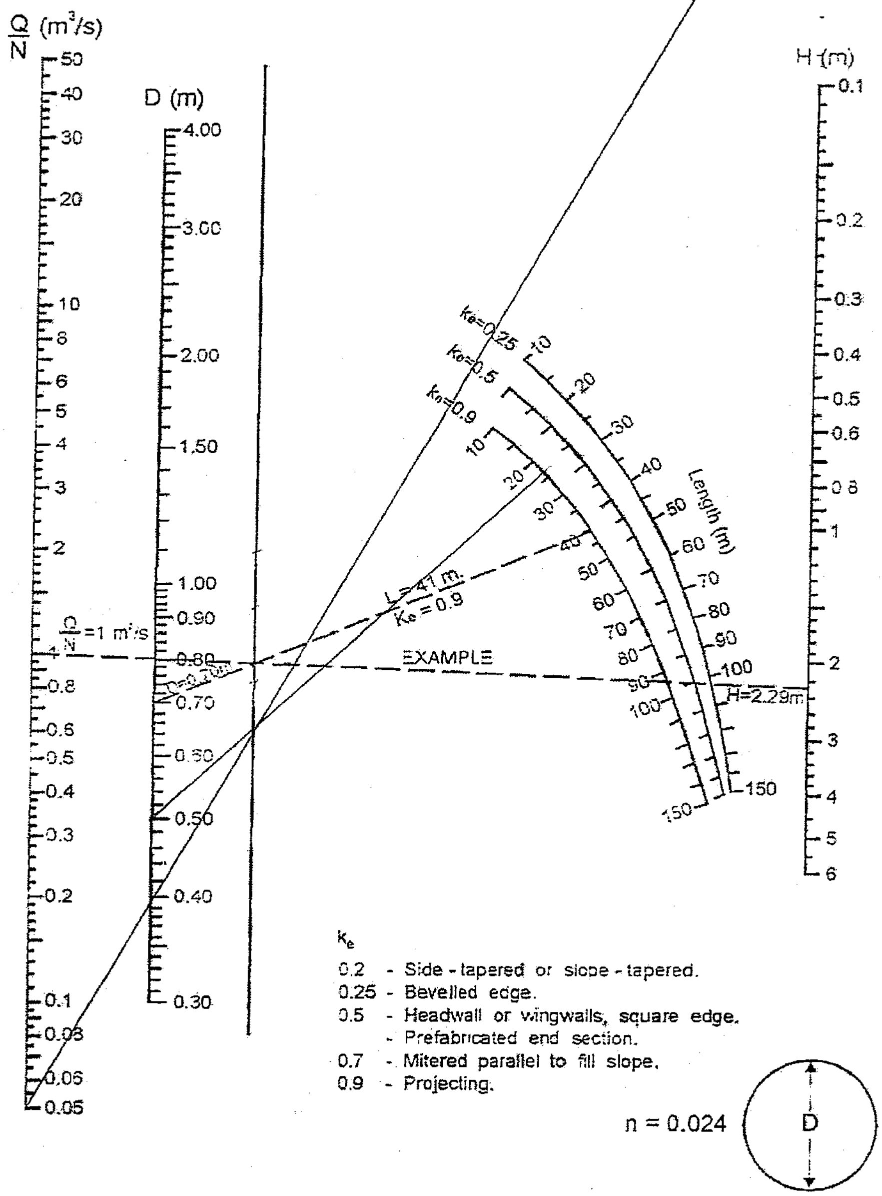
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

H < 0.1 m



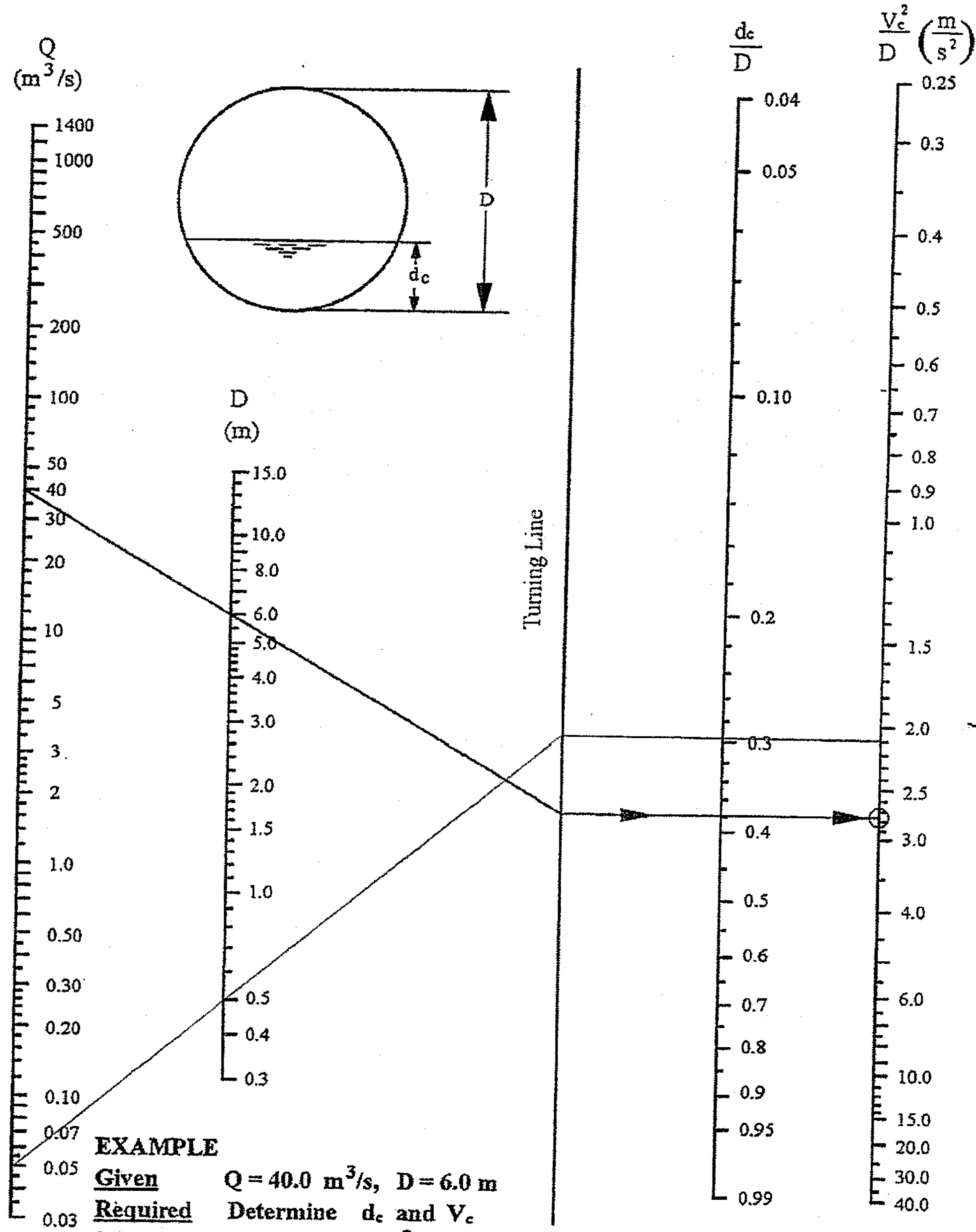
k_e

0.2 - Side - tapered or slope - tapered.
0.25 - Bevelled edge.
0.5 - Headwall or wingwalls, square edge.
- Prefabricated end section.
0.7 - Mitered parallel to fill slope.
0.9 - Projecting.

n = 0.024

Source: Herr (1977)

Design Chart 2.38: Critical Depth - Velocity relationships: Circular Pipes



$\frac{d_c}{D} = 0.3$

$d_c = 0.3 \times 0.5$

$= 0.15$

EXAMPLE

Given $Q = 40.0\ m^3/s$, $D = 6.0\ m$

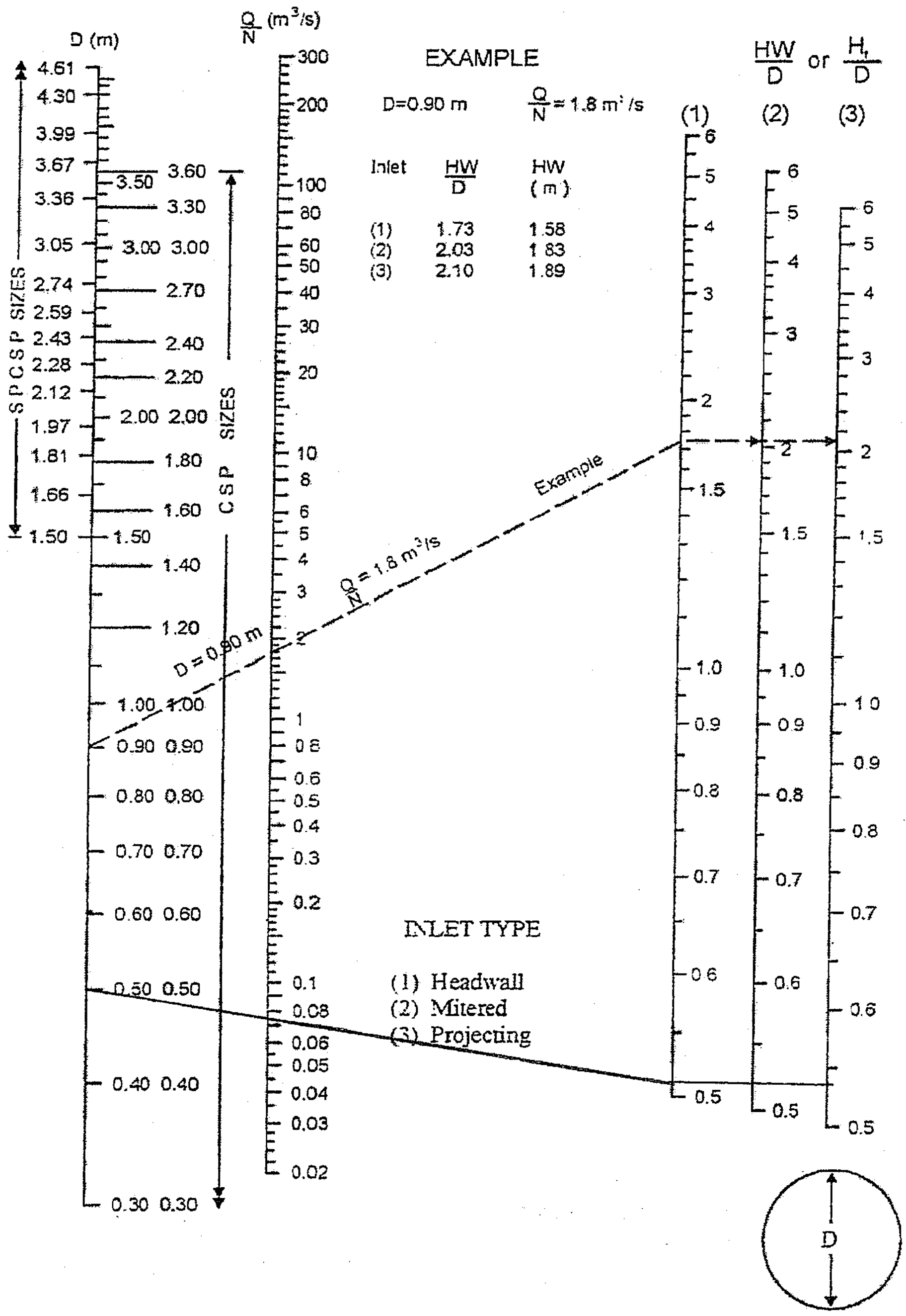
Required Determine d_c and V_c

Solution Join $Q = 40.0\ m^3/s$ to $D = 6.0\ m$ and extend to turning line.
Draw a horizontal line perpendicular to the turning line to intersect
$d_c/D = 0.38$ and $V_c^2/D = 2.76$
Calculate $d_c = 0.38 \times 6.0 = 2.28\ m.$
$V_c = (2.76 \times 6.0)^{0.5} = 4.07\ m/s$

Source: American Iron and Steel Institute

Culvert Crossing 24a to 24b 500mm Ø

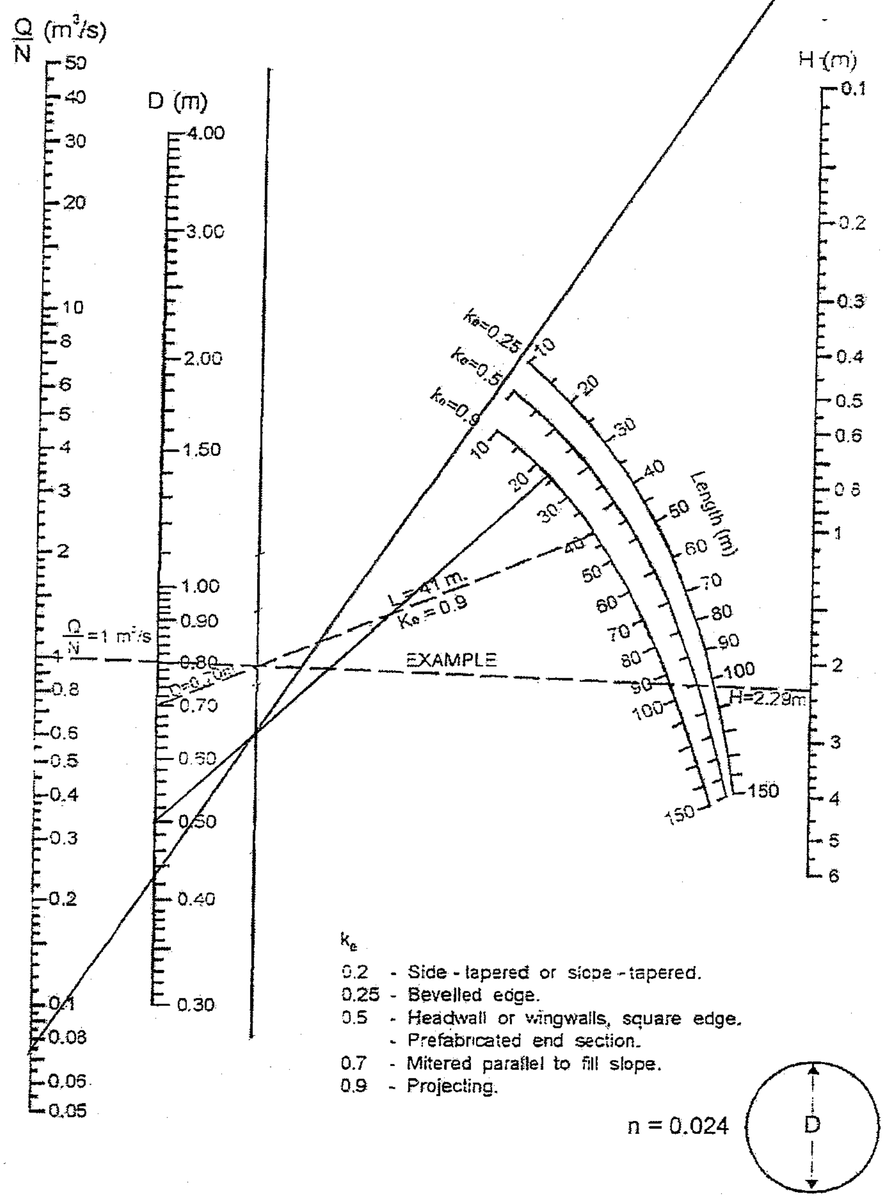
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

H < 0.1m

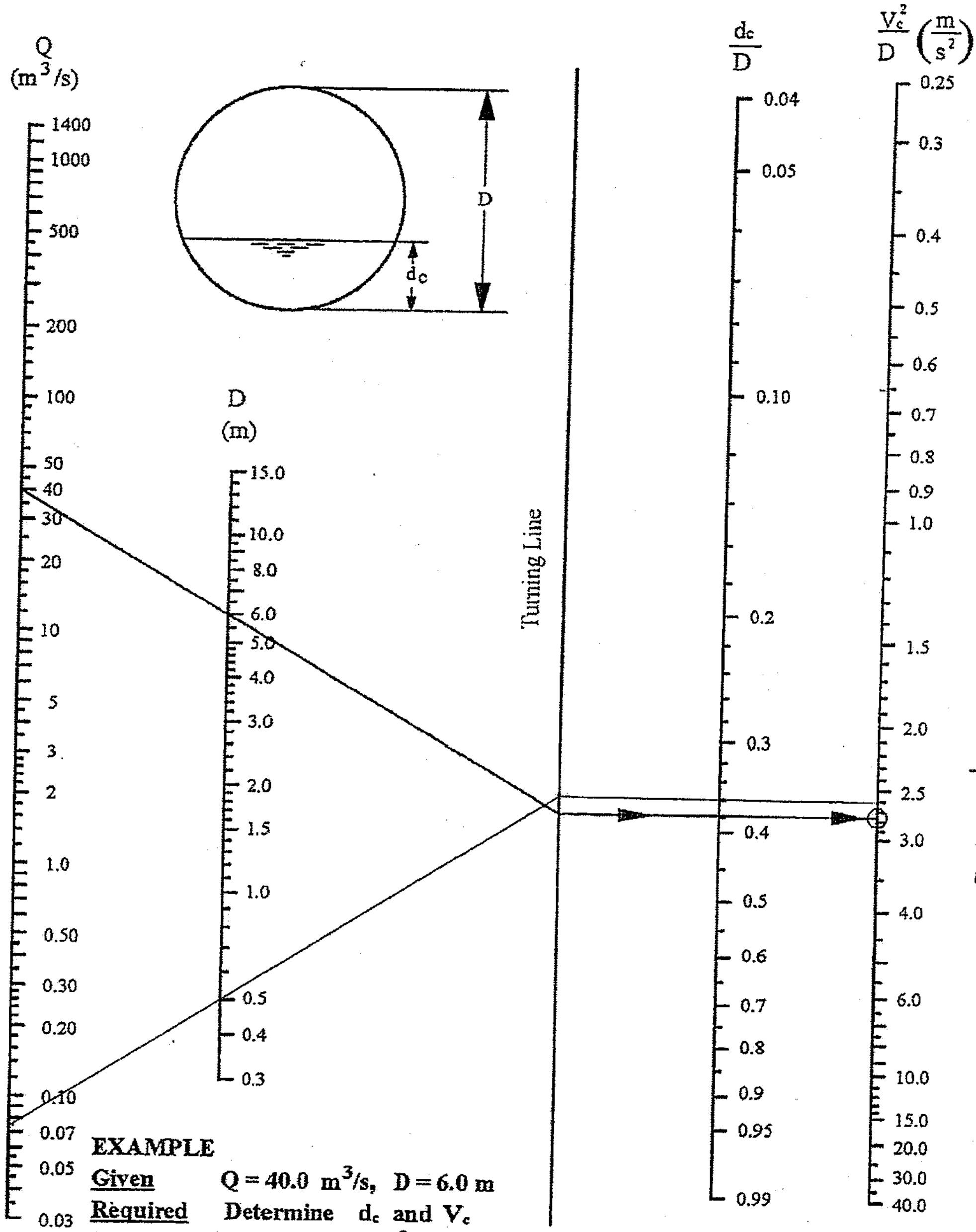


k_e

0.2 - Side - tapered or slope - tapered.
0.25 - Bevelled edge.
0.5 - Headwall or wingwalls, square edge.
- Prefabricated end section.
0.7 - Mitered parallel to fill slope.
0.9 - Projecting.

Source: Herr (1977)

Design Chart 2.38: Critical Depth - Velocity relationships: Circular Pipes



$\frac{d_c}{D} = 0.36$

$d_c = 0.36 \times 0.5$

$\doteq 0.18$

EXAMPLE

Given $Q = 40.0\ m^3/s$, $D = 6.0\ m$

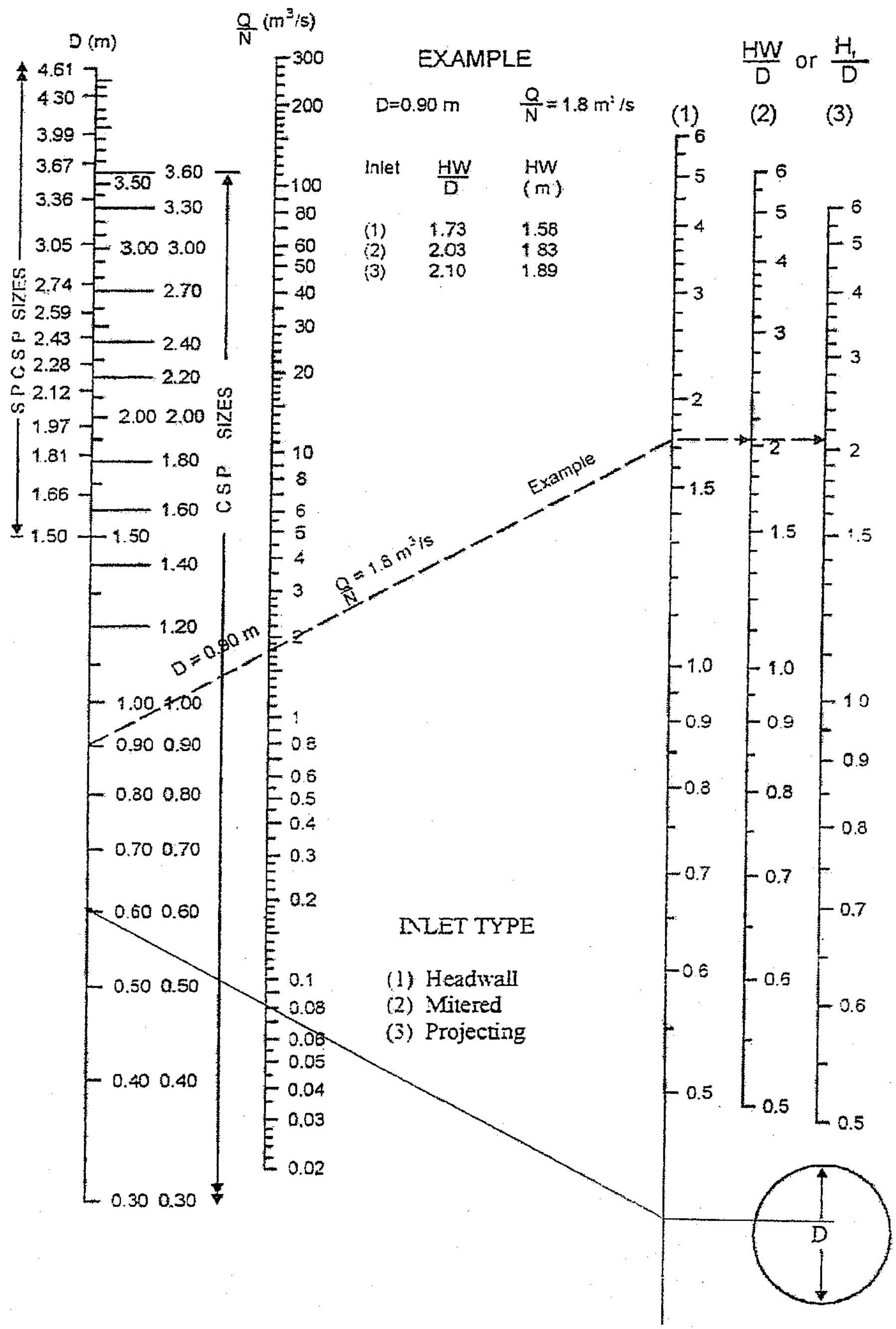
Required Determine d_c and V_c

Solution Join $Q = 40.0\ m^3/s$ to $D = 6.0\ m$ and extend to turning line.
Draw a horizontal line perpendicular to the turning line to intersect $d_c/D = 0.38$ and $V_c^2/D = 2.76$
Calculate $d_c = 0.38 \times 6.0 = 2.28\ m$.
$V_c = (2.76 \times 6.0)^{0.5} = 4.07\ m/s$

Source: American Iron and Steel Institute

Culvert Crossing 2 - 9 600 mm Ø

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts

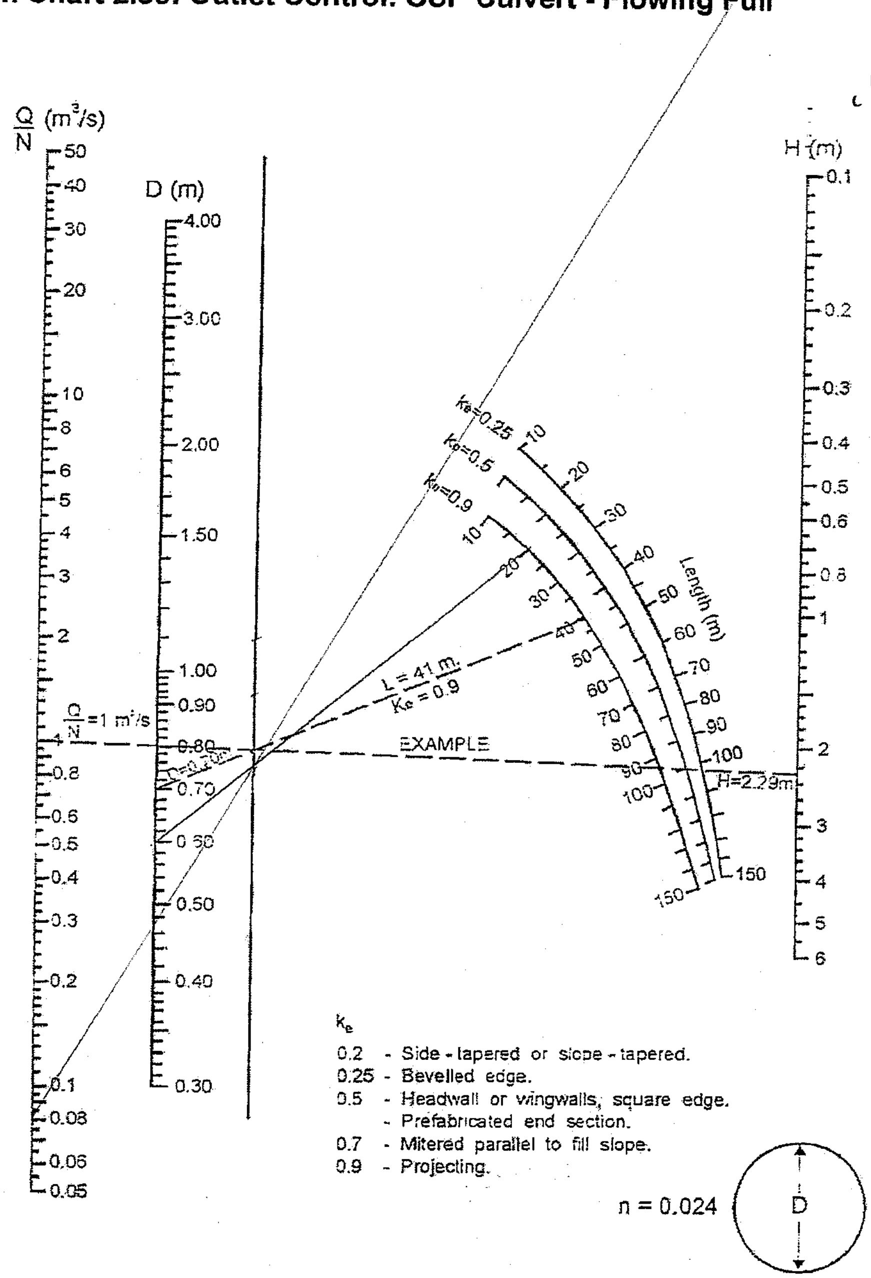


∴ HW/D < 0.5

Source: Herr (1977)

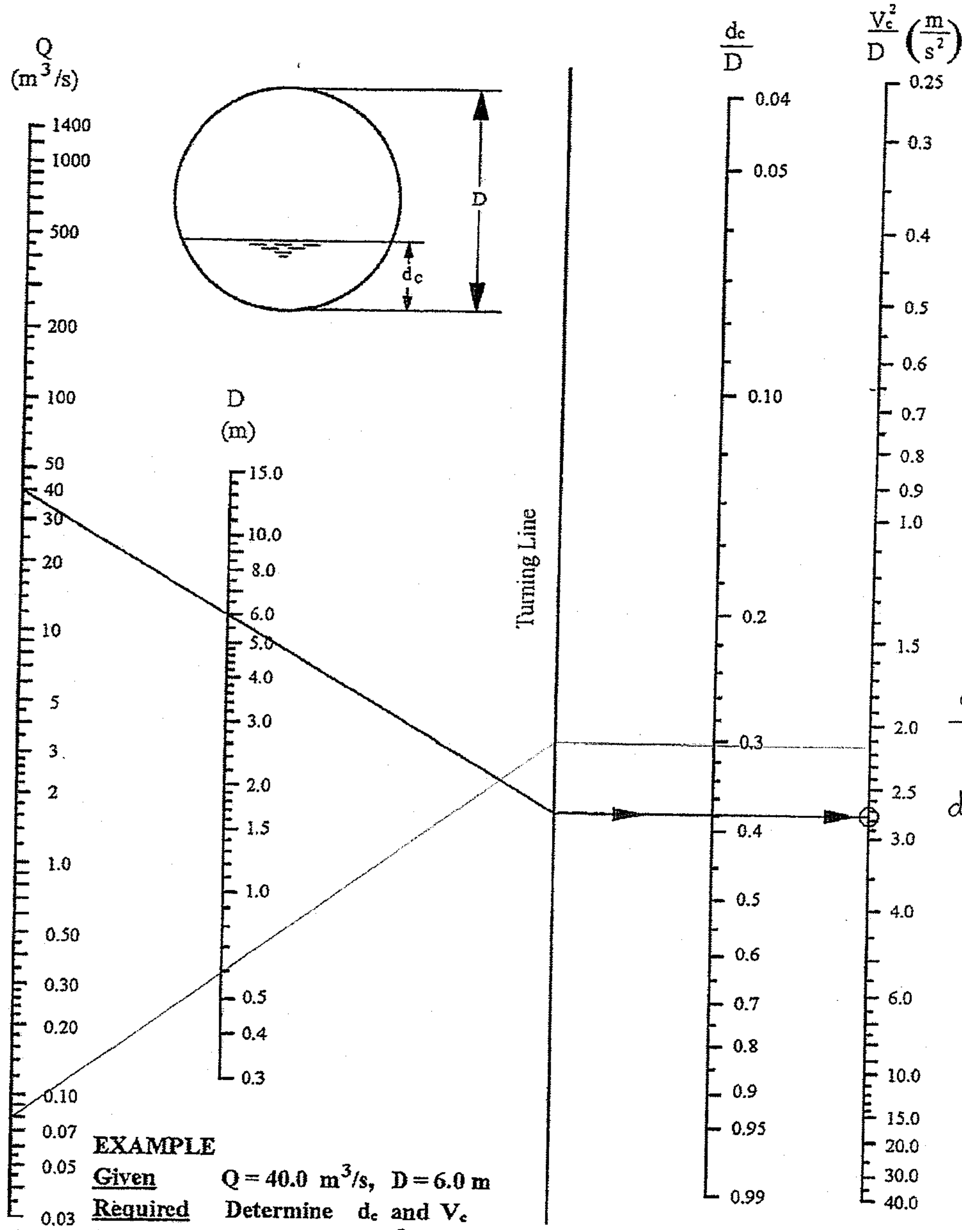
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

∴ H << 0.1m



Source: Herr (1977)

Design Chart 2.38: Critical Depth - Velocity relationships: Circular Pipes



$\frac{dc}{D} = 0.31$

$dc = 0.31 \times 0.6$

$= 0.186$

$= 0.19$

EXAMPLE

Given $Q = 40.0\ m^3/s$, $D = 6.0\ m$

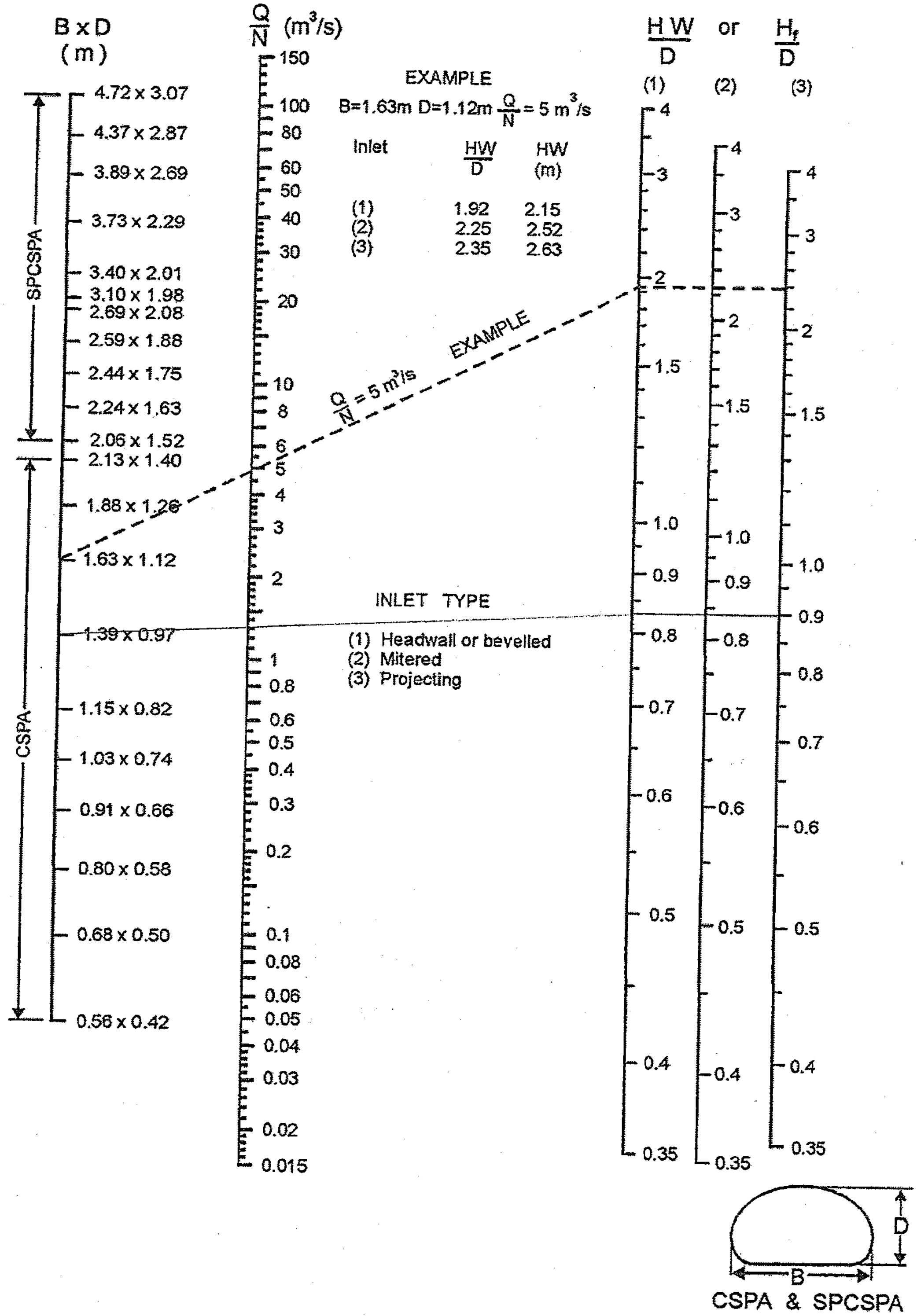
Required Determine d_c and V_c

Solution Join $Q = 40.0\ m^3/s$ to $D = 6.0\ m$ and extend to turning line.
Draw a horizontal line perpendicular to the turning line to intersect $d_c/D = 0.38$ and $V_c^2/D = 2.76$
Calculate $d_c = 0.38 \times 6.0 = 2.28\ m.$
$V_c = (2.76 \times 6.0)^{0.5} = 4.07\ m/s$

Source: American Iron and Steel Institute

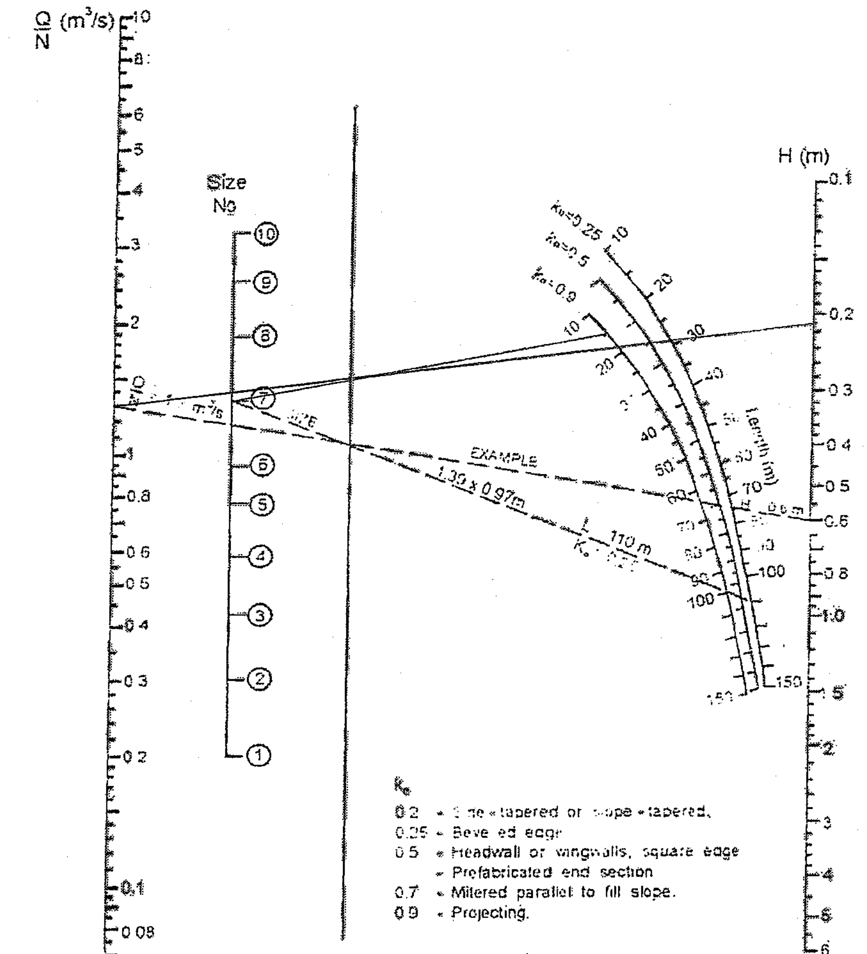
Culvert Crossing 27b to 27c 1.39 x 0.97 m

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts

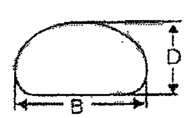


Source: Herr (1977)

Design Chart 5.47: Outlet Control: Pipe Arch CSP Culvert - Flowing Full



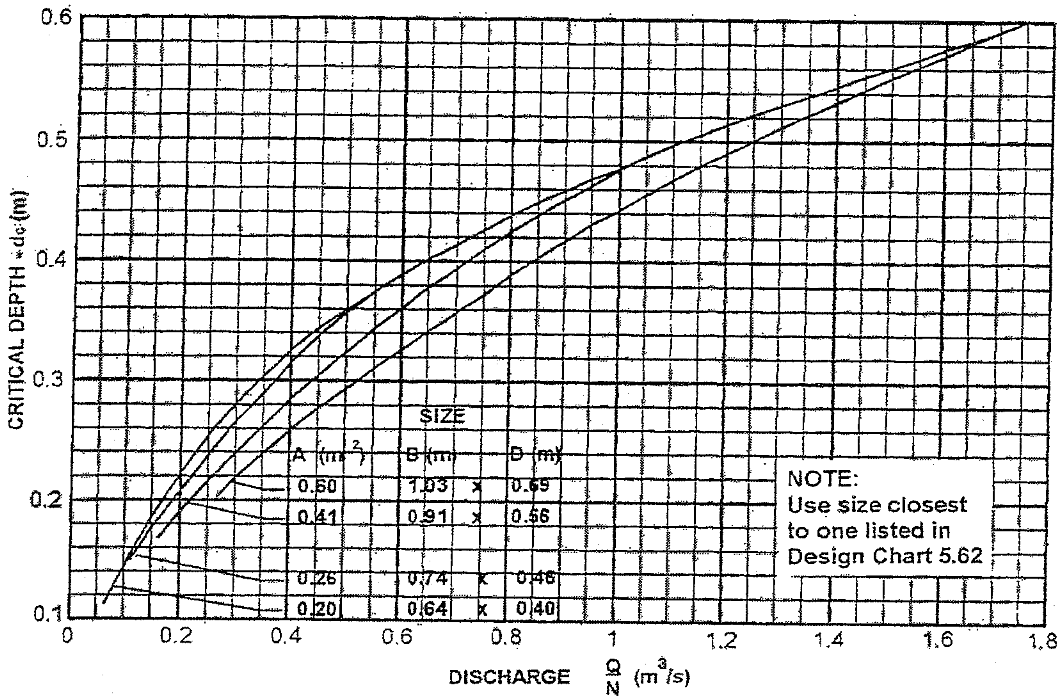
CSPA SIZES	
No	B(m) x D(m)
1	0.56 x 0.42
2	0.68 x 0.50
3	0.80 x 0.58
4	0.91 x 0.66
5	1.03 x 0.74
6	1.15 x 0.82
7	1.39 x 0.97
8	1.63 x 1.12
9	1.88 x 1.26
10	2.13 x 1.40

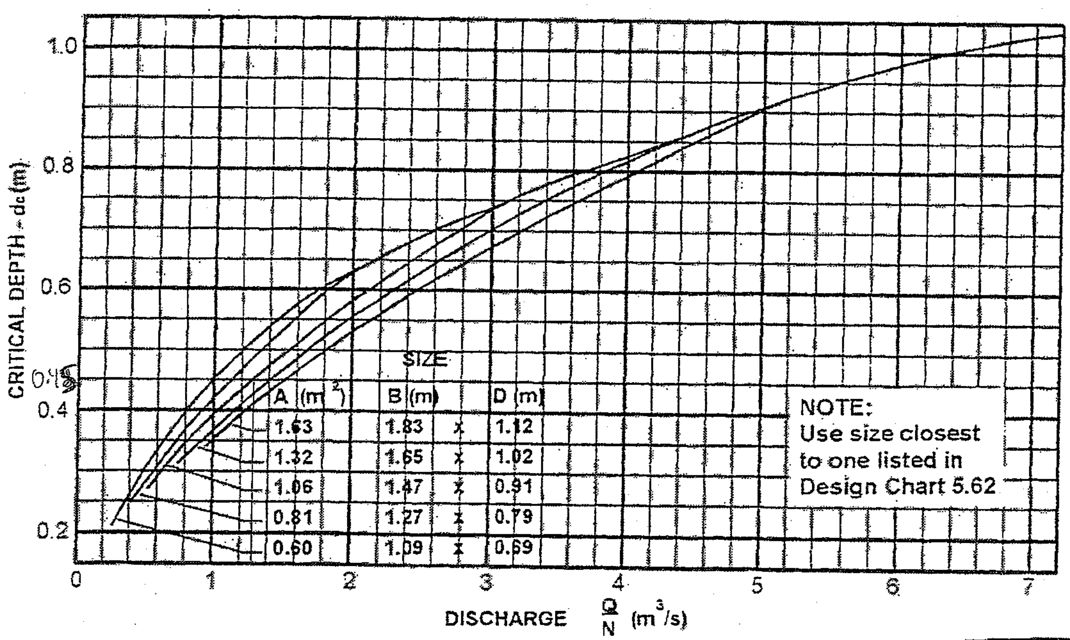


n = 0.024

Source: Herr (1977)

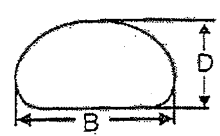
Design Chart 5.53: CSP Pipe Arch Culverts





$(d_c \ngtr D)$

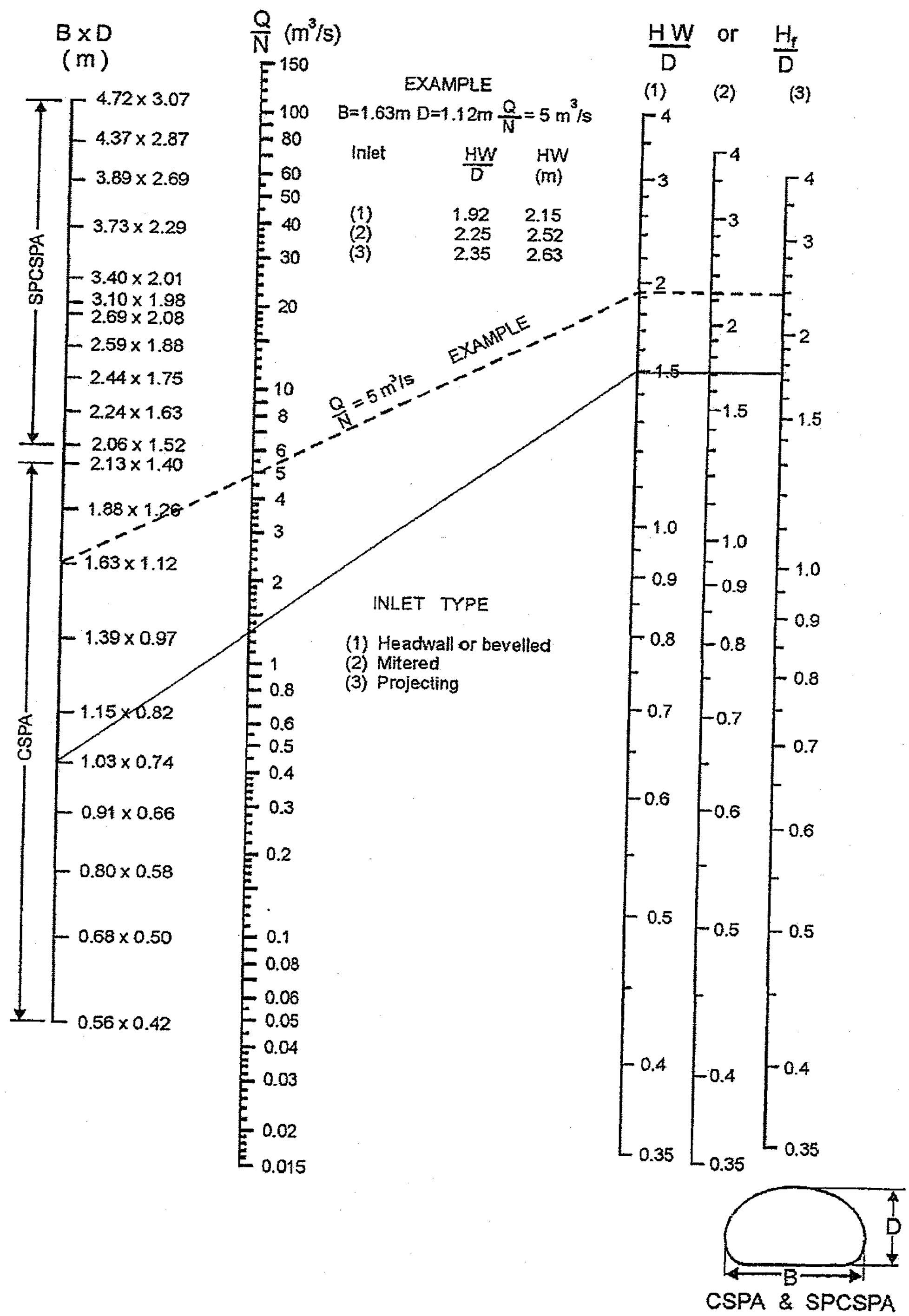
A = Cross-sectional area per barrel
interpolated for other sizes



Source: Herr (1977)

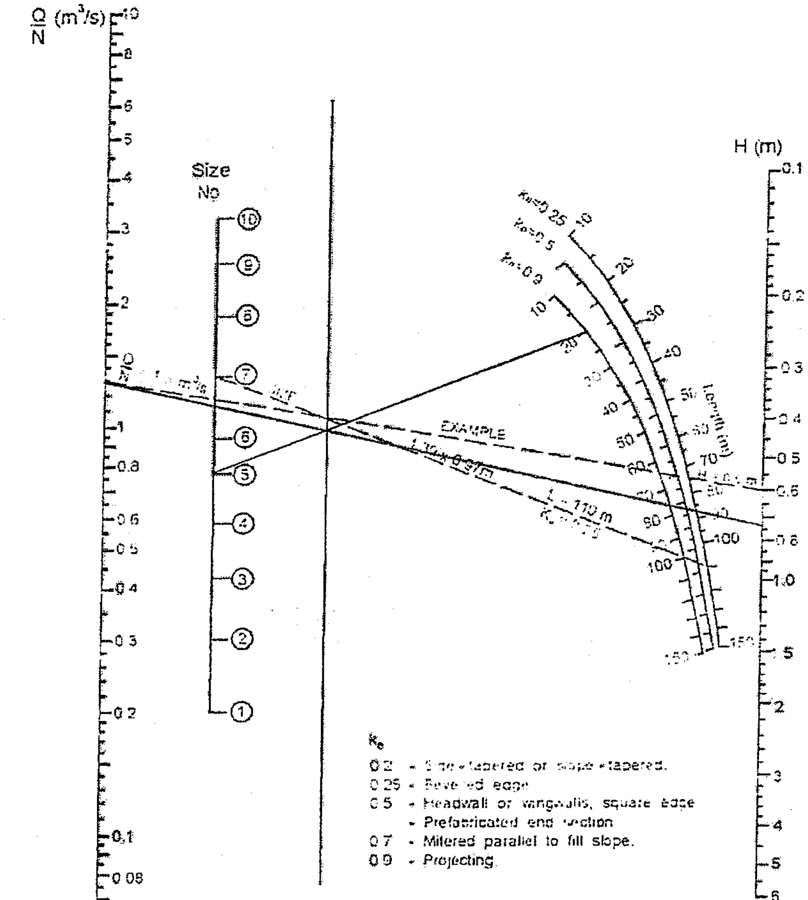
Culvert Crossing 22 - 19 2 x 1.03m x 0.74m

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts

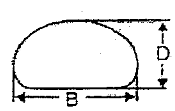


Source: Herr (1977)

Design Chart 5.47: Outlet Control: Pipe Arch CSP Culvert - Flowing Full



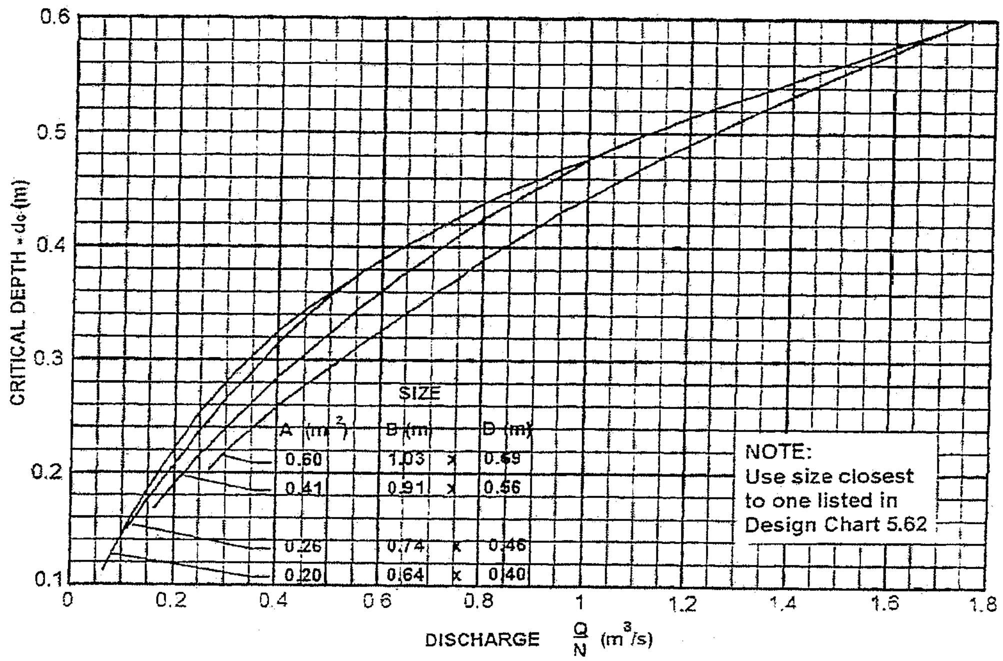
CSPA SIZES	
No	B(m) x D(m)
1	0.56 x 0.42
2	0.68 x 0.50
3	0.80 x 0.58
4	0.91 x 0.66
5	1.03 x 0.74
6	1.15 x 0.82
7	1.39 x 0.97
8	1.63 x 1.12
9	1.88 x 1.26
10	2.13 x 1.40

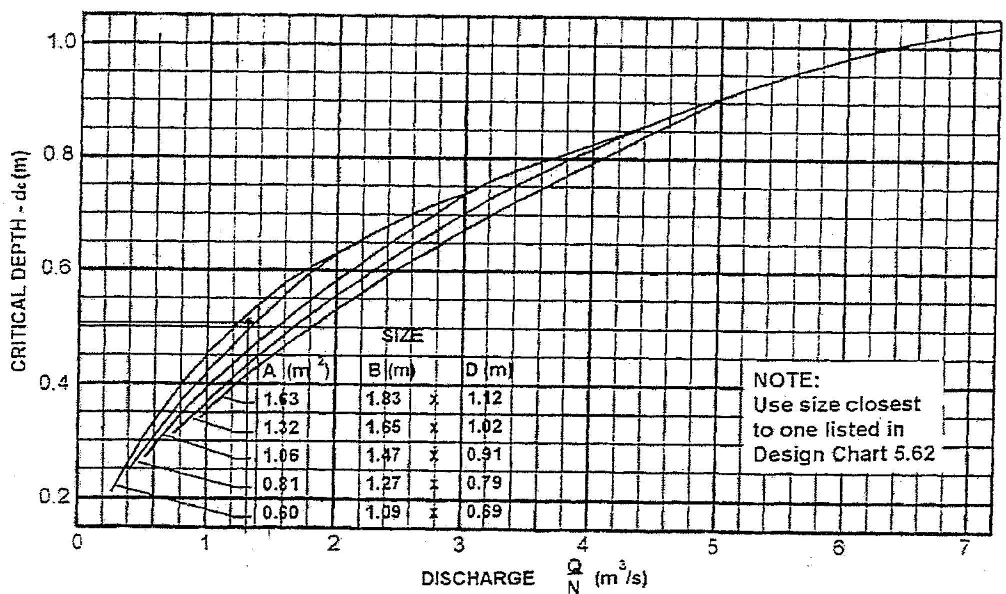


n = 0.024

Source: Herr (1977)

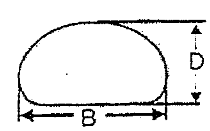
Design Chart 5.53: CSP Pipe Arch Culverts





($d_c \ngtr D$)

A = Cross-sectional area per barrel interpolated for other sizes



Source: Herr (1977)

APPENDIX 'B'

CONVENTIONAL CULVERT DESIGN SHEET

HAWTHORNE ROAD & RIDEAU ROAD

1:10 YEAR ROADSIDE CULVERT DESIGN

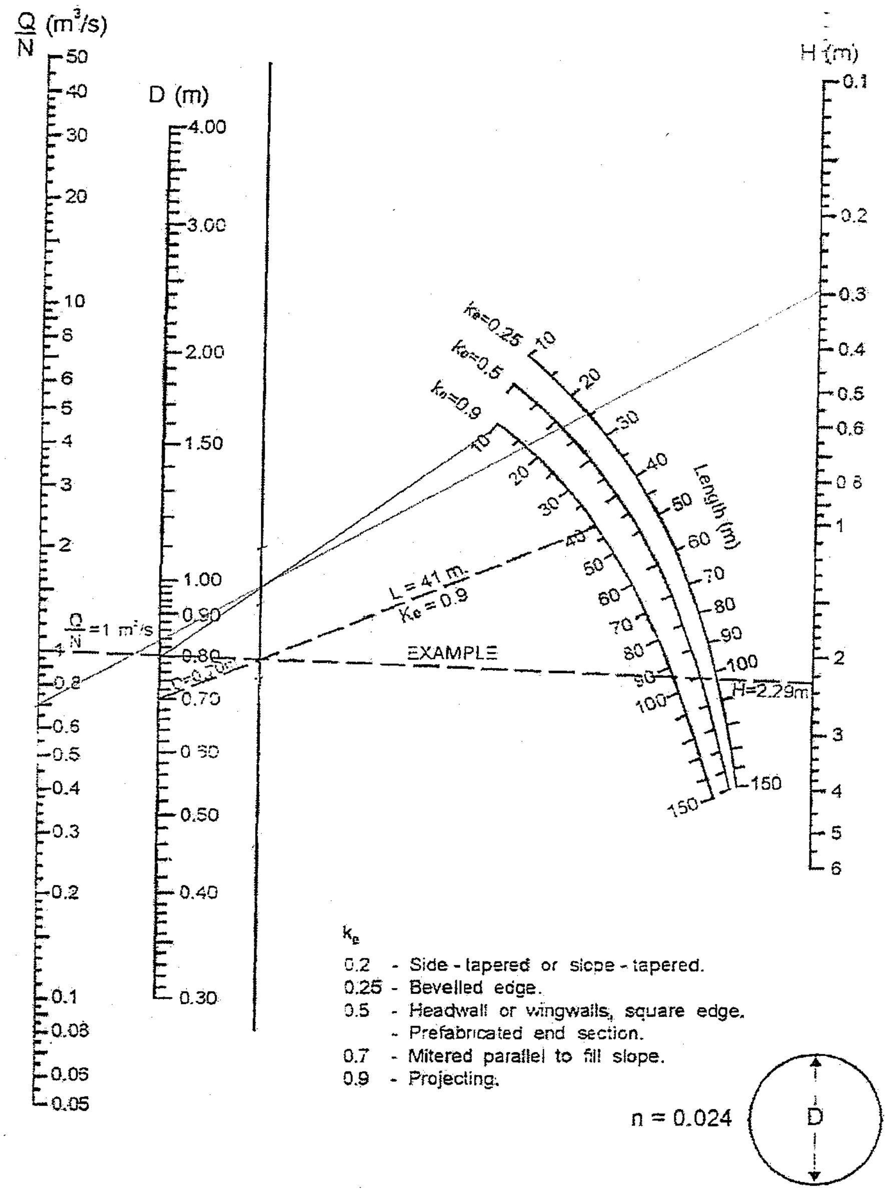
CONVENTIONAL CULVERT DESIGN

Prepared by: Mark Buchanan, E.I.T.
Reviewed by: Guy Forget, P.Eng.
Date: February 2009

	DESIGN DATA							CULVERT DATA					INLET CONTROL			OUTLET CONTROL								GOVERNING	VEL
Station	Q	d	d_e	AHW	Skew No.	L	S	Description	D or B x D	N	Q/N	A (each)	Q/NB	HW/D	HW	K_e	H	d_c	$(d_c + D)/2$	TW	h_o	LS	HW	HW	V_o
	(m^3/s)	(m)	(m)	(m)		(m)	(m/m)		(m)		(m^3/s)	(m^2)	($m^3/s/m$)		(m)		(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m/s)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
6A to 6B	0.694	0.53	0.05	1.13	0	10.0	0.010	CSP 800	0.8	1	0.694	0.50	----	1.05	0.84	0.9	0.30	0.44	0.62	0.58	0.62	0.10	0.82	0.84	
18 to 19	0.105	0.21	0.05	1.34	0	22.0	0.018	CSP 600	0.6	1	0.105	0.28	----	0.50	0.30	0.9	0.04	0.22	0.41	0.26	0.41	0.39	0.06	0.30	
20 to 21	0.113	0.29	0.05	0.81	0	20.0	0.005	CSP 600	0.6	1	0.113	0.28	----	0.52	0.31	0.9	0.05	0.26	0.43	0.34	0.43	0.10	0.37	0.37	
14B to 23	1.377	0.51	0.05	1.53	0	20.0	0.014	CSP 1000	1.0	1	1.377	0.79	----	1.14	1.14	0.9	0.55	0.68	0.84	0.56	0.84	0.28	1.11	1.14	
24 to 26	1.559	0.66	0.05	2.42	0	20.0	0.010	CSP 800	0.8	1	1.559	0.50	----	2.55	2.04	0.9	1.75	0.72	0.76	0.71	0.76	0.20	2.31	2.31	

2 From Form PH-D-533, col. 12
3 Flood Depth
4 Embedment below channel invert
5 Col. 3 + col. 4 + allowable backwater
7 Allowance for skew if applicable
8 Culvert Slope
10 D (circular) or B x D (other)
11 Number of Barrels
13 Area per barrel
14 For box only
15 Charts D5-1A to C and E to J
16 HW = col. 15 x D (col. 10)
17 Chart D5-8
18 Charts D5-2A to G
19 Charts D5-3A to F: (d_c > D)
21 Col. 3 + col. 4
22 H_o = larger of cols. 20 and 21
23 Col. 7 x col. 8
24 HW = col. 18 + col. 22 - col. 23
25 Larger of cols 16 and 24
26 Outlet velocity if required (Subsection 3.2.3)

Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full



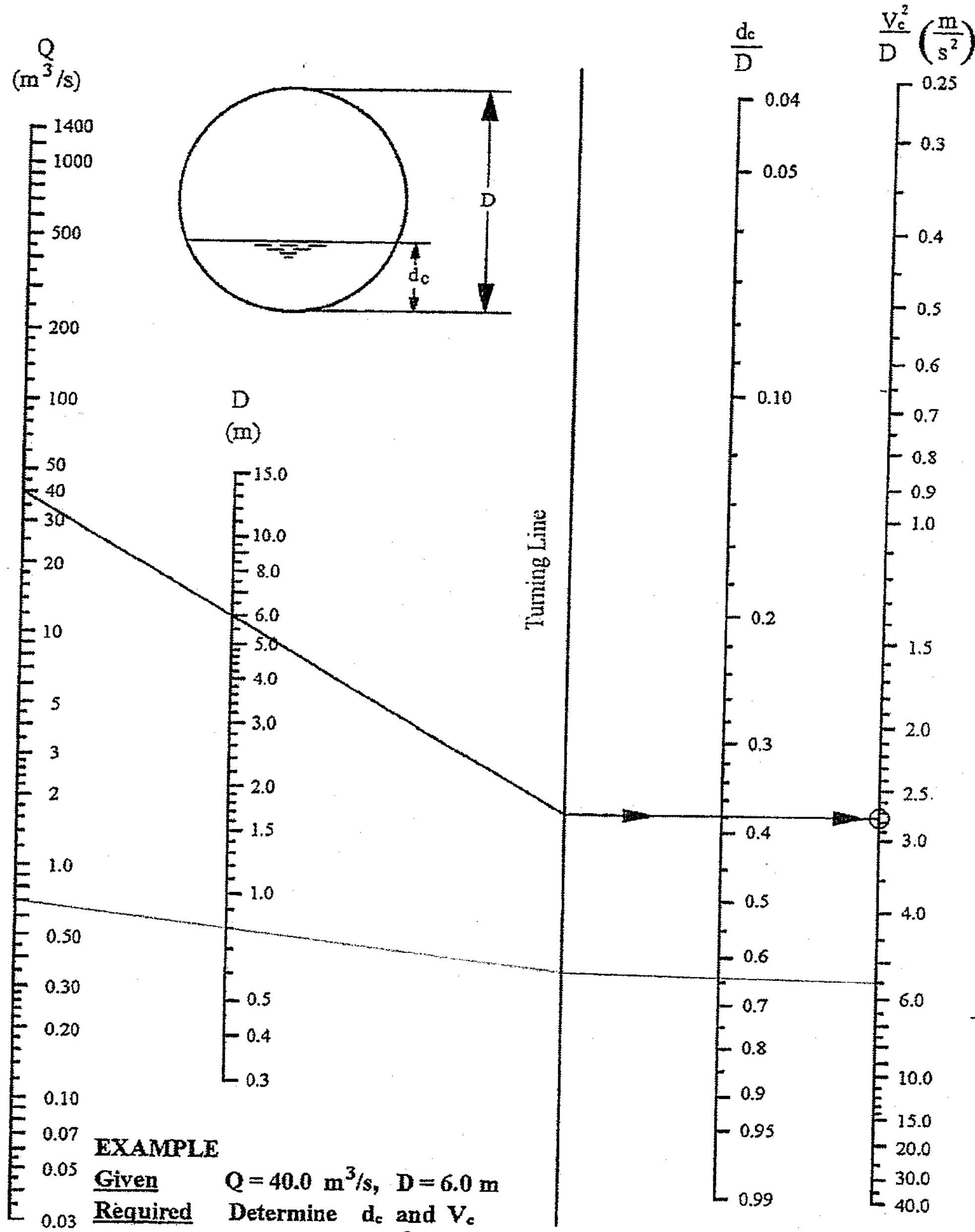
k_e

0.2 - Side - tapered or slope - tapered.
0.25 - Bevelled edge.
0.5 - Headwall or wingwalls, square edge.
- Prefabricated end section.
0.7 - Mitered parallel to fill slope.
0.9 - Projecting.

n = 0.024

Source: Herr (1977)

Design Chart 2.38: Critical Depth - Velocity relationships: Circular Pipes



$\frac{d_c}{D} = 0.55$

$d_c = 0.55 \times 0.8$

$d_c = 0.44$

EXAMPLE

Given $Q = 40.0\ m^3/s$, $D = 6.0\ m$

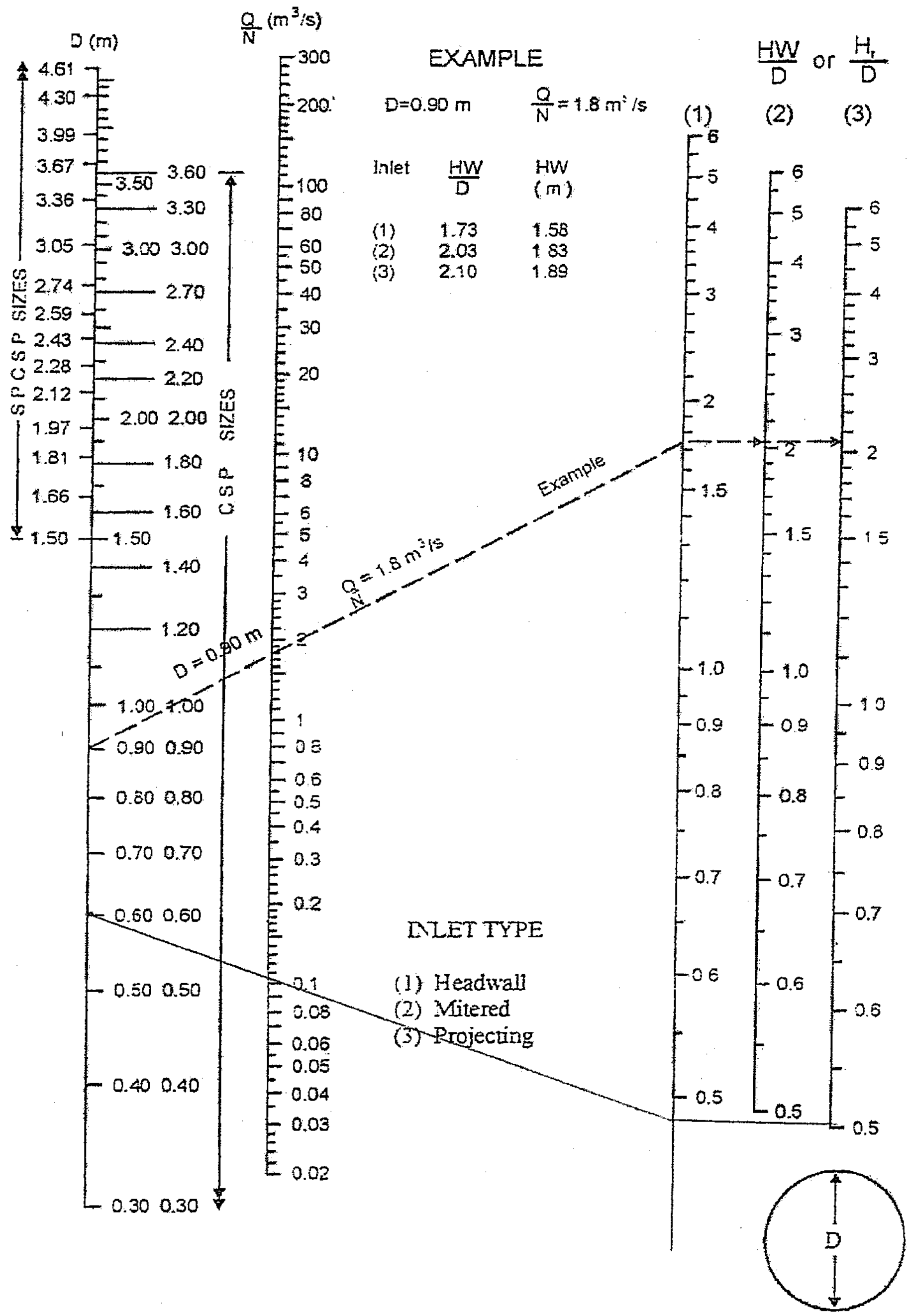
Required Determine d_c and V_c

Solution Join $Q = 40.0\ m^3/s$ to $D = 6.0$ m and extend to turning line.
Draw a horizontal line perpendicular to the turning line to intersect $d_c/D = 0.38$ and $V_c^2/D = 2.76$
Calculate $d_c = 0.38 \times 6.0 = 2.28$ m.
$V_c = (2.76 \times 6.0)^{0.5} = 4.07$ m/s

Source: American Iron and Steel Institute

Culvert Crossing 18 to 19 600 mm Ø

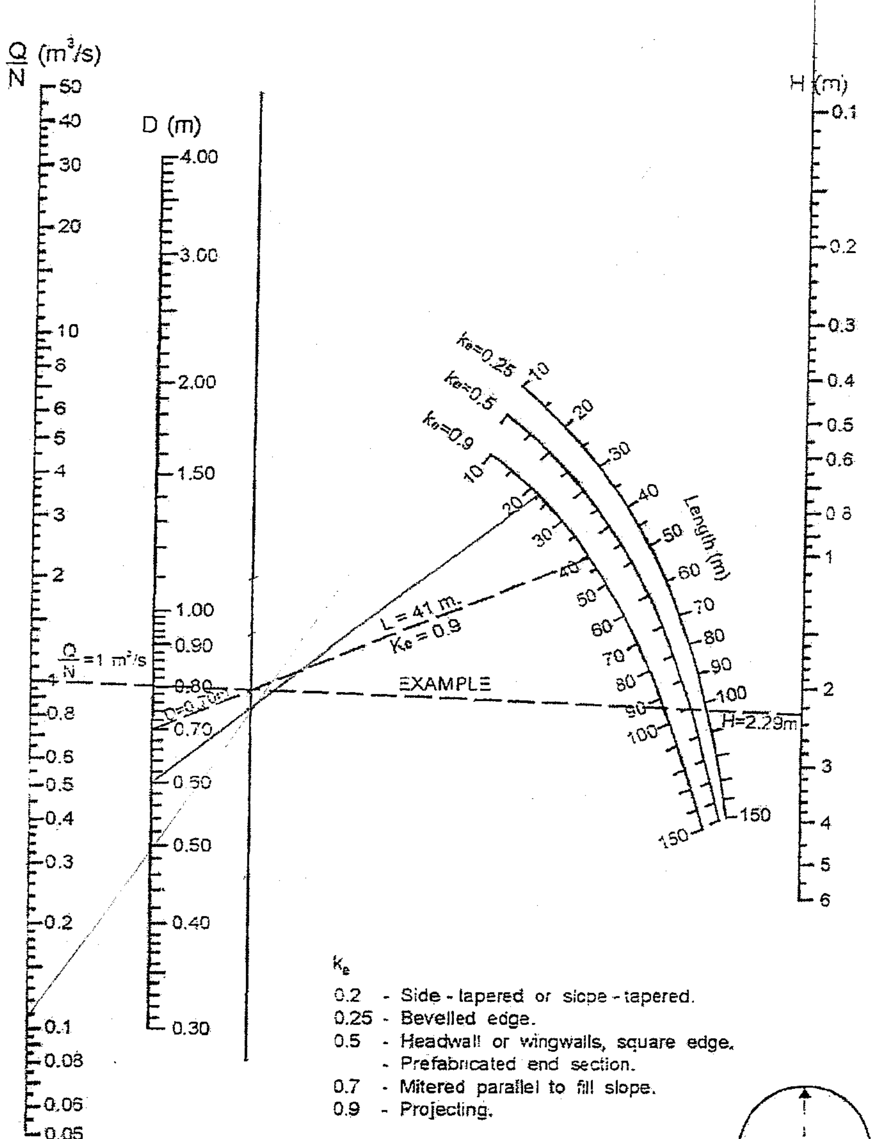
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

0.04



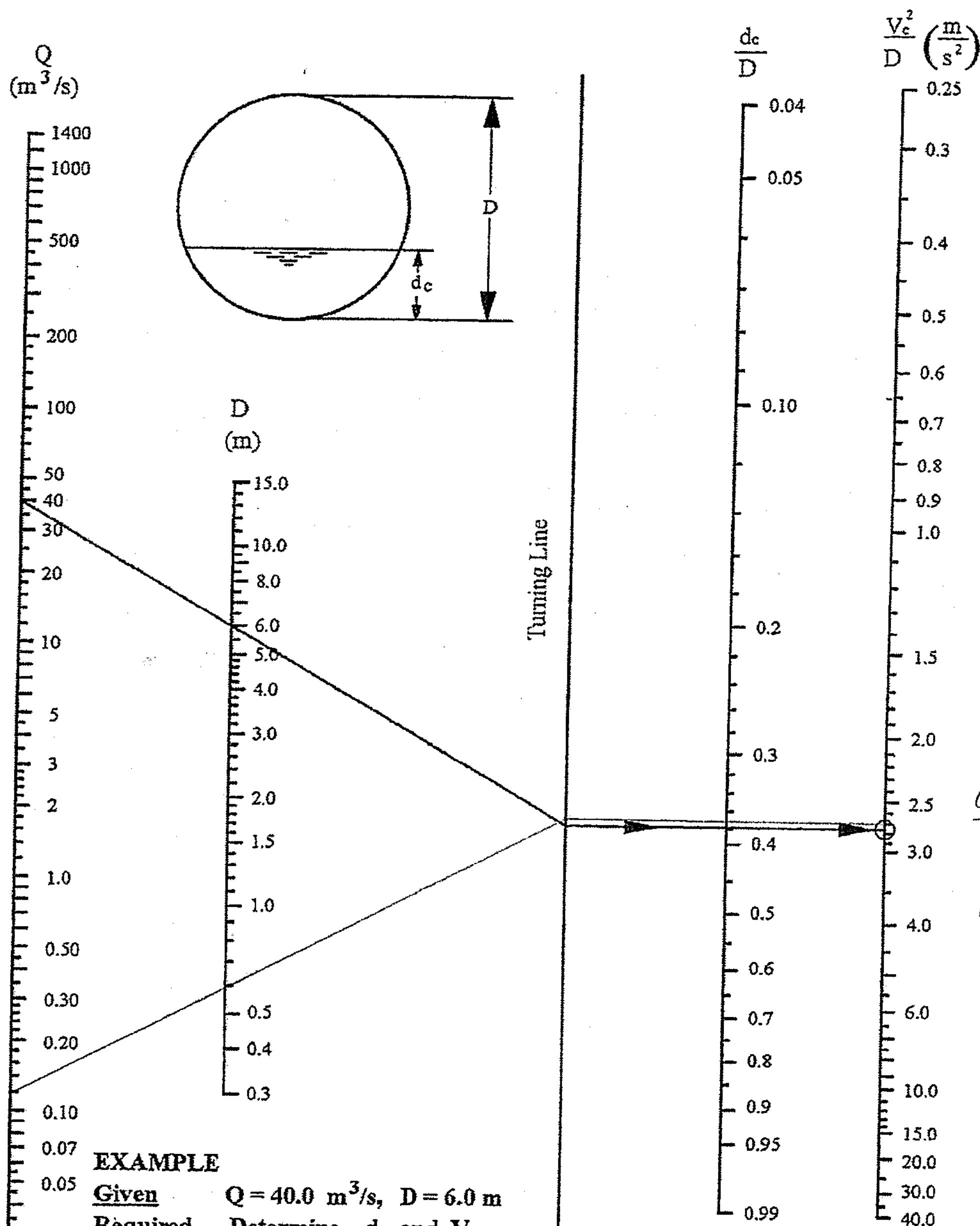
K_e

0.2 - Side - tapered or slope - tapered.
0.25 - Bevelled edge.
0.5 - Headwall or wingwalls, square edge.
- Prefabricated end section.
0.7 - Mitered parallel to fill slope.
0.9 - Projecting.

n = 0.024

Source: Herr (1977)

Design Chart 2.38: Critical Depth - Velocity relationships: Circular Pipes



$\frac{d_c}{D} = 0.425$

$d_c = 0.425 \times 0.6$

$= 0.255$

EXAMPLE

Given $Q = 40.0\ m^3/s$, $D = 6.0\ m$

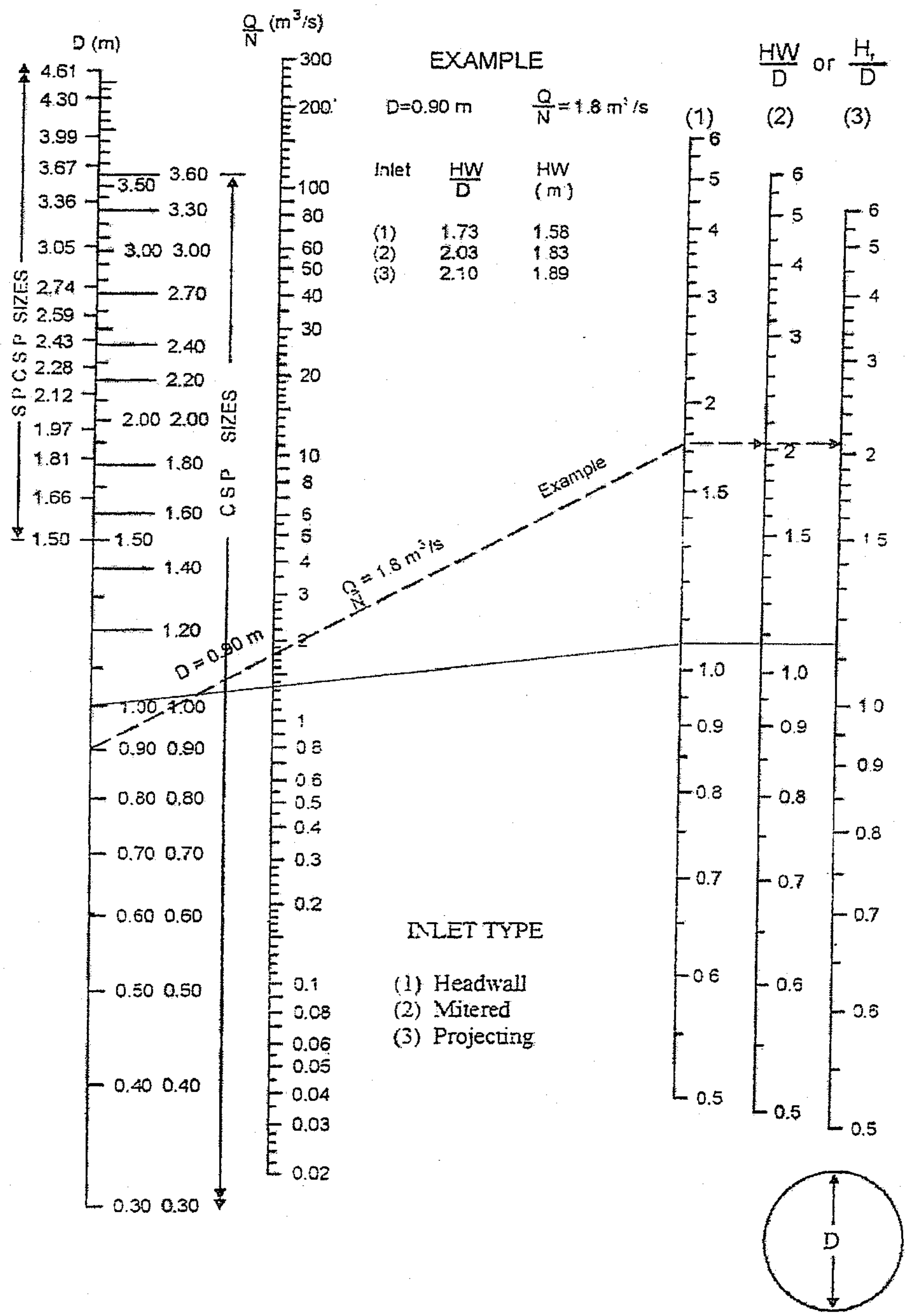
Required Determine d_c and V_c

Solution Join $Q = 40.0\ m^3/s$ to $D = 6.0\ m$ and extend to turning line.
Draw a horizontal line perpendicular to the turning line to intersect $d_c/D = 0.38$ and $V_c^2/D = 2.76$
Calculate $d_c = 0.38 \times 6.0 = 2.28$ m.
$V_c = (2.76 \times 6.0)^{0.5} = 4.07$ m/s

Source: American Iron and Steel Institute

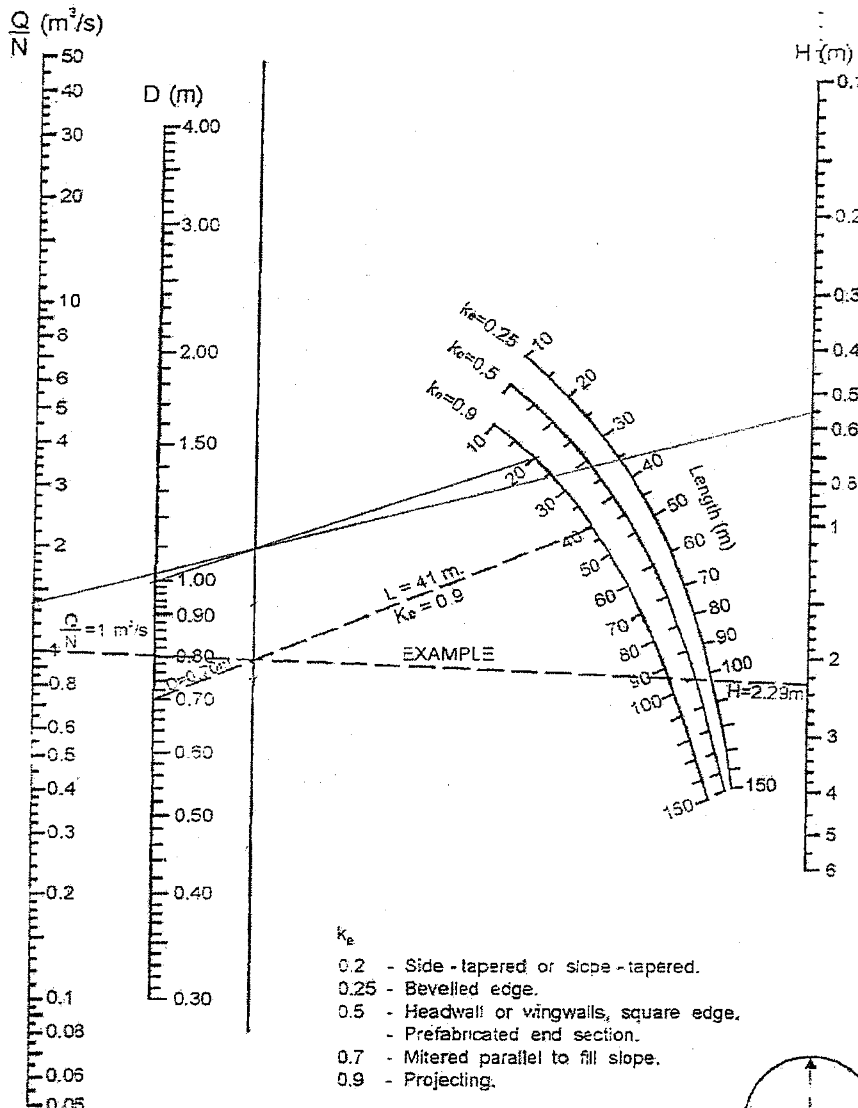
Culvert Crossing 14 to 23 1000mm Ø

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

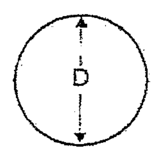
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full



k_e

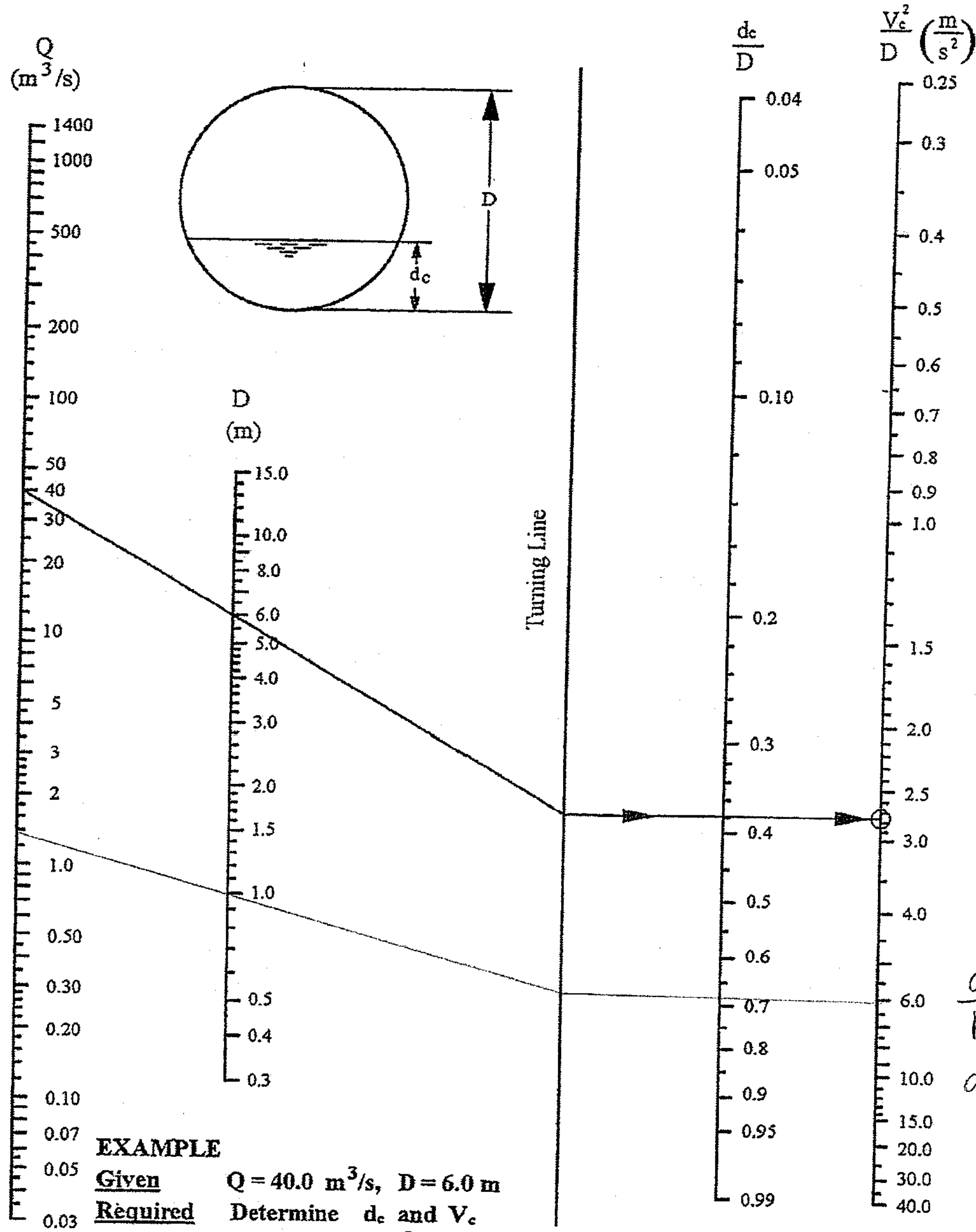
0.2 - Side - tapered or slope - tapered.
0.25 - Bevelled edge.
0.5 - Headwall or wingwalls, square edge.
 - Prefabricated end section.
0.7 - Mitered parallel to fill slope.
0.9 - Projecting.

n = 0.024



Source: Herr (1977)

Design Chart 2.38: Critical Depth - Velocity relationships: Circular Pipes



$\frac{d_c}{D} = 0.72$

$d_c = 0.72 \times 1.0$

$= 0.72$

EXAMPLE

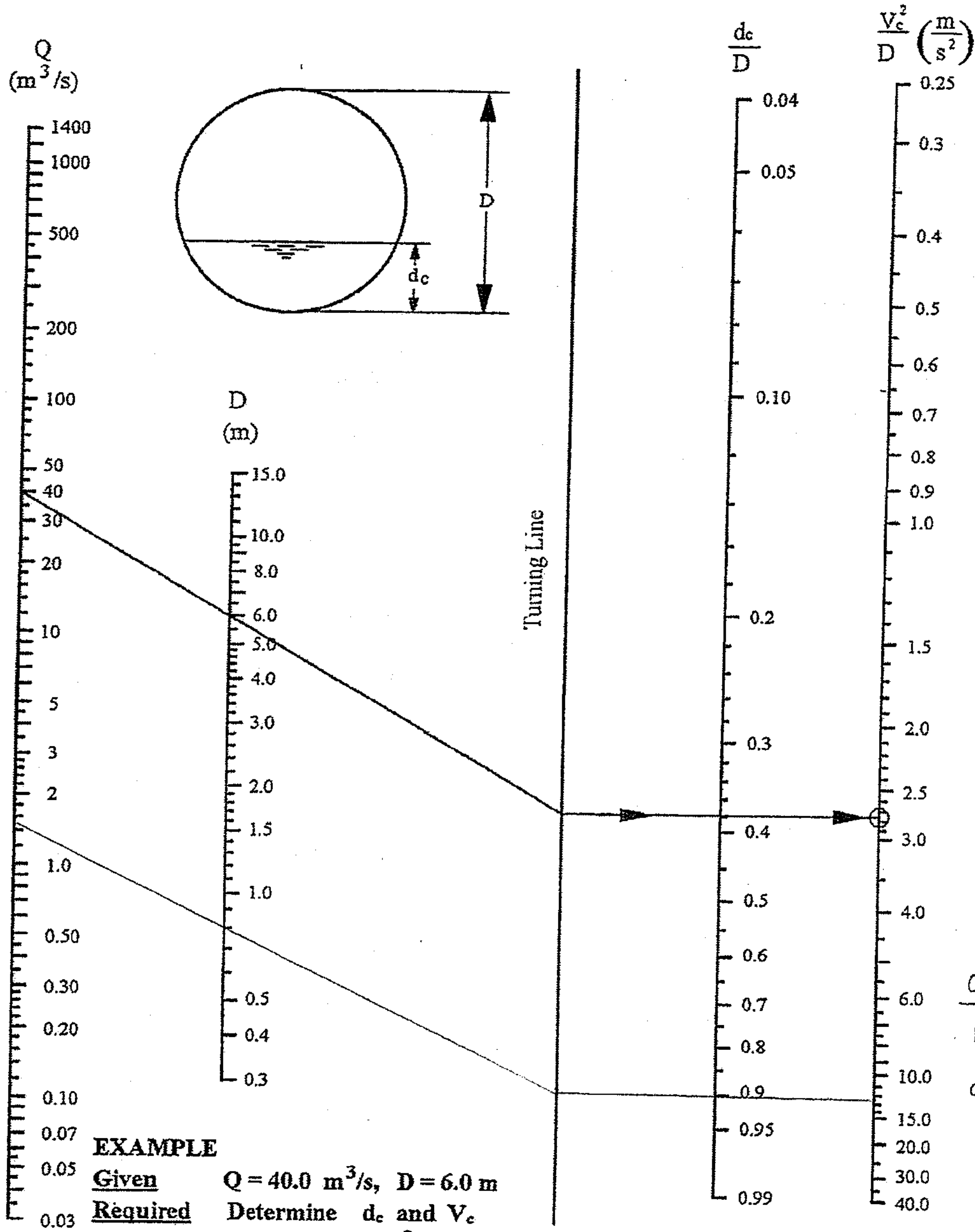
<u>Given</u> **$Q = 40.0\ m^3/s$, $D = 6.0$ m**

<u>Required</u> **Determine d_c and V_c**

<u>Solution</u> **Join $Q = 40.0\ m^3/s$ to $D = 6.0$ m and extend to turning line.
Draw a horizontal line perpendicular to the turning line to intersect $d_c/D = 0.38$ and $V_c^2/D = 2.76$
Calculate $d_c = 0.38 \times 6.0 = 2.28$ m.
$V_c = (2.76 \times 6.0)^{0.5} = 4.07$ m/s**

Source: American Iron and Steel Institute

Design Chart 2.38: Critical Depth - Velocity relationships: Circular Pipes



$\frac{dc}{D}$: 0.90

$dc = 0.90 \times 0.80$

$= 0.72$

EXAMPLE

Given $Q = 40.0\ m^3/s$, $D = 6.0\ m$

Required Determine d_c and V_c

Solution Join $Q = 40.0\ m^3/s$ to $D = 6.0\ m$ and extend to turning line.
Draw a horizontal line perpendicular to the turning line to intersect $d_c/D = 0.38$ and $V_c^2/D = 2.76$
Calculate $d_c = 0.38 \times 6.0 = 2.28$ m.
$V_c = (2.76 \times 6.0)^{0.5} = 4.07$ m/s

Source: American Iron and Steel Institute

APPENDIX 'C'

WATER QUALITY - INFILTRATION CALCULATION

JOB NO. 20983

PROJECT Hawthorne Industrial Park

Length of Perforated Pipe in Ditches

BY MB DATE Apr 14/09

J.L.Richards
ENGINEERS ARCHITECTS PLANNERS

Level of Service

Normal 70% TSS removal

Imperviousness 100% for internal roads

Extrapolating from Table 3.2 SWMPDM

water quality infiltration requirement = $35 m^3/ha$

Area of Asphalt

Phase 1	Phase 2
Length = 2250 m	300 m
width = 7 m	7 m
$15750\ m^2$	$2100\ m^2$

Required Storage

Phase 1	Phase 2
$= 1.575\ ha \times 35 \frac{m^3}{ha}$	$= 0.21\ ha \times 35 \frac{m^3}{ha}$
$= 55.1\ m^3$	$= 7.35\ m^3$

Required Length of 200mm ø Perforated Pipe

Phase 1	Phase 2
Length $= \frac{55.1\ m^3}{\pi (0.1)^2\ m^2}$	$= \frac{7.35\ m^3}{\pi (0.1)^2\ m^2}$
$= \underline{\underline{1755\ m}}$	$= \underline{234\ m}$

SHEET ____ OF ____

APPENDIX 'D'

HYDROLOGICAL PARAMETERS
(CN_{pre}, Imperviousness Calculation, Time to Peak Calculation)

JOB NO. 20983

PROJECT Hawthorne Industrial Park

% Impervious Calculation

BY MB DATE Jan 22/09

J.L.Richards
ENGINEERS ARCHITECTS PLANNERS

Typical Site Development with C=0.7

Building Footprint	10%
Asphalt Parking	35%
Gravel	35%
Grass	20%
	100%

Building Foot print = 100% Impervious

Asphalt Parking = 100% Impervious

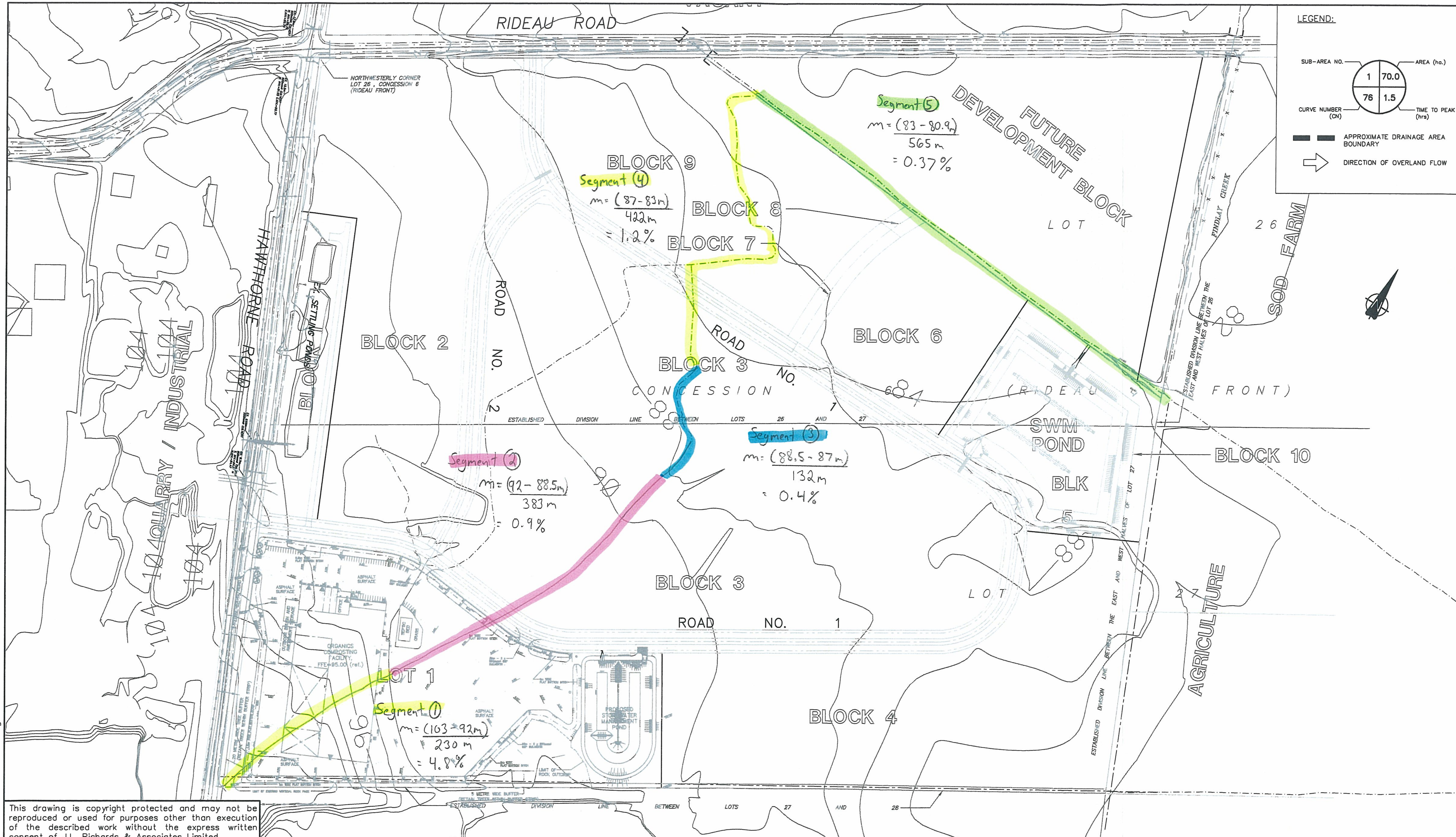
Gravel = 70% Impervious

Grass = 0% Impervious

% Imp. = 10% x 1 + 35% x 1 + 35% x 0.7 + 20% x 0

= 70%

SHEET ____ OF ____



PROJECT: HAWTHORNE INDUSTRIAL PARK

DRAWING: PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

J.L. Richards & Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012
J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS

DESIGN:	M.B.
DRAWN:	ARM
CHECKED:	G.F.
PLOTTED:	Jan 21, 2009

DRAWING NO.: FIGURE 2

JLR NO: 20983

V:\20983.DU\20983 C FIGURE 2A.dwg

JOB NO. 20983

PROJECT Hawthorne Industrial Park

Time of Concentration - Pre-development

BY MB DATE Jan 22/09

J.L.Richards
ENGINEERS ARCHITECTS PLANNERS

Segment 1

slope $= \frac{(103 - 92)\,m}{230\ m}$

$= 4.8\%$

Uplands Method Curve B - Woodland

Velocity = 0.32 m/s

Time $= \frac{230\ m}{0.32\ m/s}$

$= 719$ sec

Segment 2

slope $= \frac{(92 - 88.5)\,m}{383\ m}$

$= 0.9\%$

Uplands Method Curve C - Pasture

Velocity = 0.21 m/s

Time $= \frac{383\ m}{0.21\ m/s}$

$= 1824$ sec

SHEET ____ OF ____

JOB NO. 20983

PROJECT Hawthorne Industrial Park

Time of Concentration - Pre-development

BY MB DATE Jan 22/09

J.L.Richards
ENGINEERS ARCHITECTS PLANNERS

Segment 3

$$\text{slope} = \frac{(88.5 - 87)\,m}{132\ m}$$

$$= 0.4\ \%$$

Uplands Method Curve A - Forest (heavy litter)

Velocity = 0.05 m/s

$$\text{Time} = \frac{132\ m}{0.05\ m/s}$$

$$= 2640\ \text{sec.}$$

Segment 4

$$\text{slope} = \frac{(87 - 83)\,m}{422\ m}$$

$$= 1.2\%$$

Uplands Method Curve F - Grassed waterway

Velocity = 0.47 m/s

$$\text{Time} = \frac{422\ m}{0.47\ m/s}$$

$$= 898\ \text{sec}$$

SHEET ____ OF ____

JOB NO. 20983

PROJECT Hawthorne Industrial Park

Time of Concentration - Pre - Development

BY MB DATE Jan 22/09

J.L.Richards
ENGINEERS ARCHITECTS PLANNERS

Segment 5

slope $= \frac{(83 - 80.9) \text{ m}}{565 \text{ m}}$

$= 0.37\%$

Uplands Method Curve F - Grassed waterway

Velocity $= 0.28$ m/s

Time $= \frac{565 \text{ m}}{0.28 \text{ m/s}}$

$= 2018$ sec

Total Time $= 1 + 2 + 3 + 4 + 5$

$= 719 + 1824 + 2640 + 898 + 2018$

$= 8099$ sec

Time to Peak $= \frac{2}{3} \times 8099$ sec

$= 5399$ sec

$= 90$ min

SHEET ____ OF ____

APPENDIX 'E'

SWMHYMO INPUT AND OUTPUT FILES
(Pre - and Uncontrolled Post-Development Conditions)

```
2     Metric units
*#****************************************************************************
*#  Project Name : Hawthorne Industrial Park          Project Number:    [20983] *
*#  Date         : April, 2009                                                   *
*#  Revised      : N/A                                                           *
*#  Developed by : Mark Buchanan, E.I.T.                                         *
*#  Reviewed by  : Guy Forget, P.Eng.                                            *
*#  Company      : J.L. Richards & Associates Limited                            *
*#  License #    : 4418403                                                       *
*#****************************************************************************
*
*
*#**************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT               *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF  A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE    *
*#**************************************************************
*
******************************************************************************
*           SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE          *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS   *
******************************************************************************

*******************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*******************************************************

*************************************************************
*          POST-DEVELOPMENT UNCONTROLLED CONDITIONS          *
*************************************************************

*************************************************************
*             CALCULATION OF 4 HR 25 MM STORM EVENT          *
*************************************************************

START                  TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                      [  ] <--storm filename, one per line for NSTORM time
READ STORM             STORM_FILENAME=["4HR25-15.STM"]
*%-----------------|-------------------------------------------------------|
DEFAULT  VALUES        ICASEdef=[1],  read and print values
                       DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------|

*********************************
*          ORGAWORLD FILE        *
*********************************

* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                       XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                            LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                       XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                            LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                            LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD         ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                            LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                            LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD         ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                            LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------|

ROUTE RESERVOIR        IDout=[10],   NHYD=["POND"],  IDin=[9],
                       RDT=[1.0](min),
                             TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                      [   0.000,  0.0000]
                                      [   0.008,  0.0656]
                                      [   0.017,  0.1311]
                                      [   0.093,  0.2831]
                                      [   0.233,  0.3971]
                                      [   0.337,  0.4731]
                                      [   0.465,  0.5491]
                                      [   0.531,  0.5871]
                                      [   0.593,  0.6251]
                                      [   0.654,  0.6631]
                                      [   0.797,  0.7391]
                                      [   0.950,  0.8274]
                                      [   1.304,  0.9157]
                                      [   1.880,  1.0040]
                                      [   2.577,  1.0923]
                                      [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park    *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                            LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                            LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                            LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD          ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                       DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|


ADD HYD                IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|-------------------------------------------------------|

* SUB-AREA NO. 5

DESIGN NASHYD          ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                       DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|

* SUB-AREA NO 4

DESIGN NASHYD          ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                       DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
*%-----------------|-------------------------------------------------------|

*************************************************************
*         CALCULATION OF 3HR - 1:2 YEAR STORM EVENT          *
*************************************************************

START                  TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                      [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
CHICAGO STORM          IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                       ICASEcs=[1],
                       A=[732.951],  B=[6.199], and C=[0.810],
*%-----------------|-------------------------------------------------------|
DEFAULT VALUES         ICASEdef=[1],  read and print values
                       DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------|

*********************************
*          ORGAWORLD FILE        *
*********************************

* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                       XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                            LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                       XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                            LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                            LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD         ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
```

```
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                               LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                               LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD            ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                               LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------------|-------------------------------------------------------------|

ROUTE RESERVOIR           IDout=[10],   NHYD=["POND"],  IDin=[9],
                          RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                           (cms) - (ha-m)
                                         [   0.000,  0.0000]
                                         [   0.008,  0.0656]
                                         [   0.017,  0.1311]
                                         [   0.093,  0.2831]
                                         [   0.233,  0.3971]
                                         [   0.337,  0.4731]
                                         [   0.465,  0.5491]
                                         [   0.531,  0.5871]
                                         [   0.593,  0.6251]
                                         [   0.654,  0.6631]
                                         [   0.797,  0.7391]
                                         [   0.950,  0.8274]
                                         [   1.304,  0.9157]
                                         [   1.880,  1.0040]
                                         [   2.577,  1.0923]
                                         [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park    *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD            ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                               LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD            ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                               LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD            ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                               LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------------|-------------------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD             ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                          DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                          RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------------|-------------------------------------------------------------|


ADD HYD                   IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------------|-------------------------------------------------------------|

* SUB-AREA NO. 5

DESIGN NASHYD             ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                          DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                          RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------------|-------------------------------------------------------------|

* SUB-AREA NO 4

DESIGN NASHYD             ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                          DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                          RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
*%-----------------------|-------------------------------------------------------------|


***************************************************************
*         CALCULATION OF 3HR - 1:5 YEAR STORM EVENT           *
***************************************************************

START                     TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                         [  ] <--storm filename, one per line for NSTORM time
*%-----------------------|-------------------------------------------------------------|
CHICAGO STORM             IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                          ICASEcs=[1],
                          A=[998.071],  B=[6.053], and C=[0.814],
*%-----------------------|-------------------------------------------------------------|
DEFAULT VALUES            ICASEdef=[1],  read and print values
                          DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------------|-------------------------------------------------------------|

*************************************
*         ORGAWORLD FILE            *
*************************************

* SUB-AREA No.1

CALIB STANDHYD            ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                          XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                               LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                               LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD            ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                          XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                               LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                               LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD            ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                               LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                               LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD            ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                               LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                               LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD            ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                               LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------------|-------------------------------------------------------------|

ROUTE RESERVOIR           IDout=[10],   NHYD=["POND"],  IDin=[9],
                          RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                           (cms) - (ha-m)
                                         [   0.000,  0.0000]
                                         [   0.008,  0.0656]
                                         [   0.017,  0.1311]
                                         [   0.093,  0.2831]
                                         [   0.233,  0.3971]
                                         [   0.337,  0.4731]
                                         [   0.465,  0.5491]
                                         [   0.531,  0.5871]
                                         [   0.593,  0.6251]
                                         [   0.654,  0.6631]
                                         [   0.797,  0.7391]
                                         [   0.950,  0.8274]
                                         [   1.304,  0.9157]
                                         [   1.880,  1.0040]
                                         [   2.577,  1.0923]
                                         [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park    *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD            ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                               LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD            ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                               LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD            ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                               LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-------------------------------------------------------------|
ADD HYD                   IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------------|-------------------------------------------------------------|
*
```

```
*SUB-AREA No.4
DESIGN NASHYD         ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                      DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-------------------|-------------------------------------------------------|
* SUB-AREA NO. 5
DESIGN NASHYD         ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-------------------|-------------------------------------------------------|
* SUB-AREA NO 4
DESIGN NASHYD         ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
*%-------------------|-------------------------------------------------------|
*****************************************************************
*          CALCULATION OF 3HR - 1:10 YEAR STORM EVENT           *
*****************************************************************
START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [ ] <--storm filename, one per line for NSTORM time
*%-------------------|-------------------------------------------------------|
CHICAGO  STORM        IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                      ICASEcs=[1],
                      A=[1174.184],  B=[6.014], and C=[0.816],
*%-------------------|-------------------------------------------------------|
DEFAULT  VALUES       ICASEdef=[1],  read and print values
                      DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-------------------|-------------------------------------------------------|
************************************
*          ORGAWORLD FILE          *
************************************
* SUB-AREA No.1
CALIB STANDHYD        ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                      XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                           LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD        ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                      XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                           LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD        ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                           LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD        ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                           LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD        ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                           LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-------------------|-------------------------------------------------------|
ROUTE RESERVOIR       IDout=[10],   NHYD=["POND"],  IDin=[9],
                      RDT=[1.0](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.000,  0.0000]
                                   [   0.008,  0.0656]
                                   [   0.017,  0.1311]
                                   [   0.093,  0.2831]
                                   [   0.233,  0.3971]
                                   [   0.337,  0.4731]
                                   [   0.465,  0.5491]
                                   [   0.531,  0.5871]
                                   [   0.593,  0.6251]
                                   [   0.654,  0.6631]
                                   [   0.797,  0.7391]
                                   [   0.950,  0.8274]
                                   [   1.304,  0.9157]
                                   [   1.880,  1.0040]
                                   [   2.577,  1.0923]
                                   [   -1   ,  -1    ]  (max twenty pts)
**********************************************
*     Remaining Hawthorne Industrial Park    *
**********************************************
*
* SUB-AREA No.1
CALIB STANDHYD        ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                           LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD        ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                           LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD        ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                           LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-------------------|-------------------------------------------------------|
*
*SUB-AREA No.4
DESIGN NASHYD         ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                      DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-------------------|-------------------------------------------------------|
* SUB-AREA NO. 5
DESIGN NASHYD         ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-------------------|-------------------------------------------------------|
* SUB-AREA NO 4
DESIGN NASHYD         ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
*%-------------------|-------------------------------------------------------|
*****************************************************************
*          CALCULATION OF 3HR - 1:25 YEAR STORM EVENT           *
*****************************************************************
START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [ ] <--storm filename, one per line for NSTORM time
*%-------------------|-------------------------------------------------------|
CHICAGO STORM         IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                      ICASEcs=[1],
                      A=[1402.884],  B=[6.018], and C=[0.819],
*%-------------------|-------------------------------------------------------|
DEFAULT VALUES        ICASEdef=[1],  read and print values
                      DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-------------------|-------------------------------------------------------|
************************************
*          ORGAWORLD FILE          *
************************************
* SUB-AREA No.1
CALIB STANDHYD        ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                      XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                           LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD        ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                      XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                           LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD        ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                           LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-------------------|-------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-------------------|-------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD        ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
```

```
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|--------------------------------------------------------|
ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)
******* ****************************************
*     Remaining Hawthorne Industrial Park     *
******* ****************************************
*
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                              LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                              LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                              LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------|
*
*SUB-AREA No.4
DESIGN NASHYD            ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                         DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|--------------------------------------------------------|
* SUB-AREA NO. 5
DESIGN NASHYD            ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------|
* SUB-AREA NO 4
DESIGN NASHYD            ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
*%-----------------|--------------------------------------------------------|
*************************************************************
*        CALCULATION OF 3HR - 1:50 YEAR STORM EVENT         *
*************************************************************
START                    TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                        [  ] <--storm filename, one per line for NSTORM time
*%-----------------|--------------------------------------------------------|
CHICAGO STORM            IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                         ICASEcs=[1],
                         A=[1569.580],  B=[6.014], and C=[0.820],
*%-----------------|--------------------------------------------------------|
DEFAULT VALUES           ICASEdef=[1],  read and print values
                         DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|--------------------------------------------------------|
*************************************
*          ORGAWORLD FILE           *
*************************************
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                         XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                              LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                         XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                              LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|--------------------------------------------------------|
ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)
***********************************************
*     Remaining Hawthorne Industrial Park     *
***********************************************
*
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                              LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                              LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                              LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------|
*
*SUB-AREA No.4
```

```
DESIGN NASHYD       ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                    DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|


ADD HYD             IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|---------------------------------------------------------|

* SUB-AREA NO. 5

DESIGN NASHYD       ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                    DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|

* SUB-AREA NO 4

DESIGN NASHYD       ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                    DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
*%-----------------|---------------------------------------------------------|

******** *******************************************************
*       CALCULATION OF 3HR - 1:100 YEAR STORM EVENT           *
******** *******************************************************

START               TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [  ] <--storm filename, one per line for NSTORM time
*%-----------------|---------------------------------------------------------|
CHICAGO STORM       IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                    ICASEcs=[1],
                    A=[1735.688],  B=[6.014],  and C=[0.820],
*%-----------------|---------------------------------------------------------|
DEFAULT VALUES      ICASEdef=[1],  read and print values
                    DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|---------------------------------------------------------|

******** ****************************
*             ORGAWORLD FILE        *
******** ****************************

* SUB-AREA No.1

CALIB STANDHYD      ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                    XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                         LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                         LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD      ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                    XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                         LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                         LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD      ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                    XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                         LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                         LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD      ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                    XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                         LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD      ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                    XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                         LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|---------------------------------------------------------|

ROUTE RESERVOIR     IDout=[10],    NHYD=["POND"],  IDin=[9],
                    RDT=[1.0](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                               [   0.000,  0.0000]
                               [   0.008,  0.0656]
                               [   0.017,  0.1311]
                               [   0.093,  0.2831]
                               [   0.233,  0.3971]
                               [   0.337,  0.4731]
                               [   0.465,  0.5491]
                               [   0.531,  0.5871]
                               [   0.593,  0.6251]
                               [   0.654,  0.6631]
                               [   0.797,  0.7391]
                               [   0.950,  0.8274]
                               [   1.304,  0.9157]
                               [   1.880,  1.0040]
                               [   2.577,  1.0923]
                               [   -1   ,  -1    ]   (max twenty pts)

************************************************
*     Remaining Hawthorne Industrial Park      *
************************************************
*
* SUB-AREA No.1

CALIB STANDHYD      ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                         LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD      ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                         LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD      ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                         LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD       ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                    DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|


ADD HYD             IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|---------------------------------------------------------|

* SUB-AREA NO. 5

DESIGN NASHYD       ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                    DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|

* SUB-AREA NO 4

DESIGN NASHYD       ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                    DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                    RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
*%-----------------|---------------------------------------------------------|

FINISH

*****Rough Pond 1.87 ha x 1.4 m deep*****************
                    TABLE of ( OUTFLOW-STORAGE ) values
                             (cms) - (ha-m)
                          [    0.0 , 0.0    ]
                          [    0.10, 0.374  ]
                          [    0.25, 0.748  ]
                          [    0.50, 1.122  ]
                          [    0.85, 1.496  ]
                          [    1.20, 1.870  ]
                          [    1.30, 2.244  ]
                          [    1.50, 2.618  ]
                          [    -1  ,  -1    ]


*****Rough Pond 150x150 x 1.4 m deep******************
                             ( cms) - (ha-m)
                          [    0.0 , 0.0    ]
                          [    0.16, 0.45   ]
                          [    0.31, 0.900  ]
                          [    0.60, 1.350  ]
                          [    0.95, 1.800  ]
                          [    1.40, 2.25   ]
                          [    1.45, 2.700  ]
                          [    1.50, 3.150  ]
                          [    -1  ,  -1    ]   (max twenty pts)
```

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

SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   999  ========
S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9 9   9
SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O ##   9   9 9   9 Ver. 4.02
    S   W W   M   M  H   H    Y    M   M  O   O       9999  9999 July 1999
SSSSS   W W   M   M  H   H    Y    M   M   OOO           9     9 ========
                                                     9   9 9   9 # 4418403
     StormWater Management HYdrologic Model           999   999  ========

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

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++ Licensed user: J. L. Richards & Associates Limited         +++++++
+++++++                Ottawa                 SERIAL#:4418403      +++++++
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


*******************    D E T A I L E D   O U T P U T   *******************
**************************************************************************
*      DATE: 2009-04-21     TIME: 10:30:14     RUN COUNTER: 000173       *
**************************************************************************
* Input   filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\PSTPH1.dat          *
* Output  filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\PSTPH1.out          *
* Summary filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\PSTPH1.sum          *
* User comments:                                                         *
* 1:_____________________________________________________________________*
* 2:_____________________________________________________________________*
* 3:_____________________________________________________________________*
**************************************************************************

------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#****************************************************************************
*# Project Name : Hawthorne Industrial Park          Project Number:  [20983] *
*# Date         : April, 2009                                                *
*# Revised      : N/A                                                        *
*# Developed by : Mark Buchanan, E.I.T.                                      *
*# Reviewed by  : Guy Forget, P.Eng.                                         *
*# Company      : J.L. Richards & Associates Limited                         *
*# License #    : 4418403                                                    *
*#****************************************************************************
*
*
*#**************************************************************
*# FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT            *
*# FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE   *
*#**************************************************************
*
******************************************************************************
*          SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE          *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS  *
******************************************************************************
********************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND   *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
********************************************************
****************************************************************
*         POST-DEVELOPMENT UNCONTROLLED CONDITIONS             *
****************************************************************
****************************************************************
*            CALCULATION OF 4 HR 25 MM STORM EVENT             *
****************************************************************
--------------------
| START            |  Project  dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
--------------------  Rainfall dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\4HR25-1
| Ptotal=  25.00 mm|    Comments: 4hr-15 min 25 MM STORM EVENT (CHICAGO DI
--------------------
                  TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                   hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                   .25   1.777 |   1.25  45.631 |   2.25   3.138 |   3.25   1.675
                   .50   2.357 |   1.50  11.911 |   2.50   2.555 |   3.50   1.509
                   .75   3.618 |   1.75   6.051 |   2.75   2.165 |   3.75   1.376
                  1.00   8.975 |   2.00   4.108 |   3.00   1.885 |   4.00   1.266

------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
--------------------
| DEFAULT VALUES     |  Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\ORGA.VAL
--------------------  ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
**********************************
*          ORGAWORLD FILE        *
**********************************
* SUB-AREA No.1
--------------------
| CALIB STANDHYD     |   Area     (ha)=    2.07
| 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
--------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     1.74          .33
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .52         1.00
     Length            (m)=   204.72        20.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=    45.63         5.37
               over (min)     10.00        30.00
     Storage Coeff.  (min)=    10.80 (ii)   29.27 (ii)
     Unit Hyd. Tpeak (min)=    10.00        30.00
     Unit Hyd. peak  (cms)=      .11          .04
                                                       *TOTALS*
     PEAK FLOW       (cms)=      .16          .00         .158 (iii)
     TIME TO PEAK    (hrs)=     1.29         1.75        1.292
     RUNOFF VOLUME    (mm)=    23.43         5.17       20.508
     TOTAL RAINFALL   (mm)=    25.00        25.00       24.999
     RUNOFF COEFFICIENT   =      .94          .21         .820

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0005----------------------------------------------------------------------
*
* SUB-AREA No.2
--------------------
| CALIB STANDHYD     |   Area     (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
--------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     1.42          .12
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .50         1.00
     Length            (m)=   244.34         5.00
     Mannings n           =     .030         .030

     Max.eff.Inten.(mm/hr)=    45.63         7.24
               over (min)     12.50        15.00
     Storage Coeff.  (min)=    12.15 (ii)   14.15 (ii)
     Unit Hyd. Tpeak (min)=    12.50        15.00
     Unit Hyd. peak  (cms)=      .09          .08
                                                       *TOTALS*
     PEAK FLOW       (cms)=      .12          .00         .121 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.46        1.333
     RUNOFF VOLUME    (mm)=    23.43         5.17       21.969
     TOTAL RAINFALL   (mm)=    25.00        25.00       24.999
     RUNOFF COEFFICIENT   =      .94          .21         .879

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0006----------------------------------------------------------------------
*
* SUB-AREA No.3
--------------------
| CALIB STANDHYD     |   Area     (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     1.36          .04
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .51         1.00
     Length            (m)=   225.63         5.00
     Mannings n           =     .030         .030

     Max.eff.Inten.(mm/hr)=    45.63         7.97
               over (min)     12.50        12.50
     Storage Coeff.  (min)=    11.52 (ii)   13.44 (ii)
     Unit Hyd. Tpeak (min)=    12.50        12.50
     Unit Hyd. peak  (cms)=      .10          .09
                                                       *TOTALS*
     PEAK FLOW       (cms)=      .12          .00         .118 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.42        1.333
     RUNOFF VOLUME    (mm)=    23.43         5.17       22.881
     TOTAL RAINFALL   (mm)=    25.00        25.00       24.999
     RUNOFF COEFFICIENT   =      .94          .21         .915

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0007----------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:010       2.07      .158    1.29  20.51    .000
                 +ID2 02:020       1.54      .121    1.33  21.97    .000
                 ==================================================
                  SUM 04:040       3.61      .278    1.33  21.13    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0008----------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 03:030       1.40      .118    1.33  22.88    .000
                 +ID2 04:040       3.61      .278    1.33  21.13    .000
                 ==================================================
                  SUM 05:050       5.01      .396    1.33  21.62    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0009----------------------------------------------------------------------
*
* SUB-AREA No.4
--------------------
| CALIB STANDHYD     |   Area     (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .86          .03
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .93          .70
     Length            (m)=   164.82        40.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=    45.63         4.42
               over (min)      7.50        42.50
     Storage Coeff.  (min)=     7.97 (ii)   41.62 (ii)
     Unit Hyd. Tpeak (min)=     7.50        42.50
     Unit Hyd. peak  (cms)=      .14          .03
                                                       *TOTALS*
     PEAK FLOW       (cms)=      .09          .00         .089 (iii)
     TIME TO PEAK    (hrs)=     1.25         2.00        1.250
     RUNOFF VOLUME    (mm)=    23.43         5.17       22.882
     TOTAL RAINFALL   (mm)=    25.00        25.00       24.999
     RUNOFF COEFFICIENT   =      .94          .21         .915

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
```

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

 ------------------------------------------------------------------------------
 001:0010----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    2.66
 | 07:070     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       2.58          .08
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .61         1.50
      Length             (m)=     207.25        20.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=       45.63         5.66
                  over (min)       10.00        27.50
      Storage Coeff.  (min)=       10.37 (ii)   26.38 (ii)
      Unit Hyd. Tpeak (min)=       10.00        27.50
      Unit Hyd. peak  (cms)=         .11          .04
                                                           *TOTALS*
      PEAK FLOW        (cms)=        .24          .00          .238 (iii)
      TIME TO PEAK     (hrs)=       1.29         1.67         1.292
      RUNOFF VOLUME     (mm)=      23.43         5.17        22.882
      TOTAL RAINFALL    (mm)=      25.00        25.00        24.999
      RUNOFF COEFFICIENT   =         .94          .21          .915

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0011----------------------------------------------------------------------
 --------------------
 | ADD HYD (080    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                   ID1 06:060          .89      .089     1.25  22.88     .000
                  +ID2 07:070         2.66      .238     1.29  22.88     .000
                   ==================================================
                   SUM 08:080         3.55      .327     1.29  22.88     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0012----------------------------------------------------------------------
 --------------------
 | ADD HYD (090    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                   ID1 05:050         5.01      .396     1.33  21.62     .000
                  +ID2 08:080         3.55      .327     1.29  22.88     .000
                   ==================================================
                   SUM 09:090         8.56      .716     1.29  22.14     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0013----------------------------------------------------------------------
 ---------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
 |   IN>09:(090    )  |
 | OUT<10:(POND    )  |     =========  OUTLFOW STORAGE TABLE  =========
 ---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                              (cms)     (ha.m.)   |   (cms)     (ha.m.)
                               .000  .0000E+00   |     .593  .6251E+00
                               .008  .6560E-01   |     .654  .6631E+00
                               .017  .1311E+00   |     .797  .7391E+00
                               .093  .2831E+00   |     .950  .8274E+00
                               .233  .3971E+00   |    1.304  .9157E+00
                               .337  .4731E+00   |    1.880  .1004E+01
                               .465  .5491E+00   |    2.577  .1092E+01
                               .531  .5871E+00   |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     -------------------          (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (090    )        8.56       .716      1.292      22.143
     OUTFLOW<10: (POND   )        8.56       .032      3.875      22.141

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.470
                     TIME SHIFT OF PEAK FLOW         (min)=  155.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.1611E+00

 ------------------------------------------------------------------------------
 001:0014----------------------------------------------------------------------
 ********************************************
 *     Remaining Hawthorne Industrial Park      *
 ********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      14.13         5.77
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .60         1.50
      Length             (m)=     580.00       100.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=       34.39        11.90
                  over (min)       22.50        52.50
      Storage Coeff.  (min)=       21.64 (ii)   52.88 (ii)
      Unit Hyd. Tpeak (min)=       22.50        52.50
      Unit Hyd. peak  (cms)=         .05          .02
                                                           *TOTALS*
      PEAK FLOW        (cms)=        .60          .11          .642 (iii)
      TIME TO PEAK     (hrs)=       1.50         2.13         1.542
      RUNOFF VOLUME     (mm)=      23.43         8.74        16.085
      TOTAL RAINFALL    (mm)=      25.00        25.00        24.999
      RUNOFF COEFFICIENT   =         .94          .35          .643

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0015----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                   ID1 10:POND        8.56      .032     3.88  22.14     .000
                  +ID2 01:HIP01      19.90      .642     1.54  16.08     .000
                   ==================================================
                   SUM 02:HIP02      28.46      .655     1.54  17.91     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0016----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      12.07         4.93
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .65         1.50
      Length             (m)=     450.00       100.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=       40.81        12.73
                  over (min)       17.50        47.50
      Storage Coeff.  (min)=       16.94 (ii)   47.35 (ii)
      Unit Hyd. Tpeak (min)=       17.50        47.50
      Unit Hyd. peak  (cms)=         .07          .02
                                                           *TOTALS*
      PEAK FLOW        (cms)=        .60          .10          .625 (iii)
      TIME TO PEAK     (hrs)=       1.42         2.00         1.458
      RUNOFF VOLUME     (mm)=      23.43         8.74        16.085
      TOTAL RAINFALL    (mm)=      25.00        25.00        24.999
      RUNOFF COEFFICIENT   =         .94          .35          .643

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0017----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   18.10
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      12.85         5.25
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .50         1.50
      Length             (m)=     600.00       100.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=       34.39        11.54
                  over (min)       22.50        55.00
      Storage Coeff.  (min)=       23.33 (ii)   54.95 (ii)
      Unit Hyd. Tpeak (min)=       22.50        55.00
      Unit Hyd. peak  (cms)=         .05          .02
                                                           *TOTALS*
      PEAK FLOW        (cms)=        .53          .09          .562 (iii)
      TIME TO PEAK     (hrs)=       1.50         2.17         1.542
      RUNOFF VOLUME     (mm)=      23.43         8.74        16.085
      TOTAL RAINFALL    (mm)=      25.00        25.00        24.999
      RUNOFF COEFFICIENT   =         .94          .35          .643

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0018----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                   ID1 03:HIP03      17.00      .625     1.46  16.08     .000
                  +ID2 04:HIP04      18.10      .562     1.54  16.08     .000
                   ==================================================
                   SUM 05:HIP05      35.10     1.166     1.46  16.08     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0019----------------------------------------------------------------------
 *
 *SUB-AREA No.4
 ---------------------
 | DESIGN NASHYD      |   Area    (ha)=    4.00   Curve Number   (CN)=85.00
 | 06:Pond-B DT= 2.50 |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .170

      Unit Hyd Qpeak  (cms)=     .899

      PEAK FLOW       (cms)=     .077 (i)
      TIME TO PEAK    (hrs)=    1.375
      RUNOFF VOLUME    (mm)=    6.343
      TOTAL RAINFALL   (mm)=   24.999
      RUNOFF COEFFICIENT   =     .254

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

 ------------------------------------------------------------------------------
 001:0020----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                   ID1 02:HIP02      28.46      .655     1.54  17.91     .000
                  +ID2 05:HIP05      35.10     1.166     1.46  16.08     .000
                  +ID3 06:Pond-B      4.00      .077     1.38   6.34     .000
                   ==================================================
                   SUM 07:HIP06      67.56     1.887     1.50  16.28     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0021----------------------------------------------------------------------
 * SUB-AREA NO. 5
 ---------------------
 | DESIGN NASHYD      |   Area    (ha)=    6.80   Curve Number   (CN)=76.00
 | 10:A2      DT= 2.50 |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .370

      Unit Hyd Qpeak  (cms)=     .702

      PEAK FLOW       (cms)=     .053 (i)
      TIME TO PEAK    (hrs)=    1.708
      RUNOFF VOLUME    (mm)=    4.111
      TOTAL RAINFALL   (mm)=   24.999
      RUNOFF COEFFICIENT   =     .164

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

 ------------------------------------------------------------------------------
 001:0022----------------------------------------------------------------------
 * SUB-AREA NO 4
 ---------------------
 | DESIGN NASHYD      |   Area    (ha)=    5.30   Curve Number   (CN)=76.00
 | 01:A3      DT= 2.50 |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .804
```

```

    Unit Hyd Qpeak  (cms)=      .252

    PEAK FLOW         (cms)=      .025 (i)
    TIME TO PEAK      (hrs)=     2.333
    RUNOFF VOLUME      (mm)=     4.110
    TOTAL RAINFALL     (mm)=    24.999
    RUNOFF COEFFICIENT   =      .164

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

--------------------------------------------------------------------------------
001:0023------------------------------------------------------------------------
--------------------
| ADD HYD (0020  ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                   ID1 07:HIP06    67.56    1.887    1.50   16.28    .000
                  +ID2 10:A2        6.80     .053    1.71    4.11    .000
                  +ID3 01:A3        5.30     .025    2.33    4.11    .000
                  ==================================================
                   SUM 02:0020     79.66    1.941    1.50   14.43    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0024------------------------------------------------------------------------
**************************************************************
*        CALCULATION OF 3HR - 1:2 YEAR STORM EVENT          *
**************************************************************
--------------------
| START              |   Project dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
--------------------     Rainfall dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
   TZERO =   .00 hrs on        0
   METOUT=   2 (output = METRIC)
   NRUN  = 001
   NSTORM=   0
--------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |      IDF curve parameters: A= 732.951
| Ptotal= 31.86 mm |                            B=   6.199
--------------------                            C=    .810
                          used in:    INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33

              TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
               hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
               .17    2.815 |  1.00   76.805 |  1.83    5.095 |  2.67    2.684
               .33    3.498 |  1.17   24.079 |  2.00    4.291 |  2.83    2.463
               .50    4.687 |  1.33   12.364 |  2.17    3.718 |  3.00    2.279
               .67    7.305 |  1.50    8.324 |  2.33    3.288 |
               .83   18.209 |  1.67    6.303 |  2.50    2.953 |

--------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
--------------------
| DEFAULT VALUES     |    Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\ORGA.VAL
----------------------    ICASEdv = 1 (read and print data)
    FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
               ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
    Horton's infiltration equation parameters:
    [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=   .00 mm]
    Parameters for PERVIOUS surfaces in STANDHYD:
    [IAper=    4.67 mm] [LGP=40.00 m] [MNP= .250]
    Parameters for IMPERVIOUS surfaces in STANDHYD:
    [IAimp=    1.57 mm] [CLI= 1.50]    [MNI= .035]
    Parameters used in NASHYD:
    [Ia=   4.67 mm] [N= 3.00]
--------------------------------------------------------------------------------
001:0004------------------------------------------------------------------------
************************************
*           ORGAWORLD FILE         *
************************************
* SUB-AREA No.1
----------------------
| CALIB STANDHYD     |    Area     (ha)=     2.07
| 01:010     DT= 2.50 |    Total Imp(%)=    84.00    Dir. Conn.(%)=    84.00
----------------------
                            IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      1.74          .33
    Dep. Storage      (mm)=      1.57         4.67
    Average Slope      (%)=       .52         1.00
    Length             (m)=    204.72        20.00
    Mannings n            =      .030         .250

    Max.eff.Inten.(mm/hr)=      76.81        11.88
              over (min)       10.00        22.50
    Storage Coeff.  (min)=       8.77 (ii)   22.21 (ii)
    Unit Hyd. Tpeak (min)=      10.00        22.50
    Unit Hyd. peak  (cms)=        .12          .05
                                                          *TOTALS*
    PEAK FLOW         (cms)=      .24          .01           .245 (iii)
    TIME TO PEAK      (hrs)=     1.08         1.38          1.083
    RUNOFF VOLUME      (mm)=    30.29         8.52         26.807
    TOTAL RAINFALL     (mm)=    31.86        31.86         31.860
    RUNOFF COEFFICIENT   =       .95          .27           .841

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0005------------------------------------------------------------------------
*
* SUB-AREA No.2
----------------------
| CALIB STANDHYD     |    Area     (ha)=     1.54
| 02:020     DT= 2.50 |    Total Imp(%)=    92.00    Dir. Conn.(%)=    92.00
----------------------
                            IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      1.42          .12
    Dep. Storage      (mm)=      1.57         4.67
    Average Slope      (%)=       .50         1.00
    Length             (m)=    244.34         5.00
    Mannings n            =      .030         .030

    Max.eff.Inten.(mm/hr)=      76.81        15.07
              over (min)       10.00        12.50
    Storage Coeff.  (min)=       9.87 (ii)   11.36 (ii)
    Unit Hyd. Tpeak (min)=      10.00        12.50
    Unit Hyd. peak  (cms)=        .11          .10
                                                          *TOTALS*
    PEAK FLOW         (cms)=      .19          .00           .192 (iii)
    TIME TO PEAK      (hrs)=     1.08         1.17          1.083
    RUNOFF VOLUME      (mm)=    30.29         8.52         28.548
    TOTAL RAINFALL     (mm)=    31.86        31.86         31.860
    RUNOFF COEFFICIENT   =       .95          .27           .896

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
*
* SUB-AREA No.3
----------------------
| CALIB STANDHYD     |    Area     (ha)=     1.40
| 03:030     DT= 2.50 |    Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
----------------------
                            IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      1.36          .04
    Dep. Storage      (mm)=      1.57         4.67
    Average Slope      (%)=       .51         1.00
    Length             (m)=    225.63         5.00
    Mannings n            =      .030         .030

    Max.eff.Inten.(mm/hr)=      76.81        16.59
              over (min)       10.00        10.00
    Storage Coeff.  (min)=       9.35 (ii)   10.79 (ii)
    Unit Hyd. Tpeak (min)=      10.00        10.00
    Unit Hyd. peak  (cms)=        .12          .11
                                                          *TOTALS*
    PEAK FLOW         (cms)=      .18          .00           .186 (iii)
    TIME TO PEAK      (hrs)=     1.08         1.13          1.083
    RUNOFF VOLUME      (mm)=    30.29         8.52         29.637
    TOTAL RAINFALL     (mm)=    31.86        31.86         31.860
    RUNOFF COEFFICIENT   =       .95          .27           .930

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0007------------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                   ID1 01:010       2.07     .245    1.08   26.81    .000
                  +ID2 02:020       1.54     .192    1.08   28.55    .000
                  ==================================================
                   SUM 04:040       3.61     .436    1.08   27.55    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                   ID1 03:030       1.40     .186    1.08   29.64    .000
                  +ID2 04:040       3.61     .436    1.08   27.55    .000
                  ==================================================
                   SUM 05:050       5.01     .623    1.08   28.13    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*
* SUB-AREA No.4
----------------------
| CALIB STANDHYD     |    Area     (ha)=      .89
| 06:060     DT= 2.50 |    Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
----------------------
                            IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       .86          .03
    Dep. Storage      (mm)=      1.57         4.67
    Average Slope      (%)=       .93          .70
    Length             (m)=    164.82        40.00
    Mannings n            =      .030         .250

    Max.eff.Inten.(mm/hr)=      76.81        10.24
              over (min)        7.50        30.00
    Storage Coeff.  (min)=       6.47 (ii)   30.53 (ii)
    Unit Hyd. Tpeak (min)=       7.50        30.00
    Unit Hyd. peak  (cms)=        .16          .04
                                                          *TOTALS*
    PEAK FLOW         (cms)=      .14          .00           .139 (iii)
    TIME TO PEAK      (hrs)=     1.04         1.54          1.042
    RUNOFF VOLUME      (mm)=    30.29         8.52         29.637
    TOTAL RAINFALL     (mm)=    31.86        31.86         31.860
    RUNOFF COEFFICIENT   =       .95          .27           .930

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*
* SUB-AREA No.5
----------------------
| CALIB STANDHYD     |    Area     (ha)=     2.66
| 07:070     DT= 2.50 |    Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
----------------------
                            IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      2.58          .08
    Dep. Storage      (mm)=      1.57         4.67
    Average Slope      (%)=       .61         1.50
    Length             (m)=    207.25        20.00
    Mannings n            =      .030         .250

    Max.eff.Inten.(mm/hr)=      76.81        12.71
              over (min)        7.50        20.00
    Storage Coeff.  (min)=       8.42 (ii)   20.00 (ii)
    Unit Hyd. Tpeak (min)=       7.50        20.00
    Unit Hyd. peak  (cms)=        .14          .06
                                                          *TOTALS*
    PEAK FLOW         (cms)=      .38          .00           .379 (iii)
    TIME TO PEAK      (hrs)=     1.04         1.33          1.042
    RUNOFF VOLUME      (mm)=    30.29         8.52         29.637
    TOTAL RAINFALL     (mm)=    31.86        31.86         31.860
    RUNOFF COEFFICIENT   =       .95          .27           .930

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
--------------------
| ADD HYD (080   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                   ID1 06:060        .89     .139    1.04   29.64    .000
                  +ID2 07:070       2.66     .379    1.04   29.64    .000
                  ==================================================
```

```
                    SUM 08:080       3.55     .518    1.04  29.64     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ----------------------------------------------------------------------------
 001:0012--------------------------------------------------------------------
 -------------------
 | ADD HYD (090    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 -------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                    ID1 05:050       5.01     .623    1.08  28.13     .000
                   +ID2 08:080       3.55     .518    1.04  29.64     .000
                    ==================================================
                    SUM 09:090       8.56    1.118    1.08  28.76     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ----------------------------------------------------------------------------
 001:0013--------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
 |  IN>09:(090     )  |
 | OUT<10:(POND    )  |    =========  OUTLFOW STORAGE TABLE  =========
 --------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000   .0000E+00   |     .593  .6251E+00
                             .008   .6560E-01   |     .654  .6631E+00
                             .017   .1311E+00   |     .797  .7391E+00
                             .093   .2831E+00   |     .950  .8274E+00
                             .233   .3971E+00   |    1.304  .9157E+00
                             .337   .4731E+00   |    1.880  .1004E+01
                             .465   .5491E+00   |    2.577  .1092E+01
                             .531   .5871E+00   |     .000  .0000E+00
      ROUTING RESULTS              AREA      QPEAK       TPEAK         R.V.
      -------------------          (ha)      (cms)       (hrs)         (mm)
      INFLOW >09: (090    )        8.56      1.118       1.083       28.757
      OUTFLOW<10: (POND   )        8.56       .056       3.000       28.754
                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.030
                     TIME SHIFT OF PEAK FLOW          (min)=   115.00
                     MAXIMUM  STORAGE   USED        (ha.m.)=.2095E+00
 ----------------------------------------------------------------------------
 001:0014--------------------------------------------------------------------
 *********************************************
 *     Remaining Hawthorne Industrial Park    *
 *********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=     14.13          5.77
      Dep. Storage      (mm)=      1.57          4.67
      Average Slope      (%)=       .60          1.50
      Length             (m)=    580.00        100.00
      Mannings n            =      .030          .250
      Max.eff.Inten.(mm/hr)=      54.21         23.06
                 over (min)       17.50         42.50
      Storage Coeff.  (min)=      18.04 (ii)    42.02 (ii)
      Unit Hyd. Tpeak (min)=      17.50         42.50
      Unit Hyd. peak  (cms)=        .06           .03
                                                             *TOTALS*
      PEAK FLOW       (cms)=        .95           .21           1.020 (iii)
      TIME TO PEAK    (hrs)=       1.21          1.71           1.250
      RUNOFF VOLUME    (mm)=      30.29         13.34          21.814
      TOTAL RAINFALL   (mm)=      31.86         31.86          31.860
      RUNOFF COEFFICIENT   =        .95           .42            .685
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ----------------------------------------------------------------------------
 001:0015--------------------------------------------------------------------
 -------------------
 | ADD HYD (HIP02 ) | ID: NHYD       AREA     QPEAK    TPEAK   R.V.     DWF
 -------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 10:POND       8.56     .056    3.00  28.75     .000
                  +ID2 01:HIP01     19.90    1.020    1.25  21.81     .000
                   ==================================================
                   SUM 02:HIP02     28.46    1.039    1.25  23.90     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ----------------------------------------------------------------------------
 001:0016--------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=     12.07          4.93
      Dep. Storage      (mm)=      1.57          4.67
      Average Slope      (%)=       .65          1.50
      Length             (m)=    450.00        100.00
      Mannings n            =      .030          .250
      Max.eff.Inten.(mm/hr)=      59.23         25.04
                 over (min)       15.00         37.50
      Storage Coeff.  (min)=      14.60 (ii)    37.80 (ii)
      Unit Hyd. Tpeak (min)=      15.00         37.50
      Unit Hyd. peak  (cms)=        .08           .03
                                                             *TOTALS*
      PEAK FLOW       (cms)=        .91           .19            .978 (iii)
      TIME TO PEAK    (hrs)=       1.17          1.63           1.167
      RUNOFF VOLUME    (mm)=      30.29         13.34          21.814
      TOTAL RAINFALL   (mm)=      31.86         31.86          31.860
      RUNOFF COEFFICIENT   =        .95           .42            .685
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ----------------------------------------------------------------------------
 001:0017--------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   18.10
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=     12.85          5.25
      Dep. Storage      (mm)=      1.57          4.67
      Average Slope      (%)=       .50          1.50
      Length             (m)=    600.00        100.00
      Mannings n            =      .030          .250
      Max.eff.Inten.(mm/hr)=      50.44         22.17
                 over (min)       20.00         45.00
      Storage Coeff.  (min)=      20.01 (ii)    44.37 (ii)
      Unit Hyd. Tpeak (min)=      20.00         45.00
      Unit Hyd. peak  (cms)=        .06           .03
                                                             *TOTALS*
      PEAK FLOW       (cms)=        .80           .18            .874 (iii)
      TIME TO PEAK    (hrs)=       1.25          1.79           1.292
      RUNOFF VOLUME    (mm)=      30.29         13.34          21.814
      TOTAL RAINFALL   (mm)=      31.86         31.86          31.860
      RUNOFF COEFFICIENT   =        .95           .42            .685
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ----------------------------------------------------------------------------
 001:0018--------------------------------------------------------------------
 -------------------
 | ADD HYD (HIP05 ) | ID: NHYD       AREA     QPEAK    TPEAK   R.V.     DWF
 -------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 03:HIP03     17.00     .978    1.17  21.81     .000
                  +ID2 04:HIP04     18.10     .874    1.29  21.81     .000
                   ==================================================
                   SUM 05:HIP05     35.10    1.814    1.21  21.81     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ----------------------------------------------------------------------------
 001:0019--------------------------------------------------------------------
 *
 *SUB-AREA No.4
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=    4.00   Curve Number   (CN)=85.00
 | 06:Pond-B DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .170
      Unit Hyd Qpeak  (cms)=      .899
      PEAK FLOW       (cms)=      .145 (i)
      TIME TO PEAK    (hrs)=     1.167
      RUNOFF VOLUME    (mm)=    10.266
      TOTAL RAINFALL   (mm)=    31.860
      RUNOFF COEFFICIENT   =      .322
      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ----------------------------------------------------------------------------
 001:0020--------------------------------------------------------------------
 -------------------
 | ADD HYD (HIP06 ) | ID: NHYD       AREA     QPEAK    TPEAK   R.V.     DWF
 -------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 02:HIP02     28.46    1.039    1.25  23.90     .000
                  +ID2 05:HIP05     35.10    1.814    1.21  21.81     .000
                  +ID3 06:Pond-B     4.00     .145    1.17  10.27     .000
                   ==================================================
                   SUM 07:HIP06     67.56    2.992    1.21  22.01     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ----------------------------------------------------------------------------
 001:0021--------------------------------------------------------------------
 * SUB-AREA NO. 5
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=    6.80   Curve Number   (CN)=76.00
 | 10:A2      DT= 2.50 |  Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .370
      Unit Hyd Qpeak  (cms)=      .702
      PEAK FLOW       (cms)=      .102 (i)
      TIME TO PEAK    (hrs)=     1.458
      RUNOFF VOLUME    (mm)=     6.883
      TOTAL RAINFALL   (mm)=    31.860
      RUNOFF COEFFICIENT   =      .216
      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ----------------------------------------------------------------------------
 001:0022--------------------------------------------------------------------
 * SUB-AREA NO 4
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=    5.30   Curve Number   (CN)=76.00
 | 01:A3      DT= 2.50 |  Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .804
      Unit Hyd Qpeak  (cms)=      .252
      PEAK FLOW       (cms)=      .048 (i)
      TIME TO PEAK    (hrs)=     2.083
      RUNOFF VOLUME    (mm)=     6.883
      TOTAL RAINFALL   (mm)=    31.860
      RUNOFF COEFFICIENT   =      .216
      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ----------------------------------------------------------------------------
 001:0023--------------------------------------------------------------------
 -------------------
 | ADD HYD (0020  ) | ID: NHYD       AREA     QPEAK    TPEAK   R.V.     DWF
 -------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 07:HIP06     67.56    2.992    1.21  22.01     .000
                  +ID2 10:A2         6.80     .102    1.46   6.88     .000
                  +ID3 01:A3         5.30     .048    2.08   6.88     .000
                   ==================================================
                   SUM 02:0020      79.66    3.077    1.21  19.71     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ----------------------------------------------------------------------------
 001:0024--------------------------------------------------------------------
 ************************************************************
 *        CALCULATION OF 3HR - 1:5 YEAR STORM EVENT          *
 ************************************************************
 -------------------
 | START            |   Project  dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
 -------------------    Rainfall dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
    TZERO =    .00 hrs on       0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=    0
 ----------------------------------------------------------------------------
 001:0002--------------------------------------------------------------------
 -------------------
 | CHICAGO STORM    |     IDF curve parameters: A= 998.071
 | Ptotal= 42.51 mm |                           B=   6.053
 -------------------                            C=    .814
                          used in:   INTENSITY =  A / (t + B)^C
                          Duration of storm  =  3.00 hrs
```

```
                      Storm time step    = 10.00 min
                      Time to peak ratio =  .33

           TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
            hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
            .17    3.682 |  1.00  104.193 |  1.83    6.689 |  2.67    3.510
            .33    4.582 |  1.17   32.037 |  2.00    5.628 |  2.83    3.220
            .50    6.151 |  1.33   16.337 |  2.17    4.872 |  3.00    2.978
            .67    9.614 |  1.50   10.965 |  2.33    4.305 |
            .83   24.170 |  1.67    8.287 |  2.50    3.864 |

-- -----------------------------------------------------------------------------
00 1:0003----------------------------------------------------------------------
-- -------------------
| DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\ORGA.VAL
-- -------------------   ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=   .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
-- -----------------------------------------------------------------------------
00 1:0004----------------------------------------------------------------------
**************************************
*            ORGAWORLD FILE          *
**************************************
* SUB-AREA No.1
-----------------------
| CALIB STANDHYD      |   Area    (ha)=    2.07
| 01:010    DT= 2.50  |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
-----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      1.74          .33
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .52         1.00
     Length             (m)=    204.72        20.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=     104.19        24.26
                over (min)        7.50        17.50
     Storage Coeff.  (min)=       7.76 (ii)   17.86 (ii)
     Unit Hyd. Tpeak (min)=       7.50        17.50
     Unit Hyd. peak  (cms)=        .15          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .36          .01          .362 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.25         1.042
     RUNOFF VOLUME     (mm)=     40.94        14.70        36.745
     TOTAL RAINFALL    (mm)=     42.51        42.51        42.514
     RUNOFF COEFFICIENT   =        .96          .35          .864

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
*
* SUB-AREA No.2
-----------------------
| CALIB STANDHYD      |   Area    (ha)=    1.54
| 02:020    DT= 2.50  |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
-----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      1.42          .12
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .50         1.00
     Length             (m)=    244.34         5.00
     Mannings n            =      .030         .030

     Max.eff.Inten.(mm/hr)=     104.19        31.02
                over (min)        7.50        10.00
     Storage Coeff.  (min)=       8.73 (ii)    9.85 (ii)
     Unit Hyd. Tpeak (min)=       7.50        10.00
     Unit Hyd. peak  (cms)=        .14          .11
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .28          .01          .283 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.13         1.042
     RUNOFF VOLUME     (mm)=     40.94        14.70        38.845
     TOTAL RAINFALL    (mm)=     42.51        42.51        42.514
     RUNOFF COEFFICIENT   =        .96          .35          .914

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
*
* SUB-AREA No.3
-----------------------
| CALIB STANDHYD      |   Area    (ha)=    1.40
| 03:030    DT= 2.50  |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
-----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      1.36          .04
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .51         1.00
     Length             (m)=    225.63         5.00
     Mannings n            =      .030         .030

     Max.eff.Inten.(mm/hr)=     104.19        31.02
                over (min)        7.50        10.00
     Storage Coeff.  (min)=       8.28 (ii)    9.39 (ii)
     Unit Hyd. Tpeak (min)=       7.50        10.00
     Unit Hyd. peak  (cms)=        .14          .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .27          .00          .274 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.13         1.042
     RUNOFF VOLUME     (mm)=     40.94        14.70        40.157
     TOTAL RAINFALL    (mm)=     42.51        42.51        42.514
     RUNOFF COEFFICIENT   =        .96          .35          .945

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 01:010        2.07      .362     1.04   36.75     .000
                +ID2 02:020        1.54      .283     1.04   38.84     .000
                 ==================================================
                 SUM 04:040        3.61      .645     1.04   37.64     .000


     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 03:030        1.40      .274     1.04   40.16     .000
                +ID2 04:040        3.61      .645     1.04   37.64     .000
                 ==================================================
                 SUM 05:050        5.01      .918     1.04   38.34     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
*
* SUB-AREA No.4
-----------------------
| CALIB STANDHYD      |   Area    (ha)=     .89
| 06:060    DT= 2.50  |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
-----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       .86          .03
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .93          .70
     Length             (m)=    164.82        40.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=     104.19        20.32
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       5.72 (ii)   24.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .20          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .20          .00          .205 (iii)
     TIME TO PEAK     (hrs)=      1.00         1.38         1.000
     RUNOFF VOLUME     (mm)=     40.94        14.70        40.157
     TOTAL RAINFALL    (mm)=     42.51        42.51        42.514
     RUNOFF COEFFICIENT   =        .96          .35          .945

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
*
* SUB-AREA No.5
-----------------------
| CALIB STANDHYD      |   Area    (ha)=    2.66
| 07:070    DT= 2.50  |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
-----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      2.58          .08
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .61         1.50
     Length             (m)=    207.25        20.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=     104.19        24.26
                over (min)        7.50        17.50
     Storage Coeff.  (min)=       7.45 (ii)   16.40 (ii)
     Unit Hyd. Tpeak (min)=       7.50        17.50
     Unit Hyd. peak  (cms)=        .15          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .54          .00          .538 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.25         1.042
     RUNOFF VOLUME     (mm)=     40.94        14.70        40.157
     TOTAL RAINFALL    (mm)=     42.51        42.51        42.514
     RUNOFF COEFFICIENT   =        .96          .35          .945

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
--------------------
| ADD HYD (080   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 06:060         .89      .205     1.00   40.16     .000
                +ID2 07:070        2.66      .538     1.04   40.16     .000
                 ==================================================
                 SUM 08:080        3.55      .733     1.04   40.16     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
--------------------
| ADD HYD (090   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 05:050        5.01      .918     1.04   38.34     .000
                +ID2 08:080        3.55      .733     1.04   40.16     .000
                 ==================================================
                 SUM 09:090        8.56     1.651     1.04   39.10     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0013-----------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>09:(090   )   |
| OUT<10:(POND  )   |    ========= OUTFLOW STORAGE TABLE =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .000  .0000E+00    |    .593  .6251E+00
                           .008  .6560E-01    |    .654  .6631E+00
                           .017  .1311E+00    |    .797  .7391E+00
                           .093  .2831E+00    |    .950  .8274E+00
                           .233  .3971E+00    |   1.304  .9157E+00
                           .337  .4731E+00    |   1.880  .1004E+01
                           .465  .5491E+00    |   2.577  .1092E+01
                           .531  .5871E+00    |    .000  .0000E+00

     ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
     --------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW >09: (090   )      8.56     1.651     1.042     39.096
     OUTFLOW<10: (POND  )      8.56      .089     2.625     39.093

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=     5.413
                 TIME SHIFT OF PEAK FLOW          (min)=    95.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=.2758E+00

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001:0014-----------------------------------------------------------------------
**********************************************
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 *     Remaining Hawthorne Industrial Park      *
 **********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      14.13         5.77
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .60         1.50
     Length            (m)=     580.00       100.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=      80.14        42.65
                over (min)      15.00        35.00
     Storage Coeff.  (min)=      15.43 (ii)   34.18 (ii)
     Unit Hyd. Tpeak (min)=      15.00        35.00
     Unit Hyd. peak  (cms)=        .07          .03
                                                          *TOTALS*
     PEAK FLOW        (cms)=       1.41          .40       1.572 (iii)
     TIME TO PEAK     (hrs)=       1.17         1.54       1.208
     RUNOFF VOLUME     (mm)=      40.94        21.31      31.126
     TOTAL RAINFALL    (mm)=      42.51        42.51      42.514
     RUNOFF COEFFICIENT   =        .96          .50        .732

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0015--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 10:POND        8.56      .089     2.63  39.09     .000
                  +ID2 01:HIP01      19.90     1.572     1.21  31.13     .000
                  ==================================================
                   SUM 02:HIP02      28.46     1.615     1.21  33.52     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0016--------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.07         4.93
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .65         1.50
     Length            (m)=     450.00       100.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=      89.76        47.48
                over (min)      12.50        30.00
     Storage Coeff.  (min)=      12.36 (ii)   30.32 (ii)
     Unit Hyd. Tpeak (min)=      12.50        30.00
     Unit Hyd. peak  (cms)=        .09          .04
                                                          *TOTALS*
     PEAK FLOW        (cms)=       1.36          .37       1.504 (iii)
     TIME TO PEAK     (hrs)=       1.13         1.46       1.167
     RUNOFF VOLUME     (mm)=      40.94        21.31      31.126
     TOTAL RAINFALL    (mm)=      42.51        42.51      42.514
     RUNOFF COEFFICIENT   =        .96          .50        .732

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0017--------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    18.10
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.85         5.25
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .50         1.50
     Length            (m)=     600.00       100.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=      73.27        42.65
                over (min)      17.50        35.00
     Storage Coeff.  (min)=      17.24 (ii)   35.98 (ii)
     Unit Hyd. Tpeak (min)=      17.50        35.00
     Unit Hyd. peak  (cms)=        .07          .03
                                                          *TOTALS*
     PEAK FLOW        (cms)=       1.19          .35       1.364 (iii)
     TIME TO PEAK     (hrs)=       1.21         1.54       1.250
     RUNOFF VOLUME     (mm)=      40.94        21.31      31.126
     TOTAL RAINFALL    (mm)=      42.51        42.51      42.514
     RUNOFF COEFFICIENT   =        .96          .50        .732

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0018--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 03:HIP03      17.00     1.504     1.17  31.13     .000
                  +ID2 04:HIP04      18.10     1.364     1.25  31.13     .000
                  ==================================================
                   SUM 05:HIP05      35.10     2.800     1.17  31.13     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0019--------------------------------------------------------------------
 *
 *SUB-AREA No.4
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=     4.00   Curve Number   (CN)=85.00
 | 06:Pond-B DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=      .170

     Unit Hyd Qpeak  (cms)=      .899

     PEAK FLOW       (cms)=      .260 (i)
     TIME TO PEAK    (hrs)=     1.167
     RUNOFF VOLUME    (mm)=    17.325
     TOTAL RAINFALL   (mm)=    42.514
     RUNOFF COEFFICIENT   =      .408

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

 -----------------------------------------------------------------------------
 001:0020--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 02:HIP02      28.46     1.615     1.21  33.52     .000
                  +ID2 05:HIP05      35.10     2.800     1.17  31.13     .000
                  +ID3 06:Pond-B      4.00      .260     1.17  17.32     .000
                  ==================================================
                   SUM 07:HIP06      67.56     4.661     1.17  31.32     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0021--------------------------------------------------------------------
 * SUB-AREA NO. 5
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=     6.80   Curve Number   (CN)=76.00
 | 10:A2     DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=      .370

     Unit Hyd Qpeak  (cms)=      .702

     PEAK FLOW       (cms)=      .187 (i)
     TIME TO PEAK    (hrs)=     1.458
     RUNOFF VOLUME    (mm)=    12.131
     TOTAL RAINFALL   (mm)=    42.514
     RUNOFF COEFFICIENT   =      .285

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

 -----------------------------------------------------------------------------
 001:0022--------------------------------------------------------------------
 * SUB-AREA NO 4
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=     5.30   Curve Number   (CN)=76.00
 | 01:A3     DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=      .804

     Unit Hyd Qpeak  (cms)=      .252

     PEAK FLOW       (cms)=      .086 (i)
     TIME TO PEAK    (hrs)=     2.042
     RUNOFF VOLUME    (mm)=    12.131
     TOTAL RAINFALL   (mm)=    42.514
     RUNOFF COEFFICIENT   =      .285

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

 -----------------------------------------------------------------------------
 001:0023--------------------------------------------------------------------
 --------------------
 | ADD HYD (0020  ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 07:HIP06      67.56     4.661     1.17  31.32     .000
                  +ID2 10:A2          6.80      .187     1.46  12.13     .000
                  +ID3 01:A3          5.30      .086     2.04  12.13     .000
                  ==================================================
                   SUM 02:0020       79.66     4.812     1.21  28.40     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0024--------------------------------------------------------------------
 ************************************************************
 *       CALCULATION OF 3HR - 1:10 YEAR STORM EVENT         *
 ************************************************************
 --------------------
 | START              |   Project  dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
 --------------------     Rainfall dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
      TZERO =    .00 hrs on        0
      METOUT=    2 (output = METRIC)
      NRUN  = 001
      NSTORM=    0
 -----------------------------------------------------------------------------
 001:0002--------------------------------------------------------------------
 --------------------
 | CHICAGO STORM      |   IDF curve parameters: A=1174.184
 | Ptotal= 49.50 mm   |                         B=   6.014
 --------------------                           C=    .816
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33

        TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
         hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
         .17    4.248 |   1.00  122.142 |   1.83    7.733 |   2.67    4.049
         .33    5.290 |   1.17   37.285 |   2.00    6.502 |   2.83    3.714
         .50    7.108 |   1.33   18.954 |   2.17    5.625 |   3.00    3.434
         .67   11.130 |   1.50   12.700 |   2.33    4.969 |
         .83   28.100 |   1.67    9.588 |   2.50    4.458 |

 -----------------------------------------------------------------------------
 001:0003--------------------------------------------------------------------
 --------------------
 | DEFAULT VALUES     |   Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\ORGA.VAL
 --------------------     ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
 -----------------------------------------------------------------------------
 001:0004--------------------------------------------------------------------
 ************************************
 *          ORGAWORLD FILE          *
 ************************************
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=     2.07
 | 01:010    DT= 2.50 |   Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.74          .33
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .52         1.00
     Length            (m)=     204.72        20.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=     122.14        34.69
                over (min)       7.50        15.00
```

```
          Storage Coeff.   (min)=      7.28 (ii)   16.04 (ii)
          Unit Hyd. Tpeak  (min)=      7.50        15.00
          Unit Hyd. peak   (cms)=       .15          .07
                                                              *TOTALS*
          PEAK FLOW        (cms)=       .43          .02         .437 (iii)
          TIME TO PEAK     (hrs)=      1.04         1.21        1.042
          RUNOFF VOLUME     (mm)=     47.93        19.25       43.345
          TOTAL RAINFALL    (mm)=     49.50        49.50       49.505
          RUNOFF COEFFICIENT   =        .97          .39         .876

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  81.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0005--------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    1.54
 | 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
          Surface Area      (ha)=    1.42        .12
          Dep. Storage      (mm)=    1.57       4.67
          Average Slope      (%)=     .50       1.00
          Length             (m)=  244.34       5.00
          Mannings n           =     .030       .030

          Max.eff.Inten.(mm/hr)=   122.14      42.32
                     over (min)      7.50      10.00
          Storage Coeff.   (min)=    8.20 (ii)   9.18 (ii)
          Unit Hyd. Tpeak  (min)=    7.50      10.00
          Unit Hyd. peak   (cms)=     .14        .12
                                                            *TOTALS*
          PEAK FLOW        (cms)=     .33        .01          .341 (iii)
          TIME TO PEAK     (hrs)=    1.04       1.13         1.042
          RUNOFF VOLUME     (mm)=   47.93      19.25        45.640
          TOTAL RAINFALL    (mm)=   49.50      49.50        49.505
          RUNOFF COEFFICIENT   =      .97        .39          .922

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  81.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0006--------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    1.40
 | 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
          Surface Area      (ha)=    1.36        .04
          Dep. Storage      (mm)=    1.57       4.67
          Average Slope      (%)=     .51       1.00
          Length             (m)=  225.63       5.00
          Mannings n           =     .030       .030

          Max.eff.Inten.(mm/hr)=   122.14      48.18
                     over (min)      7.50       7.50
          Storage Coeff.   (min)=    7.77 (ii)   8.70 (ii)
          Unit Hyd. Tpeak  (min)=    7.50       7.50
          Unit Hyd. peak   (cms)=     .15        .14
                                                            *TOTALS*
          PEAK FLOW        (cms)=     .33        .00          .329 (iii)
          TIME TO PEAK     (hrs)=    1.04       1.08         1.042
          RUNOFF VOLUME     (mm)=   47.93      19.25        47.074
          TOTAL RAINFALL    (mm)=   49.50      49.50        49.505
          RUNOFF COEFFICIENT   =      .97        .39          .951

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  81.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0007--------------------------------------------------------------------
 --------------------
 | ADD HYD (040   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:010      2.07      .437    1.04  43.35    .000
                    +ID2 02:020      1.54      .341    1.04  45.64    .000
                     ================================================
                     SUM 04:040      3.61      .778    1.04  44.32    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0008--------------------------------------------------------------------
 --------------------
 | ADD HYD (050   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 03:030      1.40      .329    1.04  47.07    .000
                    +ID2 04:040      3.61      .778    1.04  44.32    .000
                     ================================================
                     SUM 05:050      5.01     1.107    1.04  45.09    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0009--------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .89
 | 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
          Surface Area      (ha)=     .86        .03
          Dep. Storage      (mm)=    1.57       4.67
          Average Slope      (%)=     .93        .70
          Length             (m)=  164.82      40.00
          Mannings n           =     .030       .250

          Max.eff.Inten.(mm/hr)=   122.14      31.19
                     over (min)      5.00      20.00
          Storage Coeff.   (min)=    5.37 (ii)  20.78 (ii)
          Unit Hyd. Tpeak  (min)=    5.00      20.00
          Unit Hyd. peak   (cms)=     .21        .06
                                                            *TOTALS*
          PEAK FLOW        (cms)=     .24        .00          .245 (iii)
          TIME TO PEAK     (hrs)=    1.00       1.29         1.000
          RUNOFF VOLUME     (mm)=   47.93      19.25        47.074
          TOTAL RAINFALL    (mm)=   49.50      49.50        49.505
          RUNOFF COEFFICIENT   =      .97        .39          .951

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  81.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0010--------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    2.66
 | 07:070    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
          Surface Area      (ha)=    2.58        .08
          Dep. Storage      (mm)=    1.57       4.67
          Average Slope      (%)=     .61       1.50
          Length             (m)=  207.25      20.00
          Mannings n           =     .030       .250

          Max.eff.Inten.(mm/hr)=   122.14      34.69
                     over (min)      7.50      15.00
          Storage Coeff.   (min)=    7.00 (ii)  14.75 (ii)
          Unit Hyd. Tpeak  (min)=    7.50      15.00
          Unit Hyd. peak   (cms)=     .16        .08
                                                            *TOTALS*
          PEAK FLOW        (cms)=     .64        .00          .645 (iii)
          TIME TO PEAK     (hrs)=    1.04       1.21         1.042
          RUNOFF VOLUME     (mm)=   47.93      19.25        47.074
          TOTAL RAINFALL    (mm)=   49.50      49.50        49.505
          RUNOFF COEFFICIENT   =      .97        .39          .951

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  81.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0011--------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 06:060       .89      .245    1.00  47.07    .000
                    +ID2 07:070      2.66      .645    1.04  47.07    .000
                     ================================================
                     SUM 08:080      3.55      .876    1.04  47.07    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0012--------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 05:050      5.01     1.107    1.04  45.09    .000
                    +ID2 08:080      3.55      .876    1.04  47.07    .000
                     ================================================
                     SUM 09:090      8.56     1.984    1.04  45.91    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0013--------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
 |   IN>09:(090   )   |
 |  OUT<10:(POND  )   |     ========= OUTFLOW STORAGE TABLE =========
 --------------------        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                              (cms)     (ha.m.)   |   (cms)     (ha.m.)
                               .000  .0000E+00    |     .593  .6251E+00
                               .008  .6560E-01    |     .654  .6631E+00
                               .017  .1311E+00    |     .797  .7391E+00
                               .093  .2831E+00    |     .950  .8274E+00
                               .233  .3971E+00    |    1.304  .9157E+00
                               .337  .4731E+00    |    1.880  .1004E+01
                               .465  .5491E+00    |    2.577  .1092E+01
                               .531  .5871E+00    |     .000  .0000E+00

    ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
    --------------------         (ha)     (cms)     (hrs)       (mm)
    INFLOW >09: (090   )         8.56     1.984     1.042     45.914
    OUTFLOW<10: (POND  )         8.56      .132     2.278     45.912

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=     6.640
                     TIME SHIFT OF PEAK FLOW          (min)=    74.17
                     MAXIMUM  STORAGE   USED       (ha.m.)=.3146E+00

 -----------------------------------------------------------------------------
 001:0014--------------------------------------------------------------------
 ***********************************************
 *     Remaining Hawthorne Industrial Park     *
 ***********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
          Surface Area      (ha)=   14.13       5.77
          Dep. Storage      (mm)=    1.57       4.67
          Average Slope      (%)=     .60       1.50
          Length             (m)=  580.00     100.00
          Mannings n           =     .030       .250

          Max.eff.Inten.(mm/hr)=    93.86      60.56
                     over (min)     15.00      30.00
          Storage Coeff.   (min)=   14.48 (ii)  30.78 (ii)
          Unit Hyd. Tpeak  (min)=   15.00      30.00
          Unit Hyd. peak   (cms)=     .08        .04
                                                            *TOTALS*
          PEAK FLOW        (cms)=    1.70        .55         1.983 (iii)
          TIME TO PEAK     (hrs)=    1.17       1.46         1.208
          RUNOFF VOLUME     (mm)=   47.93      26.92        37.426
          TOTAL RAINFALL    (mm)=   49.50      49.50        49.505
          RUNOFF COEFFICIENT   =      .97        .54          .756

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  81.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0015--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 10:POND      8.56      .132    2.28  45.91    .000
                    +ID2 01:HIP01    19.90     1.983    1.21  37.43    .000
                     ================================================
                     SUM 02:HIP02    28.46     2.044    1.21  39.98    .000

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

```
---------------------------------------------------------------------------
001:0016-------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area      (ha)=    17.00
| 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.07          4.93
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .65          1.50
     Length            (m)=     450.00        100.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=     105.17         63.81
                over (min)       12.50         27.50
     Storage Coeff.  (min)=      11.60 (ii)    27.56 (ii)
     Unit Hyd. Tpeak (min)=      12.50         27.50
     Unit Hyd. peak  (cms)=        .09           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.63           .51       1.865 (iii)
     TIME TO PEAK     (hrs)=      1.13          1.42       1.167
     RUNOFF VOLUME    (mm)=      47.93         26.92      37.426
     TOTAL RAINFALL   (mm)=      49.50         49.50      49.505
     RUNOFF COEFFICIENT   =        .97           .54        .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0017-------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |   Area      (ha)=    18.10
| 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.85          5.25
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .50          1.50
     Length            (m)=     600.00        100.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=      93.86         57.19
                over (min)       15.00         32.50
     Storage Coeff.  (min)=      15.61 (ii)    32.28 (ii)
     Unit Hyd. Tpeak (min)=      15.00         32.50
     Unit Hyd. peak  (cms)=        .07           .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.49           .48       1.723 (iii)
     TIME TO PEAK     (hrs)=      1.17          1.50       1.208
     RUNOFF VOLUME    (mm)=      47.93         26.92      37.426
     TOTAL RAINFALL   (mm)=      49.50         49.50      49.505
     RUNOFF COEFFICIENT   =        .97           .54        .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0018-------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD       AREA     QPEAK    TPEAK    R.V.    DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                ID1 03:HIP03       17.00     1.865     1.17   37.43    .000
               +ID2 04:HIP04       18.10     1.723     1.21   37.43    .000
                    ================================================
                    SUM 05:HIP05   35.10     3.572     1.17   37.43    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0019-------------------------------------------------------------------
*
*SUB-AREA No.4
--------------------
| DESIGN NASHYD        |   Area     (ha)=     4.00   Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50   |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
--------------------       U.H. Tp(hrs)=     .170

     Unit Hyd Qpeak  (cms)=      .899

     PEAK FLOW       (cms)=      .345 (i)
     TIME TO PEAK     (hrs)=    1.167
     RUNOFF VOLUME    (mm)=   22.420
     TOTAL RAINFALL   (mm)=   49.505
     RUNOFF COEFFICIENT   =      .453

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

---------------------------------------------------------------------------
001:0020-------------------------------------------------------------------
--------------------
| ADD HYD (HIP06 ) | ID: NHYD       AREA     QPEAK    TPEAK    R.V.    DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                ID1 02:HIP02       28.46     2.044     1.21   39.98    .000
               +ID2 05:HIP05       35.10     3.572     1.17   37.43    .000
               +ID3 06:Pond-B       4.00      .345     1.17   22.42    .000
                    ================================================
                    SUM 07:HIP06   67.56     5.939     1.17   37.61    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0021-------------------------------------------------------------------
* SUB-AREA NO. 5
--------------------
| DESIGN NASHYD        |   Area     (ha)=     6.80   Curve Number   (CN)=76.00
| 10:A2       DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
--------------------       U.H. Tp(hrs)=     .370

     Unit Hyd Qpeak  (cms)=      .702

     PEAK FLOW       (cms)=      .252 (i)
     TIME TO PEAK     (hrs)=    1.417
     RUNOFF VOLUME    (mm)=   16.075
     TOTAL RAINFALL   (mm)=   49.505
     RUNOFF COEFFICIENT   =      .325

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

---------------------------------------------------------------------------
001:0022-------------------------------------------------------------------
* SUB-AREA NO 4
--------------------
| DESIGN NASHYD        |   Area     (ha)=     5.30   Curve Number   (CN)=76.00
| 01:A3       DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
--------------------       U.H. Tp(hrs)=     .804

     Unit Hyd Qpeak  (cms)=      .252

     PEAK FLOW       (cms)=      .115 (i)
     TIME TO PEAK     (hrs)=    2.000
     RUNOFF VOLUME    (mm)=   16.075
     TOTAL RAINFALL   (mm)=   49.505
     RUNOFF COEFFICIENT   =      .325

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

---------------------------------------------------------------------------
001:0023-------------------------------------------------------------------
--------------------
| ADD HYD (0020  ) | ID: NHYD       AREA     QPEAK    TPEAK    R.V.    DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                ID1 07:HIP06       67.56     5.939     1.17   37.61    .000
               +ID2 10:A2           6.80      .252     1.42   16.08    .000
               +ID3 01:A3           5.30      .115     2.00   16.08    .000
                    ================================================
                    SUM 02:0020    79.66     6.135     1.17   34.34    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0024-------------------------------------------------------------------
***************************************************************
*        CALCULATION OF 3HR - 1:25 YEAR STORM EVENT           *
***************************************************************
--------------------
| START              |   Project  dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
--------------------     Rainfall dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
     TZERO =    .00 hrs on        0
     METOUT=    2 (output = METRIC)
     NRUN  = 001
     NSTORM=    0

---------------------------------------------------------------------------
001:0002-------------------------------------------------------------------
--------------------
| CHICAGO STORM      |     IDF curve parameters: A=1402.884
| Ptotal= 58.23 mm   |                           B=   6.018
--------------------                             C=    .819
                           used in:   INTENSITY =  A / (t + B)^C

                           Duration of storm  =  3.00 hrs
                           Storm time step    = 10.00 min
                           Time to peak ratio =   .33

              TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
               hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
               .17    4.934 |   1.00  144.693 |   1.83    9.014 |   2.67    4.701
               .33    6.152 |   1.17   43.904 |   2.00    7.571 |   2.83    4.310
               .50    8.282 |   1.33   22.224 |   2.17    6.544 |   3.00    3.983
               .67   13.006 |   1.50   14.852 |   2.33    5.776 |
               .83   33.041 |   1.67   11.192 |   2.50    5.179 |

---------------------------------------------------------------------------
001:0003-------------------------------------------------------------------
--------------------
| DEFAULT VALUES     |   Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\ORGA.VAL
--------------------     ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=   .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
---------------------------------------------------------------------------
001:0004-------------------------------------------------------------------
*********************************
*          ORGAWORLD FILE       *
*********************************
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |   Area      (ha)=     2.07
| 01:010    DT= 2.50 |   Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.74           .33
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .52          1.00
     Length            (m)=     204.72         20.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=     144.69         47.07
                over (min)        7.50         15.00
     Storage Coeff.  (min)=       6.81 (ii)    14.56 (ii)
     Unit Hyd. Tpeak (min)=       7.50         15.00
     Unit Hyd. peak  (cms)=        .16           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .52           .03        .532 (iii)
     TIME TO PEAK     (hrs)=      1.04          1.21       1.042
     RUNOFF VOLUME    (mm)=      56.66         25.35      51.647
     TOTAL RAINFALL   (mm)=      58.23         58.23      58.226
     RUNOFF COEFFICIENT   =        .97           .44        .887

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0005-------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area      (ha)=     1.54
| 02:020    DT= 2.50 |   Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.42           .12
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .50          1.00
     Length            (m)=     244.34          5.00
     Mannings n           =       .030          .030

     Max.eff.Inten.(mm/hr)=     144.69         65.19
                over (min)        7.50          7.50
     Storage Coeff.  (min)=       7.66 (ii)     8.49 (ii)
     Unit Hyd. Tpeak (min)=       7.50          7.50
     Unit Hyd. peak  (cms)=        .15           .14
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .40           .01        .418 (iii)
     TIME TO PEAK     (hrs)=      1.04          1.08       1.042
     RUNOFF VOLUME    (mm)=      56.66         25.35      54.152
     TOTAL RAINFALL   (mm)=      58.23         58.23      58.226
     RUNOFF COEFFICIENT   =        .97           .44        .930

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
```

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

 -------------------------------------------------------------------------------
 001:0006-----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     1.40
 | 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      1.36          .04
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .51         1.00
     Length             (m)=    225.63         5.00
     Mannings n            =      .030         .030

     Max.eff.Inten.(mm/hr)=     144.69        65.19
                over (min)        7.50         7.50
     Storage Coeff.   (min)=      7.26 (ii)    8.09 (ii)
     Unit Hyd. Tpeak (min)=       7.50         7.50
     Unit Hyd. peak   (cms)=       .15          .14
                                                           *TOTALS*
     PEAK FLOW         (cms)=       .40          .00          .400 (iii)
     TIME TO PEAK      (hrs)=      1.04         1.08         1.042
     RUNOFF VOLUME      (mm)=     56.66        25.35        55.717
     TOTAL RAINFALL     (mm)=     58.23        58.23        58.226
     RUNOFF COEFFICIENT    =        .97          .44          .957

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0007-----------------------------------------------------------------------
 --------------------
 | ADD HYD (040   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 01:010     2.07      .532     1.04   51.65     .000
                    +ID2 02:020     1.54      .418     1.04   54.15     .000
                    ==================================================
                     SUM 04:040     3.61      .950     1.04   52.72     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0008-----------------------------------------------------------------------
 --------------------
 | ADD HYD (050   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 03:030     1.40      .400     1.04   55.72     .000
                    +ID2 04:040     3.61      .950     1.04   52.72     .000
                    ==================================================
                     SUM 05:050     5.01     1.350     1.04   53.55     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0009-----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=      .89
 | 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       .86          .03
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .93          .70
     Length             (m)=    164.82        40.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=     144.69        44.12
                over (min)        5.00        17.50
     Storage Coeff.   (min)=      5.02 (ii)   18.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.50
     Unit Hyd. peak   (cms)=       .22          .06
                                                           *TOTALS*
     PEAK FLOW         (cms)=       .30          .00          .296 (iii)
     TIME TO PEAK      (hrs)=      1.00         1.25         1.000
     RUNOFF VOLUME      (mm)=     56.66        25.35        55.717
     TOTAL RAINFALL     (mm)=     58.23        58.23        58.226
     RUNOFF COEFFICIENT    =        .97          .44          .957

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0010-----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     2.66
 | 07:070    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      2.58          .08
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .61         1.50
     Length             (m)=    207.25        20.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=     144.69        51.33
                over (min)        7.50        12.50
     Storage Coeff.   (min)=      6.54 (ii)   13.16 (ii)
     Unit Hyd. Tpeak (min)=       7.50        12.50
     Unit Hyd. peak   (cms)=       .16          .09
                                                           *TOTALS*
     PEAK FLOW         (cms)=       .78          .01          .783 (iii)
     TIME TO PEAK      (hrs)=      1.04         1.17         1.042
     RUNOFF VOLUME      (mm)=     56.66        25.35        55.717
     TOTAL RAINFALL     (mm)=     58.23        58.23        58.226
     RUNOFF COEFFICIENT    =        .97          .44          .957

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0011-----------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 06:060      .89      .296     1.00   55.72     .000
                    +ID2 07:070     2.66      .783     1.04   55.72     .000
                    ==================================================
                     SUM 08:080     3.55     1.060     1.04   55.72     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0012-----------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 05:050     5.01     1.350     1.04   53.55     .000
                    +ID2 08:080     3.55     1.060     1.04   55.72     .000
                    ==================================================
                     SUM 09:090     8.56     2.410     1.04   54.45     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0013-----------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
 |  IN>09:(090   )    |
 | OUT<10:(POND  )    |     =========  OUTFLOW STORAGE TABLE  =========
 --------------------         OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                               (cms)     (ha.m.)    |   (cms)     (ha.m.)
                                .000   .0000E+00    |     .593   .6251E+00
                                .008   .6560E-01    |     .654   .6631E+00
                                .017   .1311E+00    |     .797   .7391E+00
                                .093   .2831E+00    |     .950   .8274E+00
                                .233   .3971E+00    |    1.304   .9157E+00
                                .337   .4731E+00    |    1.880   .1004E+01
                                .465   .5491E+00    |    2.577   .1092E+01
                                .531   .5871E+00    |     .000   .0000E+00

     ROUTING RESULTS               AREA     QPEAK      TPEAK        R.V.
     --------------------          (ha)     (cms)      (hrs)        (mm)
     INFLOW >09: (090   )          8.56     2.410      1.042      54.451
     OUTFLOW<10: (POND  )          8.56      .189      2.056      54.449

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.838
                    TIME SHIFT OF PEAK FLOW          (min)=   60.83
                    MAXIMUM  STORAGE   USED        (ha.m.)=.3612E+00

 -------------------------------------------------------------------------------
 001:0014-----------------------------------------------------------------------
 *********************************************
 *     Remaining Hawthorne Industrial Park      *
 *********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     14.13         5.77
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .60         1.50
     Length             (m)=    580.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=     124.54        81.98
                over (min)       12.50        27.50
     Storage Coeff.   (min)=     12.93 (ii)   27.37 (ii)
     Unit Hyd. Tpeak (min)=      12.50        27.50
     Unit Hyd. peak   (cms)=       .09          .04
                                                           *TOTALS*
     PEAK FLOW         (cms)=      2.16          .77         2.548 (iii)
     TIME TO PEAK      (hrs)=      1.13         1.42         1.167
     RUNOFF VOLUME      (mm)=     56.66        34.22        45.437
     TOTAL RAINFALL     (mm)=     58.23        58.23        58.226
     RUNOFF COEFFICIENT    =        .97          .59          .780

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0015-----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 10:POND    8.56      .189     2.06   54.45     .000
                    +ID2 01:HIP01  19.90     2.548     1.17   45.44     .000
                    ==================================================
                     SUM 02:HIP02  28.46     2.622     1.17   48.15     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0016-----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     12.07         4.93
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .65         1.50
     Length             (m)=    450.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=     144.69        87.13
                over (min)       10.00        25.00
     Storage Coeff.   (min)=     10.21 (ii)   24.30 (ii)
     Unit Hyd. Tpeak (min)=      10.00        25.00
     Unit Hyd. peak   (cms)=       .11          .05
                                                           *TOTALS*
     PEAK FLOW         (cms)=      2.10          .71         2.398 (iii)
     TIME TO PEAK      (hrs)=      1.08         1.38         1.125
     RUNOFF VOLUME      (mm)=     56.66        34.22        45.437
     TOTAL RAINFALL     (mm)=     58.23        58.23        58.226
     RUNOFF COEFFICIENT    =        .97          .59          .780

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0017-----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    18.10
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     12.85         5.25
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .50         1.50
```

```
     Length              (m)=     600.00        100.00
     Mannings n             =       .030          .250
     Max.eff.Inten.(mm/hr)=     111.10         77.71
                over (min)      15.00         30.00
     Storage Coeff.  (min)=     14.59 (ii)    29.34 (ii)
     Unit Hyd. Tpeak (min)=     15.00         30.00
     Unit Hyd. peak  (cms)=       .08           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=      1.82           .67         2.180 (iii)
     TIME TO PEAK    (hrs)=      1.17          1.46         1.208
     RUNOFF VOLUME    (mm)=     56.66         34.22        45.437
     TOTAL RAINFALL   (mm)=     58.23         58.23        58.226
     RUNOFF COEFFICIENT   =       .97           .59          .780
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 --------------------------------------------------------------------------------
 001:0018------------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                    ID1 03:HIP03     17.00    2.398    1.13  45.44    .000
                   +ID2 04:HIP04     18.10    2.180    1.21  45.44    .000
                    ===============================================
                    SUM 05:HIP05     35.10    4.439    1.13  45.44    .000
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------
 001:0019------------------------------------------------------------------------
 *
 *SUB-AREA No.4
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=    4.00   Curve Number   (CN)=85.00
 | 06:Pond-B DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=     .170
     Unit Hyd Qpeak  (cms)=      .899
     PEAK FLOW       (cms)=      .459 (i)
     TIME TO PEAK    (hrs)=     1.167
     RUNOFF VOLUME    (mm)=    29.155
     TOTAL RAINFALL   (mm)=    58.226
     RUNOFF COEFFICIENT   =      .501
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 --------------------------------------------------------------------------------
 001:0020------------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                    ID1 02:HIP02     28.46    2.622    1.17  48.15    .000
                   +ID2 05:HIP05     35.10    4.439    1.13  45.44    .000
                   +ID3 06:Pond-B     4.00     .459    1.17  29.15    .000
                    ===============================================
                    SUM 07:HIP06     67.56    7.499    1.17  45.61    .000
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------
 001:0021------------------------------------------------------------------------
 * SUB-AREA NO. 5
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=    6.80   Curve Number   (CN)=76.00
 | 10:A2      DT= 2.50 |  Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=     .370
     Unit Hyd Qpeak  (cms)=      .702
     PEAK FLOW       (cms)=      .343 (i)
     TIME TO PEAK    (hrs)=     1.417
     RUNOFF VOLUME    (mm)=    21.442
     TOTAL RAINFALL   (mm)=    58.226
     RUNOFF COEFFICIENT   =      .368
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 --------------------------------------------------------------------------------
 001:0022------------------------------------------------------------------------
 * SUB-AREA NO 4
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=    5.30   Curve Number   (CN)=76.00
 | 01:A3      DT= 2.50 |  Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=     .804
     Unit Hyd Qpeak  (cms)=      .252
     PEAK FLOW       (cms)=      .155 (i)
     TIME TO PEAK    (hrs)=     2.000
     RUNOFF VOLUME    (mm)=    21.442
     TOTAL RAINFALL   (mm)=    58.226
     RUNOFF COEFFICIENT   =      .368
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 --------------------------------------------------------------------------------
 001:0023------------------------------------------------------------------------
 --------------------
 | ADD HYD (0020  ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                    ID1 07:HIP06     67.56    7.499    1.17  45.61    .000
                   +ID2 10:A2         6.80     .343    1.42  21.44    .000
                   +ID3 01:A3         5.30     .155    2.00  21.44    .000
                    ===============================================
                    SUM 02:0020      79.66    7.772    1.17  41.94    .000
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------
 001:0024------------------------------------------------------------------------
 ****************************************************************
 *       CALCULATION OF 3HR - 1:50 YEAR STORM EVENT             *
 ****************************************************************
 --------------------
 | START              |   Project dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
 --------------------     Rainfall dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
 --------------------------------------------------------------------------------
 001:0002------------------------------------------------------------------------
 --------------------
 | CHICAGO STORM      |    IDF curve parameters: A=1569.580
 | Ptotal= 64.81 mm  |                           B=   6.014
 --------------------                           C=    .820
                           used in:   INTENSITY =  A / (t + B)^C
                           Duration of storm  =  3.00 hrs
                           Storm time step    = 10.00 min
                           Time to peak ratio =   .33
               TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
                hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
                .17    5.467 |   1.00  161.471 |   1.83   10.000 |   2.67    5.209
                .33    6.820 |   1.17   48.876 |   2.00    8.397 |   2.83    4.774
                .50    9.187 |   1.33   24.704 |   2.17    7.256 |   3.00    4.412
                .67   14.441 |   1.50   16.495 |   2.33    6.403 |
                .83   36.764 |   1.67   12.422 |   2.50    5.740 |
 --------------------------------------------------------------------------------
 001:0003------------------------------------------------------------------------
 ---------------------
 | DEFAULT VALUES      |   Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\ORGA.VAL
 ---------------------     ICASEdv = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
       Horton's infiltration equation parameters:
       [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
 --------------------------------------------------------------------------------
 001:0004------------------------------------------------------------------------
 ************************************
 *          ORGAWORLD FILE          *
 ************************************
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    2.07
 | 01:010     DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.74          .33
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .52         1.00
     Length             (m)=     204.72        20.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=     161.47        62.27
                over (min)        7.50        12.50
     Storage Coeff.  (min)=       6.51 (ii)   13.44 (ii)
     Unit Hyd. Tpeak (min)=       7.50        12.50
     Unit Hyd. peak  (cms)=        .16          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .59          .03          .609 (iii)
     TIME TO PEAK    (hrs)=       1.04         1.17         1.042
     RUNOFF VOLUME    (mm)=      63.24        30.21        57.952
     TOTAL RAINFALL   (mm)=      64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .894
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 --------------------------------------------------------------------------------
 001:0005------------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    1.54
 | 02:020     DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.42          .12
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .50         1.00
     Length             (m)=     244.34         5.00
     Mannings n            =       .030         .030
     Max.eff.Inten.(mm/hr)=     161.47        78.73
                over (min)        7.50         7.50
     Storage Coeff.  (min)=       7.33 (ii)    8.10 (ii)
     Unit Hyd. Tpeak (min)=       7.50         7.50
     Unit Hyd. peak  (cms)=        .15          .14
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .46          .02          .475 (iii)
     TIME TO PEAK    (hrs)=       1.04         1.08         1.042
     RUNOFF VOLUME    (mm)=      63.24        30.21        60.594
     TOTAL RAINFALL   (mm)=      64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .935
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 --------------------------------------------------------------------------------
 001:0006------------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    1.40
 | 03:030     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.36          .04
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .51         1.00
     Length             (m)=     225.63         5.00
     Mannings n            =       .030         .030
     Max.eff.Inten.(mm/hr)=     161.47        78.73
                over (min)        7.50         7.50
     Storage Coeff.  (min)=       6.95 (ii)    7.72 (ii)
     Unit Hyd. Tpeak (min)=       7.50         7.50
     Unit Hyd. peak  (cms)=        .16          .15
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .45          .01          .454 (iii)
     TIME TO PEAK    (hrs)=       1.04         1.08         1.042
     RUNOFF VOLUME    (mm)=      63.24        30.21        62.245
     TOTAL RAINFALL   (mm)=      64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .960
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 --------------------------------------------------------------------------------
 001:0007------------------------------------------------------------------------
 --------------------
 | ADD HYD (040    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                    ID1 01:010        2.07     .609    1.04  57.95    .000
                   +ID2 02:020        1.54     .475    1.04  60.59    .000
                    ===============================================
```

```
                   SUM 04:040       3.61    1.084    1.04  59.08    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.     DWF
--------------------              (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 03:030      1.40      .454     1.04  62.25    .000
                 +ID2 04:040      3.61     1.084     1.04  59.08    .000
                 ================================================
                  SUM 05:050      5.01     1.538     1.04  59.96    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD    |    Area     (ha)=      .89
| 06:060     DT= 2.50 |  Total Imp(%)=    97.00   Dir. Conn.(%)=   97.00
---------------------
                                   IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=          .86            .03
     Dep. Storage      (mm)=         1.57           4.67
     Average Slope      (%)=          .93            .70
     Length             (m)=       164.82          40.00
     Mannings n            =         .030           .250

     Max.eff.Inten.(mm/hr)=        161.47          53.28
               over (min)           5.00          17.50
     Storage Coeff.   (min)=        4.80 (ii)     17.24 (ii)
     Unit Hyd. Tpeak  (min)=        5.00          17.50
     Unit Hyd. peak   (cms)=         .23            .07
                                                              *TOTALS*
     PEAK FLOW        (cms)=         .33            .00         .335 (iii)
     TIME TO PEAK     (hrs)=        1.00           1.25        1.000
     RUNOFF VOLUME     (mm)=       63.24          30.21       62.245
     TOTAL RAINFALL    (mm)=       64.81          64.81       64.806
     RUNOFF COEFFICIENT   =          .98            .47         .960

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0      Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*
* SUB-AREA No.5
---------------------
| CALIB STANDHYD    |    Area     (ha)=     2.66
| 07:070     DT= 2.50 |  Total Imp(%)=    97.00   Dir. Conn.(%)=   97.00
---------------------
                                   IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=         2.58            .08
     Dep. Storage      (mm)=         1.57           4.67
     Average Slope      (%)=          .61           1.50
     Length             (m)=       207.25          20.00
     Mannings n            =         .030           .250

     Max.eff.Inten.(mm/hr)=        161.47          62.27
               over (min)           7.50          12.50
     Storage Coeff.   (min)=        6.26 (ii)     12.39 (ii)
     Unit Hyd. Tpeak  (min)=        7.50          12.50
     Unit Hyd. peak   (cms)=         .17            .09
                                                              *TOTALS*
     PEAK FLOW        (cms)=         .88            .01         .886 (iii)
     TIME TO PEAK     (hrs)=        1.04           1.17        1.042
     RUNOFF VOLUME     (mm)=       63.24          30.21       62.245
     TOTAL RAINFALL    (mm)=       64.81          64.81       64.806
     RUNOFF COEFFICIENT   =          .98            .47         .960

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0      Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
--------------------
| ADD HYD (080   ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.     DWF
--------------------              (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 06:060       .89      .335     1.00  62.25    .000
                 +ID2 07:070      2.66      .886     1.04  62.25    .000
                 ================================================
                  SUM 08:080      3.55     1.197     1.04  62.25    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
--------------------
| ADD HYD (090   ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.     DWF
--------------------              (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 05:050      5.01     1.538     1.04  59.96    .000
                 +ID2 08:080      3.55     1.197     1.04  62.25    .000
                 ================================================
                  SUM 09:090      8.56     2.735     1.04  60.91    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0013------------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
|   IN>09: (090   ) |
| OUT<10: (POND   ) |     ========  OUTFLOW STORAGE TABLE  ========
--------------------      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .000   .0000E+00     |    .593   .6251E+00
                            .008   .6560E-01     |    .654   .6631E+00
                            .017   .1311E+00     |    .797   .7391E+00
                            .093   .2831E+00     |    .950   .8274E+00
                            .233   .3971E+00     |   1.304   .9157E+00
                            .337   .4731E+00     |   1.880   .1004E+01
                            .465   .5491E+00     |   2.577   .1092E+01
                            .531   .5871E+00     |    .000   .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     ---------------------        (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (090   )         8.56      2.735      1.042      60.910
     OUTFLOW<10: (POND  )         8.56       .233      1.944      60.908

                       PEAK   FLOW    REDUCTION [Qout/Qin](%)=     8.503
                       TIME SHIFT OF PEAK FLOW          (min)=    54.17
                       MAXIMUM  STORAGE   USED        (ha.m.)=.3967E+00

--------------------------------------------------------------------------------
001:0014------------------------------------------------------------------------
*********************************************
*     Remaining Hawthorne Industrial Park       *
*********************************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD    |    Area     (ha)=    19.90
| 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                                   IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        14.13           5.77
     Dep. Storage      (mm)=         1.57           4.67
     Average Slope      (%)=          .60           1.50
     Length             (m)=       580.00         100.00
     Mannings n            =         .030           .250

     Max.eff.Inten.(mm/hr)=        138.95         102.13
               over (min)          12.50          25.00
     Storage Coeff.   (min)=       12.38 (ii)     25.60 (ii)
     Unit Hyd. Tpeak  (min)=       12.50          25.00
     Unit Hyd. peak   (cms)=         .09            .04
                                                              *TOTALS*
     PEAK FLOW        (cms)=        2.46            .95        3.001 (iii)
     TIME TO PEAK     (hrs)=        1.13           1.38        1.167
     RUNOFF VOLUME     (mm)=       63.24          39.90       51.566
     TOTAL RAINFALL    (mm)=       64.81          64.81       64.806
     RUNOFF COEFFICIENT   =          .98            .62         .796

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0      Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0015------------------------------------------------------------------------
--------------------
| ADD HYD (HIP02 ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.     DWF
--------------------              (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 10:POND     8.56      .233     1.94  60.91    .000
                 +ID2 01:HIP01   19.90     3.001     1.17  51.57    .000
                 ================================================
                  SUM 02:HIP02   28.46     3.092     1.17  54.37    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0016------------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD    |    Area     (ha)=    17.00
| 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                                   IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        12.07           4.93
     Dep. Storage      (mm)=         1.57           4.67
     Average Slope      (%)=          .65           1.50
     Length             (m)=       450.00         100.00
     Mannings n            =         .030           .250

     Max.eff.Inten.(mm/hr)=        161.47         109.61
               over (min)          10.00          22.50
     Storage Coeff.   (min)=        9.77 (ii)     22.63 (ii)
     Unit Hyd. Tpeak  (min)=       10.00          22.50
     Unit Hyd. peak   (cms)=         .11            .05
                                                              *TOTALS*
     PEAK FLOW        (cms)=        2.38            .88        2.819 (iii)
     TIME TO PEAK     (hrs)=        1.08           1.33        1.125
     RUNOFF VOLUME     (mm)=       63.24          39.90       51.566
     TOTAL RAINFALL    (mm)=       64.81          64.81       64.806
     RUNOFF COEFFICIENT   =          .98            .62         .796

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0      Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0017------------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD    |    Area     (ha)=    18.10
| 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                                   IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        12.85           5.25
     Dep. Storage      (mm)=         1.57           4.67
     Average Slope      (%)=          .50           1.50
     Length             (m)=       600.00         100.00
     Mannings n            =         .030           .250

     Max.eff.Inten.(mm/hr)=        138.95          96.02
               over (min)          12.50          27.50
     Storage Coeff.   (min)=       13.34 (ii)     26.90 (ii)
     Unit Hyd. Tpeak  (min)=       12.50          27.50
     Unit Hyd. peak   (cms)=         .09            .04
                                                              *TOTALS*
     PEAK FLOW        (cms)=        2.16            .83        2.596 (iii)
     TIME TO PEAK     (hrs)=        1.13           1.42        1.167
     RUNOFF VOLUME     (mm)=       63.24          39.90       51.566
     TOTAL RAINFALL    (mm)=       64.81          64.81       64.806
     RUNOFF COEFFICIENT   =          .98            .62         .796

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0      Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0018------------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.     DWF
--------------------              (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 03:HIP03   17.00     2.819     1.13  51.57    .000
                 +ID2 04:HIP04   18.10     2.596     1.17  51.57    .000
                 ================================================
                  SUM 05:HIP05   35.10     5.372     1.13  51.57    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0019------------------------------------------------------------------------
*
*SUB-AREA No.4
---------------------
| DESIGN NASHYD     |    Area     (ha)=     4.00    Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50 |   Ia       (mm)=    4.670    # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=     .170

     Unit Hyd Qpeak   (cms)=      .899

     PEAK FLOW        (cms)=      .551 (i)
```

```
        TIME TO PEAK     (hrs)=     1.125
        RUNOFF VOLUME     (mm)=    34.455
        TOTAL RAINFALL    (mm)=    64.806
        RUNOFF COEFFICIENT   =       .532

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

 ---------------------------------------------------------------------------
 001:0020-------------------------------------------------------------------
 --------------------
 | ADD HYD  (HIP06 ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                   ID1 02:HIP02      28.46     3.092     1.17   54.37    .000
                  +ID2 05:HIP05      35.10     5.372     1.13   51.57    .000
                  +ID3 06:Pond-B      4.00      .551     1.13   34.45    .000
                   ==========================================================
                   SUM 07:HIP06      67.56     8.958     1.13   51.73    .000

     NOTE:   PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0021-------------------------------------------------------------------
 * SUB-AREA NO. 5
 ----------------------
 | DESIGN NASHYD       |    Area      (ha)=     6.80   Curve Number   (CN)=76.00
 | 10:A2       DT= 2.50 |   Ia        (mm)=    4.670   # of Linear Res.(N)= 3.00
 ----------------------     U.H. Tp(hrs)=      .370

        Unit Hyd Qpeak  (cms)=       .702

        PEAK FLOW        (cms)=      .417 (i)
        TIME TO PEAK     (hrs)=     1.417
        RUNOFF VOLUME     (mm)=    25.767
        TOTAL RAINFALL    (mm)=    64.806
        RUNOFF COEFFICIENT   =       .398

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

 ---------------------------------------------------------------------------
 001:0022-------------------------------------------------------------------
 * SUB-AREA NO 4
 ----------------------
 | DESIGN NASHYD       |    Area      (ha)=     5.30   Curve Number   (CN)=76.00
 | 01:A3       DT= 2.50 |   Ia        (mm)=    4.670   # of Linear Res.(N)= 3.00
 ----------------------     U.H. Tp(hrs)=      .804

        Unit Hyd Qpeak  (cms)=       .252

        PEAK FLOW        (cms)=      .188 (i)
        TIME TO PEAK     (hrs)=     2.000
        RUNOFF VOLUME     (mm)=    25.767
        TOTAL RAINFALL    (mm)=    64.806
        RUNOFF COEFFICIENT   =       .398

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

 ---------------------------------------------------------------------------
 001:0023-------------------------------------------------------------------
 --------------------
 | ADD HYD  (0020  ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                   ID1 07:HIP06      67.56     8.958     1.13   51.73    .000
                  +ID2 10:A2          6.80      .417     1.42   25.77    .000
                  +ID3 01:A3          5.30      .188     2.00   25.77    .000
                   ==========================================================
                   SUM 02:0020       79.66     9.240     1.17   47.79    .000

     NOTE:   PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0024-------------------------------------------------------------------
 ***************************************************************
 *        CALCULATION OF 3HR - 1:100 YEAR STORM EVENT          *
 ***************************************************************
 --------------------
 | START             |   Project  dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
 --------------------    Rainfall dir.: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\
      TZERO =    .00 hrs on       0
      METOUT=    2 (output = METRIC)
      NRUN  = 001
      NSTORM=    0
 ---------------------------------------------------------------------------
 001:0002-------------------------------------------------------------------
 --------------------
 | CHICAGO STORM     |      IDF curve parameters: A=1735.688
 | Ptotal= 71.66 mm |                             B=    6.014
 --------------------                             C=     .820
                            used in:    INTENSITY =  A / (t + B)^C

                            Duration of storm   =  3.00 hrs
                            Storm time step     = 10.00 min
                            Time to peak ratio  =    .33

                   TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
                    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
                    .17    6.046 |   1.00  178.559 |   1.83   11.059 |   2.67    5.760
                    .33    7.542 |   1.17   54.049 |   2.00    9.285 |   2.83    5.280
                    .50   10.159 |   1.33   27.319 |   2.17    8.024 |   3.00    4.879
                    .67   15.969 |   1.50   18.240 |   2.33    7.080 |
                    .83   40.655 |   1.67   13.737 |   2.50    6.347 |

 ---------------------------------------------------------------------------
 001:0003-------------------------------------------------------------------
 ----------------------
 | DEFAULT VALUES      |   Filename: V:\20983.DU\ENG\3RDSUB~1\SWMHYMO\ORGA.VAL
 ----------------------    ICASEdv = 1 (read and print data)
        FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                   ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
        Horton's infiltration equation parameters:
        [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
        Parameters for PERVIOUS surfaces in STANDHYD:
        [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
        Parameters for IMPERVIOUS surfaces in STANDHYD:
        [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
        Parameters used in NASHYD:
        [Ia=   4.67 mm] [N= 3.00]
 ---------------------------------------------------------------------------
 001:0004-------------------------------------------------------------------
 ***********************************
 *          ORGAWORLD FILE         *
 ***********************************
 * SUB-AREA No.1
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=     2.07
 | 01:010     DT= 2.50 |   Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
 ----------------------
                                    IMPERVIOUS    PERVIOUS (i)
       Surface Area       (ha)=        1.74           .33
       Dep. Storage       (mm)=        1.57          4.67
       Average Slope       (%)=         .52          1.00
       Length              (m)=      204.72         20.00
       Mannings n             =        .030          .250

       Max.eff.Inten.(mm/hr)=        178.56         74.05
                  over (min)           7.50         12.50
       Storage Coeff.   (min)=         6.26 (ii)    12.72 (ii)
       Unit Hyd. Tpeak  (min)=         7.50         12.50
       Unit Hyd. peak   (cms)=          .17           .09
                                                                  *TOTALS*
       PEAK FLOW        (cms)=          .66           .04           .685 (iii)
       TIME TO PEAK     (hrs)=         1.04          1.17          1.042
       RUNOFF VOLUME     (mm)=        70.09         35.46         64.553
       TOTAL RAINFALL    (mm)=        71.66         71.66         71.665
       RUNOFF COEFFICIENT   =           .98           .49           .901

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0005-------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=     1.54
 | 02:020     DT= 2.50 |   Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
 ----------------------
                                    IMPERVIOUS    PERVIOUS (i)
       Surface Area       (ha)=        1.42           .12
       Dep. Storage       (mm)=        1.57          4.67
       Average Slope       (%)=         .50          1.00
       Length              (m)=      244.34          5.00
       Mannings n             =        .030          .030

       Max.eff.Inten.(mm/hr)=        178.56         93.23
                  over (min)           7.50          7.50
       Storage Coeff.   (min)=         7.04 (ii)     7.76 (ii)
       Unit Hyd. Tpeak  (min)=         7.50          7.50
       Unit Hyd. peak   (cms)=          .16           .15
                                                                  *TOTALS*
       PEAK FLOW        (cms)=          .51           .02           .534 (iii)
       TIME TO PEAK     (hrs)=         1.04          1.08          1.042
       RUNOFF VOLUME     (mm)=        70.09         35.46         67.324
       TOTAL RAINFALL    (mm)=        71.66         71.66         71.665
       RUNOFF COEFFICIENT   =           .98           .49           .939

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0006-------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=     1.40
 | 03:030     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                                    IMPERVIOUS    PERVIOUS (i)
       Surface Area       (ha)=        1.36           .04
       Dep. Storage       (mm)=        1.57          4.67
       Average Slope       (%)=         .51          1.00
       Length              (m)=      225.63          5.00
       Mannings n             =        .030          .030

       Max.eff.Inten.(mm/hr)=        178.56         93.23
                  over (min)           7.50          7.50
       Storage Coeff.   (min)=         6.67 (ii)     7.39 (ii)
       Unit Hyd. Tpeak  (min)=         7.50          7.50
       Unit Hyd. peak   (cms)=          .16           .15
                                                                  *TOTALS*
       PEAK FLOW        (cms)=          .50           .01           .509 (iii)
       TIME TO PEAK     (hrs)=         1.04          1.08          1.042
       RUNOFF VOLUME     (mm)=        70.09         35.46         69.056
       TOTAL RAINFALL    (mm)=        71.66         71.66         71.665
       RUNOFF COEFFICIENT   =           .98           .49           .964

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0007-------------------------------------------------------------------
 --------------------
 | ADD HYD  (040   ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                   ID1 01:010         2.07      .685     1.04   64.55    .000
                  +ID2 02:020         1.54      .534     1.04   67.32    .000
                   ==========================================================
                   SUM 04:040         3.61     1.220     1.04   65.74    .000

     NOTE:   PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0008-------------------------------------------------------------------
 --------------------
 | ADD HYD  (050   ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                   ID1 03:030         1.40      .509     1.04   69.06    .000
                  +ID2 04:040         3.61     1.220     1.04   65.74    .000
                   ==========================================================
                   SUM 05:050         5.01     1.729     1.04   66.66    .000

     NOTE:   PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0009-------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=      .89
 | 06:060     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                                    IMPERVIOUS    PERVIOUS (i)
       Surface Area       (ha)=         .86           .03
       Dep. Storage       (mm)=        1.57          4.67
       Average Slope       (%)=         .93           .70
       Length              (m)=      164.82         40.00
       Mannings n             =        .030          .250

       Max.eff.Inten.(mm/hr)=        178.56         67.61
                  over (min)           5.00         15.00
       Storage Coeff.   (min)=         4.62 (ii)    15.92 (ii)
       Unit Hyd. Tpeak  (min)=         5.00         15.00
       Unit Hyd. peak   (cms)=          .24           .07
                                                                  *TOTALS*
       PEAK FLOW        (cms)=          .37           .00           .374 (iii)
       TIME TO PEAK     (hrs)=         1.00          1.21          1.000
       RUNOFF VOLUME     (mm)=        70.09         35.46         69.056
       TOTAL RAINFALL    (mm)=        71.66         71.66         71.665
       RUNOFF COEFFICIENT   =           .98           .49           .964

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
```

```

     Unit Hyd Qpeak  (cms)=     .252

     PEAK FLOW       (cms)=     .223 (i)
     TIME TO PEAK    (hrs)=    1.958
     RUNOFF VOLUME    (mm)=   30.490
     TOTAL RAINFALL   (mm)=   71.665
     RUNOFF COEFFICIENT  =     .425

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

-----------------------------------------------------------------------------
001:0023---------------------------------------------------------------------
--------------------
| ADD HYD (0020  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 07:HIP06    67.56   10.299    1.13  58.18   .000
                 +ID2 10:A2        6.80     .497    1.42  30.49   .000
                 +ID3 01:A3        5.30     .223    1.96  30.49   .000
                  ==================================================
                  SUM 02:0020     79.66   10.662    1.17  53.97   .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0024---------------------------------------------------------------------
     FINISH
-----------------------------------------------------------------------------
*****************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2009-04-21     at 10:30:17
=============================================================================


```

```
2     Metric units
*#*****************************************************************************
*#  Project Name : Hawthorne Industrial Park         Project Number:    [20983] *
*#  Date         : January, 2009                                               *
*#  Revised      : N/A                                                         *
*#  Developed by : Mark Buchanan, E.I.T.                                       *
*#  Reviewed by  : Guy Forget, P.Eng.                                          *
*#  Company      : J.L. Richards & Associates Limited                          *
*#  License #    : 4418403                                                     *
*#*****************************************************************************
*
*
*#****************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT               *
*#  FILE  DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE     *
*#****************************************************************
*
******************************************************************************
*          SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE          *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS  *
******************************************************************************
*****************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*****************************************************
***********************************************************
*         POST-DEVELOPMENT UNCONTROLLED CONDITIONS          *
***********************************************************
***********************************************************
*           CALCULATION OF 4 HR 25 MM STORM EVENT           *
***********************************************************
START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [  ] <--storm filename, one per line for NSTORM time
READ STORM            STORM_FILENAME=["4HR25-15.STM"]
*%-----------------|-------------------------------------------------------|
DEFAULT  VALUES       ICASEdef=[1],  read and print values
                      DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------|
***********************************
*          ORGAWORLD FILE         *
***********************************
* SUB-AREA No.1
CALIB STANDHYD        ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                      XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                           LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD        ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                      XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                           LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD        ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                           LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD        ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                           LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD        ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                           LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR       IDout=[10],   NHYD=["POND"],  IDin=[9],
                      RDT=[1.0](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.000,  0.0000]
                                   [   0.008,  0.0656]
                                   [   0.017,  0.1311]
                                   [   0.093,  0.2831]
                                   [   0.233,  0.3971]
                                   [   0.337,  0.4731]
                                   [   0.465,  0.5491]
                                   [   0.531,  0.5871]
                                   [   0.593,  0.6251]
                                   [   0.654,  0.6631]
                                   [   0.797,  0.7391]
                                   [   0.950,  0.8274]
                                   [   1.304,  0.9157]
                                   [   1.880,  1.0040]
                                   [   2.577,  1.0923]
                                   [   -1   ,  -1    ]  (max twenty pts)
**********************************************
*     Remaining Hawthorne Industrial Park      *
**********************************************
*
* SUB-AREA No.1
CALIB STANDHYD        ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                           LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD        ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                           LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD        ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                           LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD        ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                           LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No.5
DESIGN NASHYD         ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                      DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD         ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
*%-----------------|-------------------------------------------------------|
***********************************************************
*         CALCULATION OF 3HR - 1:2 YEAR STORM EVENT         *
***********************************************************
START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
CHICAGO STORM         IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                      ICASEcs=[1],
                      A=[732.951],  B=[6.199], and C=[0.810],
*%-----------------|-------------------------------------------------------|
DEFAULT VALUES        ICASEdef=[1],  read and print values
                      DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------|
***********************************
*          ORGAWORLD FILE         *
***********************************
* SUB-AREA No.1
CALIB STANDHYD        ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                      XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                           LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD        ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                      XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                           LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD        ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                           LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
```

```
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD            ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                               LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                               LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD            ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                               LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|---------------------------------------------------------|

ROUTE RESERVOIR           IDout=[10],   NHYD=["POND"],  IDin=[9],
                          RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park     *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD            ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                               LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD            ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                               LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD            ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                               LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD            ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                               LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|---------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD             ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                          DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                          RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|


ADD HYD                   IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|---------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD             ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                          DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                          RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|

ADD HYD                   IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
*%-----------------|---------------------------------------------------------|

*************************************************************
*         CALCULATION OF 3HR - 1:5 YEAR STORM EVENT           *
*************************************************************

START                     TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                         [  ] <--storm filename, one per line for NSTORM time
*%-----------------|---------------------------------------------------------|
CHICAGO STORM             IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                          ICASEcs=[1],
                          A=[998.071],  B=[6.053], and C=[0.814],
*%-----------------|---------------------------------------------------------|
DEFAULT VALUES            ICASEdef=[1],  read and print values
                          DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|---------------------------------------------------------|

**********************************
*          ORGAWORLD FILE         *
**********************************

* SUB-AREA No.1

CALIB STANDHYD            ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                          XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                               LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                               LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD            ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                          XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                               LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                               LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD            ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                               LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                               LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD            ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                               LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                               LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD            ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                          XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                               LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|---------------------------------------------------------|

ROUTE RESERVOIR           IDout=[10],   NHYD=["POND"],  IDin=[9],
                          RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park     *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD            ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                               LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                          RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                   IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|---------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD            ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                          XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                          SCS curve number CN=[81],
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                               LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
```

```
                                                LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD          ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                             LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD          ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                             LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|--------------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD           ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                        DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                        RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------------|


ADD HYD                 IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|--------------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD           ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                        DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                        RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------------|

ADD HYD                 IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
*%-----------------|--------------------------------------------------------------|

*****************************************************************
*            CALCULATION OF 3HR - 1:10 YEAR STORM EVENT          *
*****************************************************************

START                   TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                       [  ] <--storm filename, one per line for NSTORM time
*%-----------------|--------------------------------------------------------------|
CHICAGO STORM           IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                        ICASEcs=[1],
                        A=[1174.184],  B=[6.014], and C=[0.816],
*%-----------------|--------------------------------------------------------------|
DEFAULT VALUES          ICASEdef=[1],  read and print values
                        DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|--------------------------------------------------------------|

***********************************
*          ORGAWORLD FILE         *
***********************************

* SUB-AREA No.1

CALIB STANDHYD          ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                        XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                             LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD          ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                        XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                             LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD          ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                             LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD          ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                             LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                             LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD          ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                             LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|--------------------------------------------------------------|

ROUTE RESERVOIR         IDout=[10],   NHYD=["POND"],  IDin=[9],
                        RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                     [   0.000,  0.0000]
                                     [   0.008,  0.0656]
                                     [   0.017,  0.1311]
                                     [   0.093,  0.2831]
                                     [   0.233,  0.3971]
                                     [   0.337,  0.4731]
                                     [   0.465,  0.5491]
                                     [   0.531,  0.5871]
                                     [   0.593,  0.6251]
                                     [   0.654,  0.6631]
                                     [   0.797,  0.7391]
                                     [   0.950,  0.8274]
                                     [   1.304,  0.9157]
                                     [   1.880,  1.0040]
                                     [   2.577,  1.0923]
                                     [   -1   ,  -1    ]  (max twenty pts)

************************************************
*     Remaining Hawthorne Industrial Park      *
************************************************
*
* SUB-AREA No.1

CALIB STANDHYD          ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                             LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD          ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                             LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD          ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                             LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------------|
ADD HYD                 IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD          ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                             LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|--------------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD           ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                        DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                        RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------------|


ADD HYD                 IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|--------------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD           ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                        DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                        RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------------|

ADD HYD                 IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
*%-----------------|--------------------------------------------------------------|

*****************************************************************
*            CALCULATION OF 3HR - 1:25 YEAR STORM EVENT          *
*****************************************************************

START                   TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                       [  ] <--storm filename, one per line for NSTORM time
*%-----------------|--------------------------------------------------------------|
CHICAGO STORM           IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                        ICASEcs=[1],
                        A=[1402.884],  B=[6.018], and C=[0.819],
*%-----------------|--------------------------------------------------------------|
DEFAULT VALUES          ICASEdef=[1],  read and print values
                        DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|--------------------------------------------------------------|

***********************************
*          ORGAWORLD FILE         *
***********************************

* SUB-AREA No.1

CALIB STANDHYD          ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                        XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                             LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
```

```
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD           ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                         XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                              LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|--------------------------------------------------------------|

ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)

**********************************************
*      Remaining Hawthorne Industrial Park       *
**********************************************
*
* SUB-AREA No.1

CALIB STANDHYD           ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                              LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD           ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                              LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD           ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                              LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD           ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                              LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|--------------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD            ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                         DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------------|


ADD HYD                  IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|--------------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD            ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------------|

ADD HYD                  IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
*%-----------------|--------------------------------------------------------------|

*************************************************************
*        CALCULATION OF 3HR - 1:50 YEAR STORM EVENT          *
*************************************************************

START                    TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                        [ ] <--storm filename, one per line for NSTORM time
*%-----------------|--------------------------------------------------------------|
CHICAGO STORM            IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                         ICASEcs=[1],
                         A=[1569.580],  B=[6.014], and C=[0.820],
*%-----------------|--------------------------------------------------------------|
DEFAULT VALUES           ICASEdef=[1],  read and print values
                         DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|--------------------------------------------------------------|

**********************************
*          ORGAWORLD FILE          *
**********************************

* SUB-AREA No.1

CALIB STANDHYD           ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                         XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                              LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD           ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                         XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                              LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|--------------------------------------------------------------|

ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)

**********************************************
*      Remaining Hawthorne Industrial Park       *
```

```
******* ****************************************
*
* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                            LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                            LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                            LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD         ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                            LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD          ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                       DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|


ADD HYD                IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD          ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                       DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|

ADD HYD                IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
*%-----------------|-------------------------------------------------------|

*****************************************************************
*        CALCULATION OF 3HR - 1:100 YEAR STORM EVENT           *
*****************************************************************

START                  TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                      [ ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
CHICAGO STORM          IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                       ICASEcs=[1],
                       A=[1735.688],  B=[6.014], and C=[0.820],
*%-----------------|-------------------------------------------------------|
DEFAULT VALUES         ICASEdef=[1],  read and print values
                       DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------|

***********************************
*          ORGAWORLD FILE         *
***********************************

* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                       XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                            LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                       XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                            LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                            LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD         ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                            LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                            LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD         ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                            LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------|

ROUTE RESERVOIR        IDout=[10],   NHYD=["POND"],  IDin=[9],
                       RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.000,  0.0000]
                                   [   0.008,  0.0656]
                                   [   0.017,  0.1311]
                                   [   0.093,  0.2831]
                                   [   0.233,  0.3971]
                                   [   0.337,  0.4731]
                                   [   0.465,  0.5491]
                                   [   0.531,  0.5871]
                                   [   0.593,  0.6251]
                                   [   0.654,  0.6631]
                                   [   0.797,  0.7391]
                                   [   0.950,  0.8274]
                                   [   1.304,  0.9157]
                                   [   1.880,  1.0040]
                                   [   2.577,  1.0923]
                                   [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park    *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                            LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                            LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                            LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
ADD HYD                IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD         ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                            LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD          ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                       DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|


ADD HYD                IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD          ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                       DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|

ADD HYD                IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
*%-----------------|-------------------------------------------------------|

FINISH


****1 600 mm culverts @ 84.5 + 2 600 mm culverts @ 85.25 10% Pond reduction*****
```

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

 SSSSS   W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S       W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS   W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S    W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
 SSSSS    W W   M   M  H   H    Y    M   M   OOO           9      9 =========
                                                       9   9  9   9 # 4418403
       StormWater Management HYdrologic Model           999    999  =========

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

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: J. L. Richards & Associates Limited        +++++++
 +++++++                Ottawa                  SERIAL#:4418403    +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


 ********************   D E T A I L E D   O U T P U T   ******************
 *************************************************************************
 *      DATE: 2009-02-09     TIME: 14:59:31     RUN COUNTER: 000154      *
 *************************************************************************
 * Input   filename: V:\20983.DU\ENG\SWMHYMO\PSTPH2.dat                  *
 * Output  filename: V:\20983.DU\ENG\SWMHYMO\PSTPH2.out                  *
 * Summary filename: V:\20983.DU\ENG\SWMHYMO\PSTPH2.sum                  *
 * User comments:                                                        *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 *************************************************************************

--------------------------------------------------------------------------
001:0001------------------------------------------------------------------
*#************************************************************************
*#  Project Name : Hawthorne Industrial Park        Project Number:   [20983] *
*#  Date         : January, 2009                                          *
*#  Revised      : N/A                                                    *
*#  Developed by : Mark Buchanan, E.I.T.                                  *
*#  Reviewed by  : Guy Forget, P.Eng.                                     *
*#  Company      : J.L. Richards & Associates Limited                     *
*#  License #    : 4418403                                                *
*#************************************************************************
*
*
*#*******************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT                  *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN     *
*#    OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE      *
*#*******************************************************************
*
*************************************************************************
*          SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE        *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS  *
*************************************************************************
*******************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*******************************************************
**************************************************************
*          POST-DEVELOPMENT UNCONTROLLED CONDITIONS          *
**************************************************************
**************************************************************
*            CALCULATION OF 4 HR 25 MM STORM EVENT           *
**************************************************************
--------------------
| START              |  Project  dir.: V:\20983.DU\ENG\SWMHYMO\
--------------------  Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
   TZERO =   .00 hrs on       0
   METOUT=   2 (output = METRIC)
   NRUN  = 001
   NSTORM=   0
--------------------------------------------------------------------------
001:0002------------------------------------------------------------------
--------------------
| READ STORM        |    Filename: V:\20983.DU\ENG\SWMHYMO\4HR25-15.STM
| Ptotal=  25.00 mm|    Comments: 4hr-15 min 25 MM STORM EVENT (CHICAGO DI
--------------------
                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                 .25   1.777 |   1.25  45.631 |   2.25   3.138 |   3.25   1.675
                 .50   2.357 |   1.50  11.911 |   2.50   2.555 |   3.50   1.509
                 .75   3.618 |   1.75   6.051 |   2.75   2.165 |   3.75   1.376
                1.00   8.975 |   2.00   4.108 |   3.00   1.885 |   4.00   1.266

--------------------------------------------------------------------------
001:0003------------------------------------------------------------------
---------------------
| DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
---------------------  ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
--------------------------------------------------------------------------
001:0004------------------------------------------------------------------
**********************************
*           ORGAWORLD FILE           *
**********************************
* SUB-AREA No.1
---------------------
| CALIB STANDHYD      |   Area    (ha)=    2.07
| 01:010 ,   DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.74          .33
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .52         1.00
     Length            (m)=    204.72        20.00
     Mannings n           =      .030         .250

     Max.eff.Inten.(mm/hr)=     45.63         5.37
               over (min)     10.00        30.00
     Storage Coeff.  (min)=     10.80 (ii)   29.27 (ii)
     Unit Hyd. Tpeak (min)=     10.00        30.00
     Unit Hyd. peak  (cms)=       .11          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .16          .00          .158 (iii)
     TIME TO PEAK    (hrs)=      1.29         1.75         1.292
     RUNOFF VOLUME    (mm)=     23.43         5.17        20.508
     TOTAL RAINFALL   (mm)=     25.00        25.00        24.999
     RUNOFF COEFFICIENT   =       .94          .21          .820

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
001:0005------------------------------------------------------------------
*
* SUB-AREA No.2
--------------------
| CALIB STANDHYD     |   Area    (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.42          .12
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .50         1.00
     Length            (m)=    244.34         5.00
     Mannings n           =      .030         .030

     Max.eff.Inten.(mm/hr)=     45.63         7.24
               over (min)     12.50        15.00
     Storage Coeff.  (min)=     12.15 (ii)   14.15 (ii)
     Unit Hyd. Tpeak (min)=     12.50        15.00
     Unit Hyd. peak  (cms)=       .09          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .12          .00          .121 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.46         1.333
     RUNOFF VOLUME    (mm)=     23.43         5.17        21.969
     TOTAL RAINFALL   (mm)=     25.00        25.00        24.999
     RUNOFF COEFFICIENT   =       .94          .21          .879

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
001:0006------------------------------------------------------------------
*
* SUB-AREA No.3
--------------------
| CALIB STANDHYD     |   Area    (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.36          .04
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .51         1.00
     Length            (m)=    225.63         5.00
     Mannings n           =      .030         .030

     Max.eff.Inten.(mm/hr)=     45.63         7.97
               over (min)     12.50        12.50
     Storage Coeff.  (min)=     11.52 (ii)   13.44 (ii)
     Unit Hyd. Tpeak (min)=     12.50        12.50
     Unit Hyd. peak  (cms)=       .10          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .12          .00          .118 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.42         1.333
     RUNOFF VOLUME    (mm)=     23.43         5.17        22.881
     TOTAL RAINFALL   (mm)=     25.00        25.00        24.999
     RUNOFF COEFFICIENT   =       .94          .21          .915

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
001:0007------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                 ID1 01:010        2.07     .158    1.29  20.51    .000
                +ID2 02:020        1.54     .121    1.33  21.97    .000
                 ===============================================
                 SUM 04:040        3.61     .278    1.33  21.13    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
001:0008------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                 ID1 03:030        1.40     .118    1.33  22.88    .000
                +ID2 04:040        3.61     .278    1.33  21.13    .000
                 ===============================================
                 SUM 05:050        5.01     .396    1.33  21.62    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
001:0009------------------------------------------------------------------
*
* SUB-AREA No.4
--------------------
| CALIB STANDHYD     |   Area    (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .86          .03
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .93          .70
     Length            (m)=    164.82        40.00
     Mannings n           =      .030         .250

     Max.eff.Inten.(mm/hr)=     45.63         4.42
               over (min)      7.50        42.50
     Storage Coeff.  (min)=      7.97 (ii)   41.62 (ii)
     Unit Hyd. Tpeak (min)=      7.50        42.50
     Unit Hyd. peak  (cms)=       .14          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .09          .00          .089 (iii)
     TIME TO PEAK    (hrs)=      1.25         2.00         1.250
     RUNOFF VOLUME    (mm)=     23.43         5.17        22.882
     TOTAL RAINFALL   (mm)=     25.00        25.00        24.999
     RUNOFF COEFFICIENT   =       .94          .21          .915

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
```

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

 ----------------------------------------------------------------------------
 001:0010--------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB  STANDHYD    |   Area    (ha)=     2.66
 | 07:070  DT= 2.50 |   Total Imp(%)=   97.00    Dir. Conn.(%)=    97.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      2.58          .08
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .61         1.50
     Length             (m)=    207.25        20.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      45.63         5.66
                over (min)       10.00        27.50
     Storage Coeff.   (min)=     10.37 (ii)   26.38 (ii)
     Unit Hyd. Tpeak (min)=     10.00        27.50
     Unit Hyd. peak   (cms)=       .11          .04
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .24          .00         .238 (iii)
     TIME TO PEAK     (hrs)=      1.29         1.67        1.292
     RUNOFF VOLUME     (mm)=     23.43         5.17       22.882
     TOTAL RAINFALL    (mm)=     25.00        25.00       24.999
     RUNOFF COEFFICIENT    =       .94          .21         .915

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------
 001:0011--------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 06:060       .89      .089    1.25  22.88    .000
                  +ID2 07:070      2.66      .238    1.29  22.88    .000
                  =================================================
                   SUM 08:080      3.55      .327    1.29  22.88    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0012--------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 05:050      5.01      .396    1.33  21.62    .000
                  +ID2 08:080      3.55      .327    1.29  22.88    .000
                  =================================================
                   SUM 09:090      8.56      .716    1.29  22.14    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0013--------------------------------------------------------------------
 --------------------
 | ROUTE  RESERVOIR   |     Requested routing time step =  1.0 min.
 | IN>09:(090   )   |
 | OUT<10:(POND  )  |      =========  OUTFLOW STORAGE TABLE  =========
 --------------------       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .593  .6251E+00
                              .008  .6560E-01    |     .654  .6631E+00
                              .017  .1311E+00    |     .797  .7391E+00
                              .093  .2831E+00    |     .950  .8274E+00
                              .233  .3971E+00    |    1.304  .9157E+00
                              .337  .4731E+00    |    1.880  .1004E+01
                              .465  .5491E+00    |    2.577  .1092E+01
                              .531  .5871E+00    |     .000  .0000E+00

   ROUTING RESULTS          AREA     QPEAK     TPEAK        R.V.
   --------------------     (ha)     (cms)     (hrs)        (mm)
   INFLOW >09: (090   )     8.56      .716     1.292      22.143
   OUTFLOW<10: (POND  )     8.56      .032     3.875      22.141

                  PEAK   FLOW    REDUCTION [Qout/Qin](%)=    4.470
                  TIME SHIFT OF PEAK FLOW         (min)=   155.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1611E+00

 ----------------------------------------------------------------------------
 001:0014--------------------------------------------------------------------
 ******************************************
 *      Remaining Hawthorne Industrial Park       *
 ******************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB  STANDHYD    |   Area    (ha)=    19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00    Dir. Conn.(%)=    50.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     14.13         5.77
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .60         1.50
     Length             (m)=    580.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      34.39        11.90
                over (min)       22.50        52.50
     Storage Coeff.   (min)=     21.64 (ii)   52.88 (ii)
     Unit Hyd. Tpeak (min)=     22.50        52.50
     Unit Hyd. peak   (cms)=       .05          .02
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .60          .11         .642 (iii)
     TIME TO PEAK     (hrs)=      1.50         2.13        1.542
     RUNOFF VOLUME     (mm)=     23.43         8.74       16.085
     TOTAL RAINFALL    (mm)=     25.00        25.00       24.999
     RUNOFF COEFFICIENT    =       .94          .35         .643

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------
 001:0015--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 10:POND     8.56      .032    3.88  22.14    .000
                  +ID2 01:HIP01   19.90      .642    1.54  16.08    .000
                  =================================================
                   SUM 02:HIP02   28.46      .655    1.54  17.91    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0016--------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB  STANDHYD    |   Area    (ha)=    17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=   71.00    Dir. Conn.(%)=    50.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     12.07         4.93
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .65         1.50
     Length             (m)=    450.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      40.81        12.73
                over (min)       17.50        47.50
     Storage Coeff.   (min)=     16.94 (ii)   47.35 (ii)
     Unit Hyd. Tpeak (min)=     17.50        47.50
     Unit Hyd. peak   (cms)=       .07          .02
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .60          .10         .625 (iii)
     TIME TO PEAK     (hrs)=      1.42         2.00        1.458
     RUNOFF VOLUME     (mm)=     23.43         8.74       16.085
     TOTAL RAINFALL    (mm)=     25.00        25.00       24.999
     RUNOFF COEFFICIENT    =       .94          .35         .643

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------
 001:0017--------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB  STANDHYD    |   Area    (ha)=    15.60
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=   71.00    Dir. Conn.(%)=    50.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     11.08         4.52
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .50         1.50
     Length             (m)=    600.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      34.39        11.54
                over (min)       22.50        55.00
     Storage Coeff.   (min)=     23.33 (ii)   54.95 (ii)
     Unit Hyd. Tpeak (min)=     22.50        55.00
     Unit Hyd. peak   (cms)=       .05          .02
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .45          .08         .484 (iii)
     TIME TO PEAK     (hrs)=      1.50         2.17        1.542
     RUNOFF VOLUME     (mm)=     23.43         8.74       16.085
     TOTAL RAINFALL    (mm)=     25.00        25.00       24.999
     RUNOFF COEFFICIENT    =       .94          .35         .643

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------
 001:0018--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 03:HIP03   17.00      .625    1.46  16.08    .000
                  +ID2 04:HIP04   15.60      .484    1.54  16.08    .000
                  =================================================
                   SUM 05:HIP05   32.60     1.091    1.46  16.08    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0019--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 05:HIP05   32.60     1.091    1.46  16.08    .000
                  +ID2 02:HIP02   28.46      .655    1.54  17.91    .000
                  =================================================
                   SUM 06:HIP06   61.06     1.740    1.50  16.93    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0020--------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB  STANDHYD    |   Area    (ha)=    12.20
 | 07:HIP07  DT= 2.50 |   Total Imp(%)=   71.00    Dir. Conn.(%)=    50.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      8.66         3.54
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .70         1.50
     Length             (m)=    210.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      45.63        14.15
                over (min)       10.00        40.00
     Storage Coeff.   (min)=     10.03 (ii)   39.18 (ii)
     Unit Hyd. Tpeak (min)=     10.00        40.00
     Unit Hyd. peak   (cms)=       .11          .03
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .57          .08         .585 (iii)
     TIME TO PEAK     (hrs)=      1.29         1.88        1.292
     RUNOFF VOLUME     (mm)=     23.43         8.74       16.085
     TOTAL RAINFALL    (mm)=     25.00        25.00       24.999
     RUNOFF COEFFICIENT    =       .94          .35         .643

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------
 001:0021--------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ---------------------
 | DESIGN NASHYD      |   Area    (ha)=    4.00   Curve Number    (CN)=85.00
 | 08:Pond-B DT= 2.50 |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .170

     Unit Hyd Qpeak   (cms)=      .899

     PEAK FLOW        (cms)=      .077 (i)
```

```
     TIME TO PEAK      (hrs)=     1.375
     RUNOFF VOLUME      (mm)=     6.343
     TOTAL RAINFALL     (mm)=    24.999
     RUNOFF COEFFICIENT    =       .254
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ------------------------------------------------------------------------------
 001:0022----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD       AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 06:HIP06     61.06    1.740    1.50  16.93    .000
                   +ID2 07:HIP07     12.20     .585    1.29  16.08    .000
                   +ID3 08:Pond-B     4.00     .077    1.38   6.34    .000
                    ===================================================
                    SUM 09:HIP08     77.26    2.227    1.46  16.25    .000
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ------------------------------------------------------------------------------
 001:0023----------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 *
 ----------------------
 | DESIGN NASHYD       |   Area     (ha)=    2.70   Curve Number   (CN)=76.00
 | 01:A3       DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=     .800
     Unit Hyd Qpeak  (cms)=      .129
     PEAK FLOW         (cms)=      .013 (i)
     TIME TO PEAK      (hrs)=     2.292
     RUNOFF VOLUME      (mm)=     4.110
     TOTAL RAINFALL     (mm)=    24.999
     RUNOFF COEFFICIENT    =       .164
     (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ------------------------------------------------------------------------------
 001:0024----------------------------------------------------------------------
 --------------------
 | ADD HYD (Ultima) | ID: NHYD       AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 09:HIP08     77.26    2.227    1.46  16.25    .000
                   +ID2 01:A3         2.70     .013    2.29   4.11    .000
                    ===================================================
                    SUM 02:Ultima    79.96    2.231    1.46  15.84    .000
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ------------------------------------------------------------------------------
 001:0025----------------------------------------------------------------------
 ****************************************************************
 *         CALCULATION OF 3HR - 1:2 YEAR STORM EVENT            *
 ****************************************************************
 --------------------
 | START               |  Project  dir.: V:\20983.DU\ENG\SWMHYMO\
 ---------------------   Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN   = 001
    NSTORM=   0
 ------------------------------------------------------------------------------
 001:0002----------------------------------------------------------------------
 --------------------
 | CHICAGO STORM     |     IDF curve parameters: A= 732.951
 | Ptotal= 31.86 mm |                            B=   6.199
 --------------------                            C=    .810
                           used in:   INTENSITY =  A / (t + B)^C

                           Duration of storm   =  3.00 hrs
                           Storm time step     = 10.00 min
                           Time to peak ratio =    .33

              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .17   2.815 |  1.00  76.805 |  1.83   5.095 |  2.67   2.684
               .33   3.498 |  1.17  24.079 |  2.00   4.291 |  2.83   2.463
               .50   4.687 |  1.33  12.364 |  2.17   3.718 |  3.00   2.279
               .67   7.305 |  1.50   8.324 |  2.33   3.288 |
               .83  18.209 |  1.67   6.303 |  2.50   2.953 |
 ------------------------------------------------------------------------------
 001:0003----------------------------------------------------------------------
 ---------------------
 | DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
 ---------------------   ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
 ------------------------------------------------------------------------------
 001:0004----------------------------------------------------------------------
 ********************************
 *         ORGAWORLD FILE       *
 ********************************
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=     2.07
 | 01:010     DT= 2.50 |   Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.74         .33
     Dep. Storage      (mm)=       1.57        4.67
     Average Slope      (%)=        .52        1.00
     Length             (m)=     204.72       20.00
     Mannings n           =        .030        .250

     Max.eff.Inten.(mm/hr)=       76.81       11.88
                over (min)        10.00       22.50
     Storage Coeff.   (min)=       8.77 (ii)   22.21 (ii)
     Unit Hyd. Tpeak (min)=      10.00       22.50
     Unit Hyd. peak  (cms)=        .12         .05
                                                              *TOTALS*
     PEAK FLOW        (cms)=        .24         .01            .245 (iii)
     TIME TO PEAK     (hrs)=       1.08        1.38           1.083
     RUNOFF VOLUME     (mm)=      30.29        8.52          26.807
     TOTAL RAINFALL    (mm)=      31.86       31.86          31.860
     RUNOFF COEFFICIENT   =         .95         .27            .841

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ------------------------------------------------------------------------------
 001:0005----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=     1.54
 | 02:020     DT= 2.50 |   Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.42         .12
     Dep. Storage      (mm)=       1.57        4.67
     Average Slope      (%)=        .50        1.00
     Length             (m)=     244.34        5.00
     Mannings n           =        .030        .030

     Max.eff.Inten.(mm/hr)=       76.81       15.07
                over (min)        10.00       12.50
     Storage Coeff.   (min)=       9.87 (ii)   11.36 (ii)
     Unit Hyd. Tpeak (min)=      10.00       12.50
     Unit Hyd. peak  (cms)=        .11         .10
                                                              *TOTALS*
     PEAK FLOW        (cms)=        .19         .00            .192 (iii)
     TIME TO PEAK     (hrs)=       1.08        1.17           1.083
     RUNOFF VOLUME     (mm)=      30.29        8.52          28.548
     TOTAL RAINFALL    (mm)=      31.86       31.86          31.860
     RUNOFF COEFFICIENT   =         .95         .27            .896

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ------------------------------------------------------------------------------
 001:0006----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=     1.40
 | 03:030     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.36         .04
     Dep. Storage      (mm)=       1.57        4.67
     Average Slope      (%)=        .51        1.00
     Length             (m)=     225.63        5.00
     Mannings n           =        .030        .030

     Max.eff.Inten.(mm/hr)=       76.81       16.59
                over (min)        10.00       10.00
     Storage Coeff.   (min)=       9.35 (ii)   10.79 (ii)
     Unit Hyd. Tpeak (min)=      10.00       10.00
     Unit Hyd. peak  (cms)=        .12         .11
                                                              *TOTALS*
     PEAK FLOW        (cms)=        .18         .00            .186 (iii)
     TIME TO PEAK     (hrs)=       1.08        1.13           1.083
     RUNOFF VOLUME     (mm)=      30.29        8.52          29.637
     TOTAL RAINFALL    (mm)=      31.86       31.86          31.860
     RUNOFF COEFFICIENT   =         .95         .27            .930

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ------------------------------------------------------------------------------
 001:0007----------------------------------------------------------------------
 --------------------
 | ADD HYD (040    ) | ID: NHYD       AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:010        2.07     .245    1.08  26.81    .000
                   +ID2 02:020        1.54     .192    1.08  28.55    .000
                    ===================================================
                    SUM 04:040        3.61     .436    1.08  27.55    .000
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ------------------------------------------------------------------------------
 001:0008----------------------------------------------------------------------
 --------------------
 | ADD HYD (050    ) | ID: NHYD       AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 03:030        1.40     .186    1.08  29.64    .000
                   +ID2 04:040        3.61     .436    1.08  27.55    .000
                    ===================================================
                    SUM 05:050        5.01     .623    1.08  28.13    .000
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ------------------------------------------------------------------------------
 001:0009----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=      .89
 | 06:060     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .86         .03
     Dep. Storage      (mm)=       1.57        4.67
     Average Slope      (%)=        .93         .70
     Length             (m)=     164.82       40.00
     Mannings n           =        .030        .250

     Max.eff.Inten.(mm/hr)=       76.81       10.24
                over (min)         7.50       30.00
     Storage Coeff.   (min)=       6.47 (ii)   30.53 (ii)
     Unit Hyd. Tpeak (min)=       7.50       30.00
     Unit Hyd. peak  (cms)=        .16         .04
                                                              *TOTALS*
     PEAK FLOW        (cms)=        .14         .00            .139 (iii)
     TIME TO PEAK     (hrs)=       1.04        1.54           1.042
     RUNOFF VOLUME     (mm)=      30.29        8.52          29.637
     TOTAL RAINFALL    (mm)=      31.86       31.86          31.860
     RUNOFF COEFFICIENT   =         .95         .27            .930

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ------------------------------------------------------------------------------
 001:0010----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=     2.66
 | 07:070     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.58         .08
     Dep. Storage      (mm)=       1.57        4.67
     Average Slope      (%)=        .61        1.50
     Length             (m)=     207.25       20.00
```

```
     Mannings n              =        .030         .250
     Max.eff.Inten.(mm/hr)=         76.81        12.71
                 over (min)          7.50        20.00
     Storage Coeff.    (min)=        8.42 (ii)   20.00 (ii)
     Unit Hyd. Tpeak (min)=          7.50        20.00
     Unit Hyd. peak   (cms)=          .14          .06
                                                              *TOTALS*
     PEAK FLOW         (cms)=          .38          .00         .379 (iii)
     TIME TO PEAK      (hrs)=         1.04         1.33        1.042
     RUNOFF VOLUME      (mm)=        30.29         8.52       29.637
     TOTAL RAINFALL     (mm)=        31.86        31.86       31.860
     RUNOFF COEFFICIENT    =          .95          .27         .930
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ---------------------------------------------------------------------------------
 001:0011-------------------------------------------------------------------------
 --------------------
 | ADD HYD (080  ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 06:060         .89      .139     1.04   29.64    .000
                +ID2 07:070        2.66      .379     1.04   29.64    .000
                 ==================================================
                 SUM 08:080        3.55      .518     1.04   29.64    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ---------------------------------------------------------------------------------
 001:0012-------------------------------------------------------------------------
 --------------------
 | ADD HYD (090  ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 05:050        5.01      .623     1.08   28.13    .000
                +ID2 08:080        3.55      .518     1.04   29.64    .000
                 ==================================================
                 SUM 09:090        8.56     1.118     1.08   28.76    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ---------------------------------------------------------------------------------
 001:0013-------------------------------------------------------------------------
 --------------------
 | ROUTE  RESERVOIR  |     Requested routing time step =  1.0 min.
 | IN>09:(090     )  |
 | OUT<10:(POND   )  |      ========= OUTLFOW STORAGE TABLE =========
 --------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00    |     .593  .6251E+00
                             .008  .6560E-01    |     .654  .6631E+00
                             .017  .1311E+00    |     .797  .7391E+00
                             .093  .2831E+00    |     .950  .8274E+00
                             .233  .3971E+00    |    1.304  .9157E+00
                             .337  .4731E+00    |    1.880  .1004E+01
                             .465  .5491E+00    |    2.577  .1092E+01
                             .531  .5871E+00    |     .000  .0000E+00
     ROUTING RESULTS              AREA     QPEAK      TPEAK        R.V.
     --------------------         (ha)     (cms)      (hrs)        (mm)
     INFLOW >09: (090   )         8.56     1.118      1.083      28.757
     OUTFLOW<10: (POND  )         8.56      .056      3.000      28.754
                         PEAK   FLOW   REDUCTION [Qout/Qin](%)=     5.030
                         TIME SHIFT OF PEAK FLOW          (min)=   115.00
                         MAXIMUM  STORAGE   USED        (ha.m.)=.2095E+00
 ---------------------------------------------------------------------------------
 001:0014-------------------------------------------------------------------------
 ******************************************************
 *     Remaining Hawthorne Industrial Park             *
 ******************************************************
 *
 * SUB-AREA No.1
 --------------------
 | CALIB STANDHYD     |   Area    (ha)=    19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 --------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       14.13          5.77
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .60          1.50
     Length             (m)=      580.00        100.00
     Mannings n            =        .030          .250
     Max.eff.Inten.(mm/hr)=        54.21         23.06
                 over (min)        17.50         42.50
     Storage Coeff.    (min)=      18.04 (ii)    42.02 (ii)
     Unit Hyd. Tpeak (min)=        17.50         42.50
     Unit Hyd. peak   (cms)=         .06           .03
                                                              *TOTALS*
     PEAK FLOW         (cms)=         .95           .21        1.020 (iii)
     TIME TO PEAK      (hrs)=        1.21          1.71        1.250
     RUNOFF VOLUME      (mm)=       30.29         13.34       21.814
     TOTAL RAINFALL     (mm)=       31.86         31.86       31.860
     RUNOFF COEFFICIENT    =         .95           .42         .685
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ---------------------------------------------------------------------------------
 001:0015-------------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 10:POND       8.56      .056     3.00   28.75    .000
                +ID2 01:HIP01     19.90     1.020     1.25   21.81    .000
                 ==================================================
                 SUM 02:HIP02     28.46     1.039     1.25   23.90    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ---------------------------------------------------------------------------------
 001:0016-------------------------------------------------------------------------
 *
 * SUB-AREA No.2
 --------------------
 | CALIB STANDHYD     |   Area    (ha)=    17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 --------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       12.07          4.93
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .65          1.50
     Length             (m)=      450.00        100.00
     Mannings n            =        .030          .250
     Max.eff.Inten.(mm/hr)=        59.23         25.04
                 over (min)        15.00         37.50
     Storage Coeff.    (min)=      14.60 (ii)    37.80 (ii)
     Unit Hyd. Tpeak (min)=        15.00         37.50
     Unit Hyd. peak   (cms)=         .08           .03
                                                              *TOTALS*
     PEAK FLOW         (cms)=         .91           .19         .978 (iii)
     TIME TO PEAK      (hrs)=        1.17          1.63        1.167
     RUNOFF VOLUME      (mm)=       30.29         13.34       21.814
     TOTAL RAINFALL     (mm)=       31.86         31.86       31.860
     RUNOFF COEFFICIENT    =         .95           .42         .685
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ---------------------------------------------------------------------------------
 001:0017-------------------------------------------------------------------------
 *
 * SUB-AREA No.3
 --------------------
 | CALIB STANDHYD     |   Area    (ha)=    15.60
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 --------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       11.08          4.52
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .50          1.50
     Length             (m)=      600.00        100.00
     Mannings n            =        .030          .250
     Max.eff.Inten.(mm/hr)=        50.44         22.17
                 over (min)        20.00         45.00
     Storage Coeff.    (min)=      20.01 (ii)    44.37 (ii)
     Unit Hyd. Tpeak (min)=        20.00         45.00
     Unit Hyd. peak   (cms)=         .06           .03
                                                              *TOTALS*
     PEAK FLOW         (cms)=         .69           .16         .753 (iii)
     TIME TO PEAK      (hrs)=        1.25          1.79        1.292
     RUNOFF VOLUME      (mm)=       30.29         13.34       21.814
     TOTAL RAINFALL     (mm)=       31.86         31.86       31.860
     RUNOFF COEFFICIENT    =         .95           .42         .685
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ---------------------------------------------------------------------------------
 001:0018-------------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 03:HIP03     17.00      .978     1.17   21.81    .000
                +ID2 04:HIP04     15.60      .753     1.29   21.81    .000
                 ==================================================
                 SUM 05:HIP05     32.60     1.698     1.21   21.81    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ---------------------------------------------------------------------------------
 001:0019-------------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 05:HIP05     32.60     1.698     1.21   21.81    .000
                +ID2 02:HIP02     28.46     1.039     1.25   23.90    .000
                 ==================================================
                 SUM 06:HIP06     61.06     2.733     1.21   22.79    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ---------------------------------------------------------------------------------
 001:0020-------------------------------------------------------------------------
 *
 * SUB-AREA No.4
 --------------------
 | CALIB STANDHYD     |   Area    (ha)=    12.20
 | 07:HIP07  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 --------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        8.66          3.54
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .70          1.50
     Length             (m)=      210.00        100.00
     Mannings n            =        .030          .250
     Max.eff.Inten.(mm/hr)=        76.81         29.02
                 over (min)         7.50         30.00
     Storage Coeff.    (min)=       8.15 (ii)    30.01 (ii)
     Unit Hyd. Tpeak (min)=         7.50         30.00
     Unit Hyd. peak   (cms)=         .14           .04
                                                              *TOTALS*
     PEAK FLOW         (cms)=         .91           .16         .941 (iii)
     TIME TO PEAK      (hrs)=        1.04          1.50        1.042
     RUNOFF VOLUME      (mm)=       30.29         13.34       21.814
     TOTAL RAINFALL     (mm)=       31.86         31.86       31.860
     RUNOFF COEFFICIENT    =         .95           .42         .685
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ---------------------------------------------------------------------------------
 001:0021-------------------------------------------------------------------------
 *
 *SUB-AREA No.5
 --------------------
 | DESIGN NASHYD      |   Area    (ha)=    4.00    Curve Number  (CN)=85.00
 | 08:Pond-B DT= 2.50 |   Ia      (mm)=   4.670    # of Linear Res.(N)= 3.00
 --------------------     U.H. Tp(hrs)=    .170
     Unit Hyd Qpeak   (cms)=      .899
     PEAK FLOW        (cms)=      .145 (i)
     TIME TO PEAK     (hrs)=     1.167
     RUNOFF VOLUME     (mm)=    10.266
     TOTAL RAINFALL    (mm)=    31.860
     RUNOFF COEFFICIENT   =      .322
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 ---------------------------------------------------------------------------------
 001:0022-------------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 06:HIP06     61.06     2.733     1.21   22.79    .000
                +ID2 07:HIP07     12.20      .941     1.04   21.81    .000
                +ID3 08:Pond-B     4.00      .145     1.17   10.27    .000
                 ==================================================
                 SUM 09:HIP08     77.26     3.542     1.21   21.98    .000
```

```

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0023--------------------------------------------------------------------
*
*SUB-AREA No. 6
*
---------------------
| DESIGN NASHYD      |   Area     (ha)=    2.70   Curve Number   (CN)=76.00
| 01:A3      DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=     .800

      Unit Hyd Qpeak  (cms)=      .129

      PEAK FLOW       (cms)=      .024 (i)
      TIME TO PEAK    (hrs)=     2.083
      RUNOFF VOLUME    (mm)=     6.883
      TOTAL RAINFALL   (mm)=    31.860
      RUNOFF COEFFICIENT   =      .216

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

----------------------------------------------------------------------------
001:0024--------------------------------------------------------------------
---------------------
| ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
---------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 09:HIP08    77.26     3.542    1.21  21.98     .000
                 +ID2 01:A3        2.70      .024    2.08   6.88     .000
                  =======================================================
                  SUM 02:Ultima   79.96     3.548    1.21  21.47     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0025--------------------------------------------------------------------
*******************************************************************
*          CALCULATION OF 3HR - 1:5 YEAR STORM EVENT              *
*******************************************************************
---------------------
| START              |  Project  dir.: V:\20983.DU\ENG\SWMHYMO\
---------------------  Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
    TZERO =    .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN   = 001
    NSTORM=   0
----------------------------------------------------------------------------
001:0002--------------------------------------------------------------------
---------------------
| CHICAGO STORM      |      IDF curve parameters: A= 998.071
| Ptotal= 42.51 mm   |                            B=   6.053
---------------------                             C=    .814
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33

            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .17   3.682 |   1.00 104.193 |   1.83   6.689 |   2.67   3.510
             .33   4.582 |   1.17  32.037 |   2.00   5.628 |   2.83   3.220
             .50   6.151 |   1.33  16.337 |   2.17   4.872 |   3.00   2.978
             .67   9.614 |   1.50  10.965 |   2.33   4.305 |
             .83  24.170 |   1.67   8.287 |   2.50   3.864 |

----------------------------------------------------------------------------
001:0003--------------------------------------------------------------------
---------------------
| DEFAULT VALUES     |  Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
---------------------   ICASEdv = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]    [MNI= .035]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
----------------------------------------------------------------------------
001:0004--------------------------------------------------------------------
*************************************
*           ORGAWORLD FILE          *
*************************************
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |   Area    (ha)=     2.07
| 01:010      DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      1.74          .33
      Dep. Storage      (mm)=      1.57         4.67
      Average Slope      (%)=       .52         1.00
      Length             (m)=    204.72        20.00
      Mannings n           =       .030         .250

      Max.eff.Inten.(mm/hr)=     104.19        24.26
                 over (min)        7.50        17.50
      Storage Coeff.  (min)=       7.76 (ii)   17.86 (ii)
      Unit Hyd. Tpeak (min)=       7.50        17.50
      Unit Hyd. peak  (cms)=        .15          .06
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .36          .01         .362 (iii)
      TIME TO PEAK    (hrs)=       1.04         1.25        1.042
      RUNOFF VOLUME    (mm)=      40.94        14.70       36.745
      TOTAL RAINFALL   (mm)=      42.51        42.51       42.514
      RUNOFF COEFFICIENT   =        .96          .35         .864

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0005--------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area    (ha)=     1.54
| 02:020      DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      1.42          .12
      Dep. Storage      (mm)=      1.57         4.67
      Average Slope      (%)=       .50         1.00
      Length             (m)=    244.34         5.00
      Mannings n           =       .030         .030

      Max.eff.Inten.(mm/hr)=     104.19        31.02
                 over (min)        7.50        10.00
      Storage Coeff.  (min)=       8.73 (ii)    9.85 (ii)
```

```
      Unit Hyd. Tpeak (min)=       7.50        10.00
      Unit Hyd. peak  (cms)=        .14          .11
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .28          .01         .283 (iii)
      TIME TO PEAK    (hrs)=       1.04         1.13        1.042
      RUNOFF VOLUME    (mm)=      40.94        14.70       38.845
      TOTAL RAINFALL   (mm)=      42.51        42.51       42.514
      RUNOFF COEFFICIENT   =        .96          .35         .914

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0006--------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |   Area    (ha)=     1.40
| 03:030      DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      1.36          .04
      Dep. Storage      (mm)=      1.57         4.67
      Average Slope      (%)=       .51         1.00
      Length             (m)=    225.63         5.00
      Mannings n           =       .030         .030

      Max.eff.Inten.(mm/hr)=     104.19        31.02
                 over (min)        7.50        10.00
      Storage Coeff.  (min)=       8.28 (ii)    9.39 (ii)
      Unit Hyd. Tpeak (min)=       7.50        10.00
      Unit Hyd. peak  (cms)=        .14          .12
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .27          .00         .274 (iii)
      TIME TO PEAK    (hrs)=       1.04         1.13        1.042
      RUNOFF VOLUME    (mm)=      40.94        14.70       40.157
      TOTAL RAINFALL   (mm)=      42.51        42.51       42.514
      RUNOFF COEFFICIENT   =        .96          .35         .945

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0007--------------------------------------------------------------------
---------------------
| ADD HYD (040    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
---------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 01:010        2.07      .362    1.04  36.75     .000
                 +ID2 02:020        1.54      .283    1.04  38.84     .000
                  =======================================================
                  SUM 04:040        3.61      .645    1.04  37.64     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0008--------------------------------------------------------------------
---------------------
| ADD HYD (050    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
---------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 03:030        1.40      .274    1.04  40.16     .000
                 +ID2 04:040        3.61      .645    1.04  37.64     .000
                  =======================================================
                  SUM 05:050        5.01      .918    1.04  38.34     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0009--------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD     |   Area    (ha)=      .89
| 06:060      DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       .86          .03
      Dep. Storage      (mm)=      1.57         4.67
      Average Slope      (%)=       .93          .70
      Length             (m)=    164.82        40.00
      Mannings n           =       .030         .250

      Max.eff.Inten.(mm/hr)=     104.19        20.32
                 over (min)        5.00        25.00
      Storage Coeff.  (min)=       5.72 (ii)   24.02 (ii)
      Unit Hyd. Tpeak (min)=       5.00        25.00
      Unit Hyd. peak  (cms)=        .20          .05
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .20          .00         .205 (iii)
      TIME TO PEAK    (hrs)=       1.00         1.38        1.000
      RUNOFF VOLUME    (mm)=      40.94        14.70       40.157
      TOTAL RAINFALL   (mm)=      42.51        42.51       42.514
      RUNOFF COEFFICIENT   =        .96          .35         .945

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0010--------------------------------------------------------------------
*
* SUB-AREA No.5
---------------------
| CALIB STANDHYD     |   Area    (ha)=     2.66
| 07:070      DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      2.58          .08
      Dep. Storage      (mm)=      1.57         4.67
      Average Slope      (%)=       .61         1.50
      Length             (m)=    207.25        20.00
      Mannings n           =       .030         .250

      Max.eff.Inten.(mm/hr)=     104.19        24.26
                 over (min)        7.50        17.50
      Storage Coeff.  (min)=       7.45 (ii)   16.40 (ii)
      Unit Hyd. Tpeak (min)=       7.50        17.50
      Unit Hyd. peak  (cms)=        .15          .07
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .54          .00         .538 (iii)
      TIME TO PEAK    (hrs)=       1.04         1.25        1.042
      RUNOFF VOLUME    (mm)=      40.94        14.70       40.157
      TOTAL RAINFALL   (mm)=      42.51        42.51       42.514
      RUNOFF COEFFICIENT   =        .96          .35         .945

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

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

 -------------------------------------------------------------------------------
 001:0011-----------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 06:060         .89      .205     1.00  40.16    .000
                 +ID2 07:070        2.66      .538     1.04  40.16    .000
                  ===================================================
                  SUM 08:080        3.55      .733     1.04  40.16    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0012-----------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 05:050        5.01      .918     1.04  38.34    .000
                 +ID2 08:080        3.55      .733     1.04  40.16    .000
                  ===================================================
                  SUM 09:090        8.56     1.651     1.04  39.10    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0013-----------------------------------------------------------------------
 --------------------
 | ROUTE  RESERVOIR  |     Requested routing time step =  1.0 min.
 |   IN>09:(090   )  |
 | OUT<10:(POND   )  |     =========  OUTLFOW STORAGE TABLE  =========
 --------------------      OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000  .0000E+00     |      .593  .6251E+00
                             .008  .6560E-01     |      .654  .6631E+00
                             .017  .1311E+00     |      .797  .7391E+00
                             .093  .2831E+00     |      .950  .8274E+00
                             .233  .3971E+00     |     1.304  .9157E+00
                             .337  .4731E+00     |     1.880  .1004E+01
                             .465  .5491E+00     |     2.577  .1092E+01
                             .531  .5871E+00     |      .000  .0000E+00

      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
      -------------------          (ha)      (cms)      (hrs)        (mm)
      INFLOW >09: (090   )         8.56      1.651      1.042      39.096
      OUTFLOW<10: (POND  )         8.56       .089      2.625      39.093

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=     5.413
                   TIME SHIFT OF PEAK FLOW          (min)=    95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.2758E+00

 -------------------------------------------------------------------------------
 001:0014-----------------------------------------------------------------------
 ******************************************
 *     Remaining Hawthorne Industrial Park     *
 ******************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB  STANDHYD     |   Area     (ha)=    19.90
 | 01:HIP01  DT= 2.50  |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      14.13         5.77
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .60         1.50
      Length             (m)=     580.00       100.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=       80.14        42.65
                  over (min)       15.00        35.00
      Storage Coeff.   (min)=      15.43 (ii)   34.18 (ii)
      Unit Hyd. Tpeak  (min)=      15.00        35.00
      Unit Hyd. peak   (cms)=        .07          .03
                                                               *TOTALS*
      PEAK FLOW        (cms)=       1.41          .40           1.572 (iii)
      TIME TO PEAK     (hrs)=       1.17         1.54           1.208
      RUNOFF VOLUME     (mm)=      40.94        21.31          31.126
      TOTAL RAINFALL    (mm)=      42.51        42.51          42.514
      RUNOFF COEFFICIENT   =         .96          .50            .732

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0015-----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 10:POND       8.56      .089     2.63  39.09    .000
                 +ID2 01:HIP01     19.90     1.572     1.21  31.13    .000
                  ===================================================
                  SUM 02:HIP02     28.46     1.615     1.21  33.52    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0016-----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB  STANDHYD     |   Area     (ha)=    17.00
 | 03:HIP03  DT= 2.50  |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      12.07         4.93
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .65         1.50
      Length             (m)=     450.00       100.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=       89.76        47.48
                  over (min)       12.50        30.00
      Storage Coeff.   (min)=      12.36 (ii)   30.32 (ii)
      Unit Hyd. Tpeak  (min)=      12.50        30.00
      Unit Hyd. peak   (cms)=        .09          .04
                                                               *TOTALS*
      PEAK FLOW        (cms)=       1.36          .37           1.504 (iii)
      TIME TO PEAK     (hrs)=       1.13         1.46           1.167
      RUNOFF VOLUME     (mm)=      40.94        21.31          31.126
      TOTAL RAINFALL    (mm)=      42.51        42.51          42.514
      RUNOFF COEFFICIENT   =         .96          .50            .732

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0017-----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB  STANDHYD     |   Area     (ha)=    15.60
 | 04:HIP04  DT= 2.50  |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      11.08         4.52
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .50         1.50
      Length             (m)=     600.00       100.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=       73.27        42.65
                  over (min)       17.50        35.00
      Storage Coeff.   (min)=      17.24 (ii)   35.98 (ii)
      Unit Hyd. Tpeak  (min)=      17.50        35.00
      Unit Hyd. peak   (cms)=        .07          .03
                                                               *TOTALS*
      PEAK FLOW        (cms)=       1.03          .30           1.176 (iii)
      TIME TO PEAK     (hrs)=       1.21         1.54           1.250
      RUNOFF VOLUME     (mm)=      40.94        21.31          31.126
      TOTAL RAINFALL    (mm)=      42.51        42.51          42.514
      RUNOFF COEFFICIENT   =         .96          .50            .732

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0018-----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 03:HIP03     17.00     1.504     1.17  31.13    .000
                 +ID2 04:HIP04     15.60     1.176     1.25  31.13    .000
                  ===================================================
                  SUM 05:HIP05     32.60     2.621     1.17  31.13    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0019-----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 05:HIP05     32.60     2.621     1.17  31.13    .000
                 +ID2 02:HIP02     28.46     1.615     1.21  33.52    .000
                  ===================================================
                  SUM 06:HIP06     61.06     4.222     1.17  32.24    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0020-----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB  STANDHYD     |   Area     (ha)=    12.20
 | 07:HIP07  DT= 2.50  |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       8.66         3.54
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .70         1.50
      Length             (m)=     210.00       100.00
      Mannings n           =        .030         .250

      Max.eff.Inten.(mm/hr)=      104.19        52.96
                  over (min)        7.50        25.00
      Storage Coeff.   (min)=       7.21 (ii)   24.40 (ii)
      Unit Hyd. Tpeak  (min)=       7.50        25.00
      Unit Hyd. peak   (cms)=        .15          .05
                                                               *TOTALS*
      PEAK FLOW        (cms)=       1.28          .31           1.375 (iii)
      TIME TO PEAK     (hrs)=       1.04         1.38           1.042
      RUNOFF VOLUME     (mm)=      40.94        21.31          31.126
      TOTAL RAINFALL    (mm)=      42.51        42.51          42.514
      RUNOFF COEFFICIENT   =         .96          .50            .732

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0021-----------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ---------------------
 | DESIGN NASHYD       |   Area     (ha)=     4.00   Curve Number   (CN)=85.00
 | 08:Pond-B DT= 2.50  |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=     .170

      Unit Hyd Qpeak   (cms)=        .899

      PEAK FLOW        (cms)=        .260 (i)
      TIME TO PEAK     (hrs)=       1.167
      RUNOFF VOLUME     (mm)=      17.325
      TOTAL RAINFALL    (mm)=      42.514
      RUNOFF COEFFICIENT   =         .408

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

 -------------------------------------------------------------------------------
 001:0022-----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 06:HIP06     61.06     4.222     1.17  32.24    .000
                 +ID2 07:HIP07     12.20     1.375     1.04  31.13    .000
                 +ID3 08:Pond-B     4.00      .260     1.17  17.32    .000
                  ===================================================
                  SUM 09:HIP08     77.26     5.545     1.17  31.29    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0023-----------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 *
 ---------------------
 | DESIGN NASHYD       |   Area     (ha)=     2.70   Curve Number   (CN)=76.00
 | 01:A3     DT= 2.50  |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=     .800

      Unit Hyd Qpeak   (cms)=        .129

      PEAK FLOW        (cms)=        .044 (i)
      TIME TO PEAK     (hrs)=       2.042
```

```
        RUNOFF VOLUME     (mm)=    12.131
        TOTAL RAINFALL    (mm)=    42.514
        RUNOFF COEFFICIENT   =       .285

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

-------------------------------------------------------------------------------
001:0024-----------------------------------------------------------------------
--------------------
| ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                    ID1 09:HIP08   77.26    5.545     1.17  31.29    .000
                   +ID2 01:A3       2.70     .044     2.04  12.13    .000
                    ===================================================
                    SUM 02:Ultima  79.96    5.554     1.17  30.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0025-----------------------------------------------------------------------
**************************************************************
*          CALCULATION OF 3HR - 1:10 YEAR STORM EVENT          *
**************************************************************
--------------------
| START              |  Project  dir.: V:\20983.DU\ENG\SWMHYMO\
--------------------    Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
--------------------
| CHICAGO STORM    |     IDF curve parameters: A=1174.184
| Ptotal= 49.50 mm |                           B=   6.014
--------------------                           C=    .816
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =   .33

                  TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                   hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                   .17   4.248 |   1.00 122.142 |   1.83   7.733 |   2.67   4.049
                   .33   5.290 |   1.17  37.285 |   2.00   6.502 |   2.83   3.714
                   .50   7.108 |   1.33  18.954 |   2.17   5.625 |   3.00   3.434
                   .67  11.130 |   1.50  12.700 |   2.33   4.969 |
                   .83  28.100 |   1.67   9.588 |   2.50   4.458 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
--------------------
| DEFAULT VALUES     |   Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
--------------------     ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
**********************************
*           ORGAWORLD FILE         *
**********************************
* SUB-AREA No.1
--------------------
| CALIB  STANDHYD    |   Area     (ha)=     2.07
| 01:010     DT= 2.50 |  Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=         1.74          .33
      Dep. Storage      (mm)=         1.57         4.67
      Average Slope      (%)=          .52         1.00
      Length             (m)=       204.72        20.00
      Mannings n           =          .030         .250

      Max.eff.Inten.(mm/hr)=        122.14        34.69
                 over (min)           7.50        15.00
      Storage Coeff.   (min)=         7.28 (ii)   16.04 (ii)
      Unit Hyd. Tpeak  (min)=         7.50        15.00
      Unit Hyd. peak   (cms)=          .15          .07
                                                              *TOTALS*
      PEAK FLOW        (cms)=          .43          .02          .437 (iii)
      TIME TO PEAK     (hrs)=         1.04         1.21         1.042
      RUNOFF VOLUME     (mm)=        47.93        19.25        43.345
      TOTAL RAINFALL    (mm)=        49.50        49.50        49.505
      RUNOFF COEFFICIENT   =           .97          .39          .876

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
*
* SUB-AREA No.2
--------------------
| CALIB  STANDHYD    |   Area     (ha)=     1.54
| 02:020     DT= 2.50 |  Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=         1.42          .12
      Dep. Storage      (mm)=         1.57         4.67
      Average Slope      (%)=          .50         1.00
      Length             (m)=       244.34         5.00
      Mannings n           =          .030         .030

      Max.eff.Inten.(mm/hr)=        122.14        42.32
                 over (min)           7.50        10.00
      Storage Coeff.   (min)=         8.20 (ii)    9.18 (ii)
      Unit Hyd. Tpeak  (min)=         7.50        10.00
      Unit Hyd. peak   (cms)=          .14          .12
                                                              *TOTALS*
      PEAK FLOW        (cms)=          .33          .01          .341 (iii)
      TIME TO PEAK     (hrs)=         1.04         1.13         1.042
      RUNOFF VOLUME     (mm)=        47.93        19.25        45.640
      TOTAL RAINFALL    (mm)=        49.50        49.50        49.505
      RUNOFF COEFFICIENT   =           .97          .39          .922

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
*
* SUB-AREA No.3
--------------------
| CALIB  STANDHYD    |   Area     (ha)=     1.40
| 03:030     DT= 2.50 |  Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=         1.36          .04
      Dep. Storage      (mm)=         1.57         4.67
      Average Slope      (%)=          .51         1.00
      Length             (m)=       225.63         5.00
      Mannings n           =          .030         .030

      Max.eff.Inten.(mm/hr)=        122.14        48.18
                 over (min)           7.50         7.50
      Storage Coeff.   (min)=         7.77 (ii)    8.70 (ii)
      Unit Hyd. Tpeak  (min)=         7.50         7.50
      Unit Hyd. peak   (cms)=          .15          .14
                                                              *TOTALS*
      PEAK FLOW        (cms)=          .33          .00          .329 (iii)
      TIME TO PEAK     (hrs)=         1.04         1.08         1.042
      RUNOFF VOLUME     (mm)=        47.93        19.25        47.074
      TOTAL RAINFALL    (mm)=        49.50        49.50        49.505
      RUNOFF COEFFICIENT   =           .97          .39          .951

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                    ID1 01:010      2.07     .437     1.04  43.35    .000
                   +ID2 02:020      1.54     .341     1.04  45.64    .000
                    ===================================================
                    SUM 04:040      3.61     .778     1.04  44.32    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                    ID1 03:030      1.40     .329     1.04  47.07    .000
                   +ID2 04:040      3.61     .778     1.04  44.32    .000
                    ===================================================
                    SUM 05:050      5.01    1.107     1.04  45.09    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
*
* SUB-AREA No.4
--------------------
| CALIB  STANDHYD    |   Area     (ha)=      .89
| 06:060     DT= 2.50 |  Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=          .86          .03
      Dep. Storage      (mm)=         1.57         4.67
      Average Slope      (%)=          .93          .70
      Length             (m)=       164.82        40.00
      Mannings n           =          .030         .250

      Max.eff.Inten.(mm/hr)=        122.14        31.19
                 over (min)           5.00        20.00
      Storage Coeff.   (min)=         5.37 (ii)   20.78 (ii)
      Unit Hyd. Tpeak  (min)=         5.00        20.00
      Unit Hyd. peak   (cms)=          .21          .06
                                                              *TOTALS*
      PEAK FLOW        (cms)=          .24          .00          .245 (iii)
      TIME TO PEAK     (hrs)=         1.00         1.29         1.000
      RUNOFF VOLUME     (mm)=        47.93        19.25        47.074
      TOTAL RAINFALL    (mm)=        49.50        49.50        49.505
      RUNOFF COEFFICIENT   =           .97          .39          .951

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
*
* SUB-AREA No.5
--------------------
| CALIB  STANDHYD    |   Area     (ha)=     2.66
| 07:070     DT= 2.50 |  Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                                   IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=         2.58          .08
      Dep. Storage      (mm)=         1.57         4.67
      Average Slope      (%)=          .61         1.50
      Length             (m)=       207.25        20.00
      Mannings n           =          .030         .250

      Max.eff.Inten.(mm/hr)=        122.14        34.69
                 over (min)           7.50        15.00
      Storage Coeff.   (min)=         7.00 (ii)   14.75 (ii)
      Unit Hyd. Tpeak  (min)=         7.50        15.00
      Unit Hyd. peak   (cms)=          .16          .08
                                                              *TOTALS*
      PEAK FLOW        (cms)=          .64          .00          .645 (iii)
      TIME TO PEAK     (hrs)=         1.04         1.21         1.042
      RUNOFF VOLUME     (mm)=        47.93        19.25        47.074
      TOTAL RAINFALL    (mm)=        49.50        49.50        49.505
      RUNOFF COEFFICIENT   =           .97          .39          .951

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
--------------------
| ADD HYD (080   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                    ID1 06:060       .89     .245     1.00  47.07    .000
                   +ID2 07:070      2.66     .645     1.04  47.07    .000
                    ===================================================
                    SUM 08:080      3.55     .876     1.04  47.07    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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001:0012-----------------------------------------------------------------------
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 ---------------------
 | ADD HYD (090   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 05:050         5.01    1.107     1.04   45.09    .000
                 +ID2 08:080         3.55     .876     1.04   47.07    .000
                 ==================================================
                  SUM 09:090         8.56    1.984     1.04   45.91    .000

   NOTE :  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0013---------------------------------------------------------------------
 ---------------------
 | ROUTE  RESERVOIR   |     Requested routing time step =  1.0 min.
 |  IN>09:(090     )  |
 | OUT<10:(POND    )  |     ========= OUTFLOW STORAGE TABLE  ========
 ---------------------        OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                               (cms)      (ha.m.)   |   (cms)     (ha.m.)
                               .000    .0000E+00    |    .593   .6251E+00
                               .008    .6560E-01    |    .654   .6631E+00
                               .017    .1311E+00    |    .797   .7391E+00
                               .093    .2831E+00    |    .950   .8274E+00
                               .233    .3971E+00    |   1.304   .9157E+00
                               .337    .4731E+00    |   1.880   .1004E+01
                               .465    .5491E+00    |   2.577   .1092E+01
                               .531    .5871E+00    |    .000   .0000E+00

    ROUTING RESULTS              AREA      QPEAK     TPEAK        R.V.
    --------------------         (ha)      (cms)     (hrs)        (mm)
    INFLOW >09: (090     )       8.56      1.984     1.042       45.914
    OUTFLOW<10: (POND    )       8.56       .132     2.278       45.912

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=     6.640
                  TIME SHIFT OF PEAK FLOW        (min)=    74.17
                  MAXIMUM  STORAGE   USED        (ha.m.)=.3146E+00

 ------------------------------------------------------------------------------
 001:0014---------------------------------------------------------------------
 *******************************************
 *     Remaining Hawthorne Industrial Park     *
 *******************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB  STANDHYD     |    Area     (ha)=    19.90
 | 01:HIP01  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      14.13          5.77
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .60          1.50
     Length            (m)=     580.00        100.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=      93.86         60.56
                over (min)       15.00         30.00
     Storage Coeff.  (min)=      14.48 (ii)    30.78 (ii)
     Unit Hyd. Tpeak (min)=      15.00         30.00
     Unit Hyd. peak  (cms)=        .08           .04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       1.70           .55            1.983 (iii)
     TIME TO PEAK    (hrs)=       1.17          1.46            1.208
     RUNOFF VOLUME    (mm)=      47.93         26.92           37.426
     TOTAL RAINFALL   (mm)=      49.50         49.50           49.505
     RUNOFF COEFFICIENT   =        .97           .54             .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0015---------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 10:POND        8.56      .132     2.28   45.91    .000
                 +ID2 01:HIP01      19.90     1.983     1.21   37.43    .000
                 ==================================================
                  SUM 02:HIP02      28.46     2.044     1.21   39.98    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0016---------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB  STANDHYD     |    Area     (ha)=    17.00
 | 03:HIP03  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.07          4.93
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .65          1.50
     Length            (m)=     450.00        100.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=     105.17         63.81
                over (min)       12.50         27.50
     Storage Coeff.  (min)=      11.60 (ii)    27.56 (ii)
     Unit Hyd. Tpeak (min)=      12.50         27.50
     Unit Hyd. peak  (cms)=        .09           .04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       1.63           .51            1.865 (iii)
     TIME TO PEAK    (hrs)=       1.13          1.42            1.167
     RUNOFF VOLUME    (mm)=      47.93         26.92           37.426
     TOTAL RAINFALL   (mm)=      49.50         49.50           49.505
     RUNOFF COEFFICIENT   =        .97           .54             .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0017---------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB  STANDHYD     |    Area     (ha)=    15.60
 | 04:HIP04  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.08          4.52
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .50          1.50
     Length            (m)=     600.00        100.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=      93.86         57.19
                over (min)       15.00         32.50
     Storage Coeff.  (min)=      15.61 (ii)    32.28 (ii)
     Unit Hyd. Tpeak (min)=      15.00         32.50
     Unit Hyd. peak  (cms)=        .07           .03
                                                             *TOTALS*
     PEAK FLOW       (cms)=       1.29           .42            1.485 (iii)
     TIME TO PEAK    (hrs)=       1.17          1.50            1.208
     RUNOFF VOLUME    (mm)=      47.93         26.92           37.426
     TOTAL RAINFALL   (mm)=      49.50         49.50           49.505
     RUNOFF COEFFICIENT   =        .97           .54             .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0018---------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 03:HIP03      17.00     1.865     1.17   37.43    .000
                 +ID2 04:HIP04      15.60     1.485     1.21   37.43    .000
                 ==================================================
                  SUM 05:HIP05      32.60     3.336     1.17   37.43    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0019---------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 05:HIP05      32.60     3.336     1.17   37.43    .000
                 +ID2 02:HIP02      28.46     2.044     1.21   39.98    .000
                 ==================================================
                  SUM 06:HIP06      61.06     5.358     1.17   38.61    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0020---------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB  STANDHYD     |    Area     (ha)=    12.20
 | 07:HIP07  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.66          3.54
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .70          1.50
     Length            (m)=     210.00        100.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=     122.14         72.53
                over (min)        7.50         22.50
     Storage Coeff.  (min)=       6.77 (ii)    21.93 (ii)
     Unit Hyd. Tpeak (min)=       7.50         22.50
     Unit Hyd. peak  (cms)=        .16           .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       1.54           .42            1.687 (iii)
     TIME TO PEAK    (hrs)=       1.04          1.33            1.042
     RUNOFF VOLUME    (mm)=      47.93         26.92           37.426
     TOTAL RAINFALL   (mm)=      49.50         49.50           49.505
     RUNOFF COEFFICIENT   =        .97           .54             .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0021---------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ----------------------
 | DESIGN NASHYD        |    Area     (ha)=    4.00   Curve Number   (CN)=85.00
 | 08:Pond-B DT= 2.50 |    Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------    U.H. Tp(hrs)=     .170

     Unit Hyd Qpeak   (cms)=      .899

     PEAK FLOW       (cms)=      .345 (i)
     TIME TO PEAK    (hrs)=     1.167
     RUNOFF VOLUME    (mm)=    22.420
     TOTAL RAINFALL   (mm)=    49.505
     RUNOFF COEFFICIENT   =      .453

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

 ------------------------------------------------------------------------------
 001:0022---------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 06:HIP06      61.06     5.358     1.17   38.61    .000
                 +ID2 07:HIP07      12.20     1.687     1.04   37.43    .000
                 +ID3 08:Pond-B      4.00      .345     1.17   22.42    .000
                 ==================================================
                  SUM 09:HIP08      77.26     7.016     1.17   37.59    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0023---------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 *
 ----------------------
 | DESIGN NASHYD        |    Area     (ha)=    2.70   Curve Number   (CN)=76.00
 | 01:A3     DT= 2.50 |    Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------    U.H. Tp(hrs)=     .800

     Unit Hyd Qpeak   (cms)=      .129

     PEAK FLOW       (cms)=      .059 (i)
     TIME TO PEAK    (hrs)=     2.000
     RUNOFF VOLUME    (mm)=    16.075
     TOTAL RAINFALL   (mm)=    49.505
     RUNOFF COEFFICIENT   =      .325

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

 ------------------------------------------------------------------------------
 001:0024---------------------------------------------------------------------
 ---------------------
 | ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 09:HIP08      77.26     7.016     1.17   37.59    .000
                 +ID2 01:A3          2.70      .059     2.00   16.08    .000
                 ==================================================
                  SUM 02:Ultima     79.96     7.029     1.17   36.86    .000

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

```

-----------------------------------------------------------------------------
001:0025---------------------------------------------------------------------
*************************************************************
*          CALCULATION OF 3HR - 1:25 YEAR STORM EVENT       *
*************************************************************
--------------------
| START               |  Project  dir.: V:\20983.DU\ENG\SWMHYMO\
--------------------    Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN   = 001
    NSTORM=   0
-----------------------------------------------------------------------------
001:0002---------------------------------------------------------------------
--------------------
| CHICAGO STORM     |     IDF curve parameters: A=1402.884
| Ptotal= 58.23 mm  |                           B=    6.018
--------------------                            C=     .819
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33

               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                .17   4.934 |   1.00 144.693 |   1.83   9.014 |   2.67   4.701
                .33   6.152 |   1.17  43.904 |   2.00   7.571 |   2.83   4.310
                .50   8.282 |   1.33  22.224 |   2.17   6.544 |   3.00   3.983
                .67  13.006 |   1.50  14.852 |   2.33   5.776 |
                .83  33.041 |   1.67  11.192 |   2.50   5.179 |

-----------------------------------------------------------------------------
001:0003---------------------------------------------------------------------
--------------------
| DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
--------------------     ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
-----------------------------------------------------------------------------
001:0004---------------------------------------------------------------------
*********************************
*          ORGAWORLD FILE        *
*********************************
* SUB-AREA No.1
--------------------
| CALIB  STANDHYD     |   Area    (ha)=    2.07
| 01:010     DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.74          .33
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .52         1.00
     Length             (m)=     204.72        20.00
     Mannings n            =       .030         .250

     Max.eff.Inten.(mm/hr)=      144.69        47.07
                over (min)         7.50        15.00
     Storage Coeff.   (min)=       6.81 (ii)   14.56 (ii)
     Unit Hyd. Tpeak (min)=        7.50        15.00
     Unit Hyd. peak  (cms)=         .16          .08
                                                         *TOTALS*
     PEAK FLOW         (cms)=       .52          .03        .532 (iii)
     TIME TO PEAK      (hrs)=      1.04         1.21       1.042
     RUNOFF VOLUME      (mm)=     56.66        25.35      51.647
     TOTAL RAINFALL     (mm)=     58.23        58.23      58.226
     RUNOFF COEFFICIENT    =        .97          .44        .887

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0005---------------------------------------------------------------------
*
* SUB-AREA No.2
--------------------
| CALIB  STANDHYD     |   Area    (ha)=    1.54
| 02:020     DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.42          .12
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .50         1.00
     Length             (m)=     244.34         5.00
     Mannings n            =       .030         .030

     Max.eff.Inten.(mm/hr)=      144.69        65.19
                over (min)         7.50         7.50
     Storage Coeff.   (min)=       7.66 (ii)    8.49 (ii)
     Unit Hyd. Tpeak (min)=        7.50         7.50
     Unit Hyd. peak  (cms)=         .15          .14
                                                         *TOTALS*
     PEAK FLOW         (cms)=       .40          .01        .418 (iii)
     TIME TO PEAK      (hrs)=      1.04         1.08       1.042
     RUNOFF VOLUME      (mm)=     56.66        25.35      54.152
     TOTAL RAINFALL     (mm)=     58.23        58.23      58.226
     RUNOFF COEFFICIENT    =        .97          .44        .930

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0006---------------------------------------------------------------------
*
* SUB-AREA No.3
--------------------
| CALIB  STANDHYD     |   Area    (ha)=    1.40
| 03:030     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.36          .04
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .51         1.00
     Length             (m)=     225.63         5.00
     Mannings n            =       .030         .030

     Max.eff.Inten.(mm/hr)=      144.69        65.19
                over (min)         7.50         7.50
     Storage Coeff.   (min)=       7.26 (ii)    8.09 (ii)
     Unit Hyd. Tpeak (min)=        7.50         7.50
     Unit Hyd. peak  (cms)=         .15          .14
                                                         *TOTALS*
     PEAK FLOW         (cms)=       .40          .00        .400 (iii)
     TIME TO PEAK      (hrs)=      1.04         1.08       1.042
     RUNOFF VOLUME      (mm)=     56.66        25.35      55.717
     TOTAL RAINFALL     (mm)=     58.23        58.23      58.226
     RUNOFF COEFFICIENT    =        .97          .44        .957

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0007---------------------------------------------------------------------
--------------------
| ADD HYD (040    ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 01:010           2.07      .532     1.04   51.65     .000
              +ID2 02:020           1.54      .418     1.04   54.15     .000
               ==========================================================
               SUM 04:040           3.61      .950     1.04   52.72     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0008---------------------------------------------------------------------
--------------------
| ADD HYD (050    ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 03:030           1.40      .400     1.04   55.72     .000
              +ID2 04:040           3.61      .950     1.04   52.72     .000
               ==========================================================
               SUM 05:050           5.01     1.350     1.04   53.55     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0009---------------------------------------------------------------------
*
* SUB-AREA No.4
--------------------
| CALIB  STANDHYD     |   Area    (ha)=     .89
| 06:060     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .86          .03
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .93          .70
     Length             (m)=     164.82        40.00
     Mannings n            =       .030         .250

     Max.eff.Inten.(mm/hr)=      144.69        44.12
                over (min)         5.00        17.50
     Storage Coeff.   (min)=       5.02 (ii)   18.44 (ii)
     Unit Hyd. Tpeak (min)=        5.00        17.50
     Unit Hyd. peak  (cms)=         .22          .06
                                                         *TOTALS*
     PEAK FLOW         (cms)=       .30          .00        .296 (iii)
     TIME TO PEAK      (hrs)=      1.00         1.25       1.000
     RUNOFF VOLUME      (mm)=     56.66        25.35      55.717
     TOTAL RAINFALL     (mm)=     58.23        58.23      58.226
     RUNOFF COEFFICIENT    =        .97          .44        .957

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0010---------------------------------------------------------------------
*
* SUB-AREA No.5
--------------------
| CALIB  STANDHYD     |   Area    (ha)=    2.66
| 07:070     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.58          .08
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .61         1.50
     Length             (m)=     207.25        20.00
     Mannings n            =       .030         .250

     Max.eff.Inten.(mm/hr)=      144.69        51.33
                over (min)         7.50        12.50
     Storage Coeff.   (min)=       6.54 (ii)   13.16 (ii)
     Unit Hyd. Tpeak (min)=        7.50        12.50
     Unit Hyd. peak  (cms)=         .16          .09
                                                         *TOTALS*
     PEAK FLOW         (cms)=       .78          .01        .783 (iii)
     TIME TO PEAK      (hrs)=      1.04         1.17       1.042
     RUNOFF VOLUME      (mm)=     56.66        25.35      55.717
     TOTAL RAINFALL     (mm)=     58.23        58.23      58.226
     RUNOFF COEFFICIENT    =        .97          .44        .957

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0011---------------------------------------------------------------------
--------------------
| ADD HYD (080    ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 06:060            .89      .296     1.00   55.72     .000
              +ID2 07:070           2.66      .783     1.04   55.72     .000
               ==========================================================
               SUM 08:080           3.55     1.060     1.04   55.72     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0012---------------------------------------------------------------------
--------------------
| ADD HYD (090    ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 05:050           5.01     1.350     1.04   53.55     .000
              +ID2 08:080           3.55     1.060     1.04   55.72     .000
               ==========================================================
               SUM 09:090           8.56     2.410     1.04   54.45     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0013---------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
| IN>09:(090    )    |
| OUT<10:(POND   )   |    =========  OUTFLOW STORAGE TABLE  =========
--------------------        OUTFLOW    STORAGE  |  OUTFLOW    STORAGE
```

```
                                  (cms)    (ha.m.)   |    (cms)    (ha.m.)
                                   .000  .0000E+00   |     .593  .6251E+00
                                   .008  .6560E-01   |     .654  .6631E+00
                                   .017  .1311E+00   |     .797  .7391E+00
                                   .093  .2831E+00   |     .950  .8274E+00
                                   .233  .3971E+00   |    1.304  .9157E+00
                                   .337  .4731E+00   |    1.880  .1004E+01
                                   .465  .5491E+00   |    2.577  .1092E+01
                                   .531  .5871E+00   |     .000  .0000E+00

      ROUTING RESULTS               AREA     QPEAK      TPEAK        R.V.
      -------------------           (ha)     (cms)      (hrs)        (mm)
      INFLOW >09: (090   )          8.56     2.410      1.042      54.451
      OUTFLOW<10: (POND  )          8.56      .189      2.056      54.449

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     7.838
                    TIME SHIFT OF PEAK FLOW          (min)=    60.83
                    MAXIMUM  STORAGE   USED        (ha.m.)=.3612E+00

------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
*****************************************
*     Remaining Hawthorne Industrial Park     *
*****************************************
*
* SUB-AREA No.1
---------------------
| CALIB  STANDHYD      |   Area     (ha)=   19.90
| 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area       (ha)=       14.13         5.77
      Dep. Storage       (mm)=        1.57         4.67
      Average Slope       (%)=         .60         1.50
      Length              (m)=      580.00       100.00
      Mannings n             =        .030         .250

      Max.eff.Inten.(mm/hr)=        124.54        81.98
                  over (min)         12.50        27.50
      Storage Coeff.  (min)=         12.93 (ii)   27.37 (ii)
      Unit Hyd. Tpeak (min)=         12.50        27.50
      Unit Hyd. peak  (cms)=           .09          .04
                                                              *TOTALS*
      PEAK FLOW         (cms)=        2.16          .77          2.548 (iii)
      TIME TO PEAK      (hrs)=        1.13         1.42          1.167
      RUNOFF VOLUME      (mm)=       56.66        34.22         45.437
      TOTAL RAINFALL     (mm)=       58.23        58.23         58.226
      RUNOFF COEFFICIENT    =          .97          .59           .780

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0015----------------------------------------------------------------------
-------------------
| ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 10:POND     8.56      .189     2.06   54.45    .000
                   +ID2 01:HIP01   19.90     2.548     1.17   45.44    .000
                    ==================================================
                    SUM 02:HIP02   28.46     2.622     1.17   48.15    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0016----------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD      |   Area     (ha)=   17.00
| 03:HIP03  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area       (ha)=       12.07         4.93
      Dep. Storage       (mm)=        1.57         4.67
      Average Slope       (%)=         .65         1.50
      Length              (m)=      450.00       100.00
      Mannings n             =        .030         .250

      Max.eff.Inten.(mm/hr)=        144.69        87.13
                  over (min)         10.00        25.00
      Storage Coeff.  (min)=         10.21 (ii)   24.30 (ii)
      Unit Hyd. Tpeak (min)=         10.00        25.00
      Unit Hyd. peak  (cms)=           .11          .05
                                                              *TOTALS*
      PEAK FLOW         (cms)=        2.10          .71          2.398 (iii)
      TIME TO PEAK      (hrs)=        1.08         1.38          1.125
      RUNOFF VOLUME      (mm)=       56.66        34.22         45.437
      TOTAL RAINFALL     (mm)=       58.23        58.23         58.226
      RUNOFF COEFFICIENT    =          .97          .59           .780

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0017----------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD      |   Area     (ha)=   15.60
| 04:HIP04  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area       (ha)=       11.08         4.52
      Dep. Storage       (mm)=        1.57         4.67
      Average Slope       (%)=         .50         1.50
      Length              (m)=      600.00       100.00
      Mannings n             =        .030         .250

      Max.eff.Inten.(mm/hr)=        111.10        77.71
                  over (min)         15.00        30.00
      Storage Coeff.  (min)=         14.59 (ii)   29.34 (ii)
      Unit Hyd. Tpeak (min)=         15.00        30.00
      Unit Hyd. peak  (cms)=           .08          .04
                                                              *TOTALS*
      PEAK FLOW         (cms)=        1.57          .57          1.879 (iii)
      TIME TO PEAK      (hrs)=        1.17         1.46          1.208
      RUNOFF VOLUME      (mm)=       56.66        34.22         45.437
      TOTAL RAINFALL     (mm)=       58.23        58.23         58.226
      RUNOFF COEFFICIENT    =          .97          .59           .780

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0018----------------------------------------------------------------------
```

```
-------------------
| ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 03:HIP03   17.00     2.398     1.13   45.44    .000
                   +ID2 04:HIP04   15.60     1.879     1.21   45.44    .000
                    ==================================================
                    SUM 05:HIP05   32.60     4.157     1.13   45.44    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0019----------------------------------------------------------------------
-------------------
| ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 05:HIP05   32.60     4.157     1.13   45.44    .000
                   +ID2 02:HIP02   28.46     2.622     1.17   48.15    .000
                    ==================================================
                    SUM 06:HIP06   61.06     6.741     1.17   46.70    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0020----------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD      |   Area     (ha)=   12.20
| 07:HIP07  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area       (ha)=        8.66         3.54
      Dep. Storage       (mm)=        1.57         4.67
      Average Slope       (%)=         .70         1.50
      Length              (m)=      210.00       100.00
      Mannings n             =        .030         .250

      Max.eff.Inten.(mm/hr)=        144.69       101.36
                  over (min)          7.50        20.00
      Storage Coeff.  (min)=          6.32 (ii)   19.58 (ii)
      Unit Hyd. Tpeak (min)=          7.50        20.00
      Unit Hyd. peak  (cms)=           .17          .06
                                                              *TOTALS*
      PEAK FLOW         (cms)=        1.86          .59          2.109 (iii)
      TIME TO PEAK      (hrs)=        1.04         1.29          1.042
      RUNOFF VOLUME      (mm)=       56.66        34.22         45.437
      TOTAL RAINFALL     (mm)=       58.23        58.23         58.226
      RUNOFF COEFFICIENT    =          .97          .59           .780

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0021----------------------------------------------------------------------
*
*SUB-AREA No.5
---------------------
| DESIGN NASHYD       |   Area     (ha)=     4.00   Curve Number   (CN)=85.00
| 08:Pond-B DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=     .170

    Unit Hyd Qpeak  (cms)=      .899

    PEAK FLOW        (cms)=      .459 (i)
    TIME TO PEAK     (hrs)=     1.167
    RUNOFF VOLUME     (mm)=    29.155
    TOTAL RAINFALL    (mm)=    58.226
    RUNOFF COEFFICIENT   =      .501

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

------------------------------------------------------------------------------
001:0022----------------------------------------------------------------------
-------------------
| ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 06:HIP06   61.06     6.741     1.17   46.70    .000
                   +ID2 07:HIP07   12.20     2.109     1.04   45.44    .000
                   +ID3 08:Pond-B   4.00      .459     1.17   29.15    .000
                    ==================================================
                    SUM 09:HIP08   77.26     8.998     1.13   45.59    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0023----------------------------------------------------------------------
*
*SUB-AREA No. 6
*
---------------------
| DESIGN NASHYD       |   Area     (ha)=     2.70   Curve Number   (CN)=76.00
| 01:A3      DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=     .800

    Unit Hyd Qpeak  (cms)=      .129

    PEAK FLOW        (cms)=      .079 (i)
    TIME TO PEAK     (hrs)=     2.000
    RUNOFF VOLUME     (mm)=    21.442
    TOTAL RAINFALL    (mm)=    58.226
    RUNOFF COEFFICIENT   =      .368

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

------------------------------------------------------------------------------
001:0024----------------------------------------------------------------------
-------------------
| ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 09:HIP08   77.26     8.998     1.13   45.59    .000
                   +ID2 01:A3       2.70      .079     2.00   21.44    .000
                    ==================================================
                    SUM 02:Ultima  79.96     9.013     1.13   44.78    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0025----------------------------------------------------------------------
***********************************************************
*       CALCULATION OF 3HR - 1:50 YEAR STORM EVENT        *
***********************************************************
-------------------
| START             |   Project dir.: V:\20983.DU\ENG\SWMHYMO\
-------------------     Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
-------------------
| CHICAGO STORM     |    IDF curve parameters: A=1569.580
```

```
| Ptotal= 64.81 mm |                              B=    6.014
--------------------                              C=     .820
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =    .33

                 TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                  hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                  .17   5.467 |   1.00 161.471 |   1.83  10.000 |   2.67   5.209
                  .33   6.820 |   1.17  48.876 |   2.00   8.397 |   2.83   4.774
                  .50   9.187 |   1.33  24.704 |   2.17   7.256 |   3.00   4.412
                  .67  14.441 |   1.50  16.495 |   2.33   6.403 |
                  .83  36.764 |   1.67  12.422 |   2.50   5.740 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
---------------------
| DEFAULT VALUES      |   Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
---------------------     ICASEdv = 1 (read and print data)
    FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
               ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
    Horton's infiltration equation parameters:
    [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
    Parameters for PERVIOUS surfaces in STANDHYD:
    [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
    Parameters for IMPERVIOUS surfaces in STANDHYD:
    [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
    Parameters used in NASHYD:
    [Ia=   4.67 mm] [N= 3.00]
-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
************************************
*            ORGAWORLD FILE          *
************************************
* SUB-AREA No.1
---------------------
| CALIB  STANDHYD    |   Area    (ha)=    2.07
| 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=          1.74          .33
    Dep. Storage      (mm)=          1.57         4.67
    Average Slope      (%)=           .52         1.00
    Length             (m)=        204.72        20.00
    Mannings n            =          .030         .250

    Max.eff.Inten.(mm/hr)=        161.47        62.27
               over (min)           7.50        12.50
    Storage Coeff.   (min)=          6.51 (ii)   13.44 (ii)
    Unit Hyd. Tpeak (min)=          7.50        12.50
    Unit Hyd. peak  (cms)=           .16          .09
                                                          *TOTALS*
    PEAK FLOW        (cms)=           .59          .03        .609 (iii)
    TIME TO PEAK     (hrs)=          1.04         1.17       1.042
    RUNOFF VOLUME     (mm)=         63.24        30.21      57.952
    TOTAL RAINFALL    (mm)=         64.81        64.81      64.806
    RUNOFF COEFFICIENT    =           .98          .47        .894

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB  STANDHYD    |   Area    (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=          1.42          .12
    Dep. Storage      (mm)=          1.57         4.67
    Average Slope      (%)=           .50         1.00
    Length             (m)=        244.34         5.00
    Mannings n            =          .030         .030

    Max.eff.Inten.(mm/hr)=        161.47        78.73
               over (min)           7.50         7.50
    Storage Coeff.   (min)=          7.33 (ii)    8.10 (ii)
    Unit Hyd. Tpeak (min)=          7.50         7.50
    Unit Hyd. peak  (cms)=           .15          .14
                                                          *TOTALS*
    PEAK FLOW        (cms)=           .46          .02        .475 (iii)
    TIME TO PEAK     (hrs)=          1.04         1.08       1.042
    RUNOFF VOLUME     (mm)=         63.24        30.21      60.594
    TOTAL RAINFALL    (mm)=         64.81        64.81      64.806
    RUNOFF COEFFICIENT    =           .98          .47        .935

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB  STANDHYD    |   Area    (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=          1.36          .04
    Dep. Storage      (mm)=          1.57         4.67
    Average Slope      (%)=           .51         1.00
    Length             (m)=        225.63         5.00
    Mannings n            =          .030         .030

    Max.eff.Inten.(mm/hr)=        161.47        78.73
               over (min)           7.50         7.50
    Storage Coeff.   (min)=          6.95 (ii)    7.72 (ii)
    Unit Hyd. Tpeak (min)=          7.50         7.50
    Unit Hyd. peak  (cms)=           .16          .15
                                                          *TOTALS*
    PEAK FLOW        (cms)=           .45          .01        .454 (iii)
    TIME TO PEAK     (hrs)=          1.04         1.08       1.042
    RUNOFF VOLUME     (mm)=         63.24        30.21      62.245
    TOTAL RAINFALL    (mm)=         64.81        64.81      64.806
    RUNOFF COEFFICIENT    =           .98          .47        .960

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
---------------------
| ADD HYD (040   ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 01:010        2.07      .609     1.04   57.95     .000
              +ID2 02:020        1.54      .475     1.04   60.59     .000
               ==========================================================
               SUM 04:040        3.61     1.084     1.04   59.08     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 03:030        1.40      .454     1.04   62.25     .000
              +ID2 04:040        3.61     1.084     1.04   59.08     .000
               ==========================================================
               SUM 05:050        5.01     1.538     1.04   59.96     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=           .86          .03
    Dep. Storage      (mm)=          1.57         4.67
    Average Slope      (%)=           .93          .70
    Length             (m)=        164.82        40.00
    Mannings n            =          .030         .250

    Max.eff.Inten.(mm/hr)=        161.47        53.28
               over (min)           5.00        17.50
    Storage Coeff.   (min)=          4.80 (ii)   17.24 (ii)
    Unit Hyd. Tpeak (min)=          5.00        17.50
    Unit Hyd. peak  (cms)=           .23          .07
                                                          *TOTALS*
    PEAK FLOW        (cms)=           .33          .00        .335 (iii)
    TIME TO PEAK     (hrs)=          1.00         1.25       1.000
    RUNOFF VOLUME     (mm)=         63.24        30.21      62.245
    TOTAL RAINFALL    (mm)=         64.81        64.81      64.806
    RUNOFF COEFFICIENT    =           .98          .47        .960

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
*
* SUB-AREA No.5
---------------------
| CALIB STANDHYD     |   Area    (ha)=    2.66
| 07:070    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                  IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=          2.58          .08
    Dep. Storage      (mm)=          1.57         4.67
    Average Slope      (%)=           .61         1.50
    Length             (m)=        207.25        20.00
    Mannings n            =          .030         .250

    Max.eff.Inten.(mm/hr)=        161.47        62.27
               over (min)           7.50        12.50
    Storage Coeff.   (min)=          6.26 (ii)   12.39 (ii)
    Unit Hyd. Tpeak (min)=          7.50        12.50
    Unit Hyd. peak  (cms)=           .17          .09
                                                          *TOTALS*
    PEAK FLOW        (cms)=           .88          .01        .886 (iii)
    TIME TO PEAK     (hrs)=          1.04         1.17       1.042
    RUNOFF VOLUME     (mm)=         63.24        30.21      62.245
    TOTAL RAINFALL    (mm)=         64.81        64.81      64.806
    RUNOFF COEFFICIENT    =           .98          .47        .960

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
--------------------
| ADD HYD (080   ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 06:060         .89      .335     1.00   62.25     .000
              +ID2 07:070        2.66      .886     1.04   62.25     .000
               ==========================================================
               SUM 08:080        3.55     1.197     1.04   62.25     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
--------------------
| ADD HYD (090   ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
               ID1 05:050        5.01     1.538     1.04   59.96     .000
              +ID2 08:080        3.55     1.197     1.04   62.25     .000
               ==========================================================
               SUM 09:090        8.56     2.735     1.04   60.91     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0013-----------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|   IN>09:(090   )  |
| OUT<10:(POND   )  |     ========  OUTLFOW STORAGE TABLE  ========
--------------------       OUTFLOW     STORAGE   |   OUTFLOW    STORAGE
                            (cms)      (ha.m.)   |    (cms)     (ha.m.)
                             .000   .0000E+00    |     .593   .6251E+00
                             .008   .6560E-01    |     .654   .6631E+00
                             .017   .1311E+00    |     .797   .7391E+00
                             .093   .2831E+00    |     .950   .8274E+00
                             .233   .3971E+00    |    1.304   .9157E+00
                             .337   .4731E+00    |    1.880   .1004E+01
                             .465   .5491E+00    |    2.577   .1092E+01
                             .531   .5871E+00    |     .000   .0000E+00

   ROUTING RESULTS             AREA      QPEAK      TPEAK        R.V.
   -------------------         (ha)      (cms)      (hrs)        (mm)
   INFLOW >09: (090   )        8.56      2.735      1.042      60.910
   OUTFLOW<10: (POND  )        8.56       .233      1.944      60.908

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=      8.503
                    TIME SHIFT OF PEAK FLOW           (min)=     54.17
```

```
                      MAXIMUM  STORAGE   USED       (ha.m.)=.3967E+00


 -----------------------------------------------------------------------------
 001:0014---------------------------------------------------------------------
 ******* ***************************************
 *     Remaining Hawthorne Industrial Park      *
 ******* ***************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=     14.13          5.77
      Dep. Storage     (mm)=      1.57          4.67
      Average Slope     (%)=       .60          1.50
      Length            (m)=    580.00        100.00
      Mannings n          =       .030          .250

      Max.eff.Inten.(mm/hr)=    138.95        102.13
                over (min)      12.50          25.00
      Storage Coeff.  (min)=     12.38 (ii)    25.60 (ii)
      Unit Hyd. Tpeak (min)=     12.50         25.00
      Unit Hyd. peak  (cms)=       .09           .04
                                                           *TOTALS*
      PEAK FLOW        (cms)=      2.46           .95        3.001 (iii)
      TIME TO PEAK     (hrs)=      1.13          1.38        1.167
      RUNOFF VOLUME     (mm)=     63.24         39.90       51.566
      TOTAL RAINFALL    (mm)=     64.81         64.81       64.806
      RUNOFF COEFFICIENT   =        .98           .62         .796

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0     Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0015---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD        AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                    ID1 10:POND        8.56      .233     1.94   60.91    .000
                   +ID2 01:HIP01      19.90     3.001     1.17   51.57    .000
                   ==================================================
                    SUM 02:HIP02      28.46     3.092     1.17   54.37    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0016---------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=     12.07          4.93
      Dep. Storage     (mm)=      1.57          4.67
      Average Slope     (%)=       .65          1.50
      Length            (m)=    450.00        100.00
      Mannings n          =       .030          .250

      Max.eff.Inten.(mm/hr)=    161.47        109.61
                over (min)      10.00          22.50
      Storage Coeff.  (min)=      9.77 (ii)    22.63 (ii)
      Unit Hyd. Tpeak (min)=     10.00         22.50
      Unit Hyd. peak  (cms)=       .11           .05
                                                           *TOTALS*
      PEAK FLOW        (cms)=      2.38           .88        2.819 (iii)
      TIME TO PEAK     (hrs)=      1.08          1.33        1.125
      RUNOFF VOLUME     (mm)=     63.24         39.90       51.566
      TOTAL RAINFALL    (mm)=     64.81         64.81       64.806
      RUNOFF COEFFICIENT   =        .98           .62         .796

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0     Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0017---------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    15.60
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=     11.08          4.52
      Dep. Storage     (mm)=      1.57          4.67
      Average Slope     (%)=       .50          1.50
      Length            (m)=    600.00        100.00
      Mannings n          =       .030          .250

      Max.eff.Inten.(mm/hr)=    138.95         96.02
                over (min)      12.50          27.50
      Storage Coeff.  (min)=     13.34 (ii)    26.90 (ii)
      Unit Hyd. Tpeak (min)=     12.50         27.50
      Unit Hyd. peak  (cms)=       .09           .04
                                                           *TOTALS*
      PEAK FLOW        (cms)=      1.86           .72        2.237 (iii)
      TIME TO PEAK     (hrs)=      1.13          1.42        1.167
      RUNOFF VOLUME     (mm)=     63.24         39.90       51.566
      TOTAL RAINFALL    (mm)=     64.81         64.81       64.806
      RUNOFF COEFFICIENT   =        .98           .62         .796

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0     Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0018---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD        AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                    ID1 03:HIP03      17.00     2.819     1.13   51.57    .000
                   +ID2 04:HIP04      15.60     2.237     1.17   51.57    .000
                   ==================================================
                    SUM 05:HIP05      32.60     5.019     1.13   51.57    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0019---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD        AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                    ID1 05:HIP05      32.60     5.019     1.13   51.57    .000
                   +ID2 02:HIP02      28.46     3.092     1.17   54.37    .000
```

```
                   ==================================================
                    SUM 06:HIP06      61.06     8.054     1.13   52.87    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0020---------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    12.20
 | 07:HIP07  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      8.66          3.54
      Dep. Storage     (mm)=      1.57          4.67
      Average Slope     (%)=       .70          1.50
      Length            (m)=    210.00        100.00
      Mannings n          =       .030          .250

      Max.eff.Inten.(mm/hr)=    161.47        126.32
                over (min)       5.00          17.50
      Storage Coeff.  (min)=      6.05 (ii)    18.19 (ii)
      Unit Hyd. Tpeak (min)=      5.00         17.50
      Unit Hyd. peak  (cms)=       .20           .06
                                                           *TOTALS*
      PEAK FLOW        (cms)=      2.19           .73        2.470 (iii)
      TIME TO PEAK     (hrs)=      1.00          1.25        1.042
      RUNOFF VOLUME     (mm)=     63.24         39.90       51.566
      TOTAL RAINFALL    (mm)=     64.81         64.81       64.806
      RUNOFF COEFFICIENT   =        .98           .62         .796

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0     Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0021---------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ---------------------
 | DESIGN NASHYD        |   Area      (ha)=     4.00   Curve Number    (CN)=85.00
 | 08:Pond-B DT= 2.50   |   Ia        (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------      U.H. Tp(hrs)=      .170

      Unit Hyd Qpeak   (cms)=       .899

      PEAK FLOW        (cms)=       .551 (i)
      TIME TO PEAK     (hrs)=      1.125
      RUNOFF VOLUME     (mm)=     34.455
      TOTAL RAINFALL    (mm)=     64.806
      RUNOFF COEFFICIENT   =        .532

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

 -----------------------------------------------------------------------------
 001:0022---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD        AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                    ID1 06:HIP06      61.06     8.054     1.13   52.87    .000
                   +ID2 07:HIP07      12.20     2.470     1.04   51.57    .000
                   +ID3 08:Pond-B      4.00      .551     1.13   34.45    .000
                   ==================================================
                    SUM 09:HIP08      77.26    10.570     1.13   51.71    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0023---------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 *
 ---------------------
 | DESIGN NASHYD        |   Area      (ha)=     2.70   Curve Number    (CN)=76.00
 | 01:A3      DT= 2.50  |   Ia        (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------      U.H. Tp(hrs)=      .800

      Unit Hyd Qpeak   (cms)=       .129

      PEAK FLOW        (cms)=       .096 (i)
      TIME TO PEAK     (hrs)=      1.958
      RUNOFF VOLUME     (mm)=     25.767
      TOTAL RAINFALL    (mm)=     64.806
      RUNOFF COEFFICIENT   =        .398

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

 -----------------------------------------------------------------------------
 001:0024---------------------------------------------------------------------
 --------------------
 | ADD HYD (Ultima) | ID: NHYD        AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                    ID1 09:HIP08      77.26    10.570     1.13   51.71    .000
                   +ID2 01:A3          2.70      .096     1.96   25.77    .000
                   ==================================================
                    SUM 02:Ultima     79.96    10.588     1.13   50.84    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0025---------------------------------------------------------------------
 ***************************************************************
 *       CALCULATION OF 3HR - 1:100 YEAR STORM EVENT            *
 ***************************************************************
 --------------------
 | START              |  Project  dir.: V:\20983.DU\ENG\SWMHYMO\
 --------------------    Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
      TZERO =    .00 hrs on        0
      METOUT=    2 (output = METRIC)
      NRUN  =  001
      NSTORM=    0

 -----------------------------------------------------------------------------
 001:0002---------------------------------------------------------------------
 --------------------
 | CHICAGO STORM      |    IDF curve parameters: A=1735.688
 | Ptotal= 71.66 mm   |                          B=   6.014
 --------------------                            C=    .820
                           used in:    INTENSITY =  A / (t + B)^C

                           Duration of storm  =  3.00 hrs
                           Storm time step    = 10.00 min
                           Time to peak ratio =   .33

              TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
               hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
               .17    6.046 |  1.00  178.559 |  1.83   11.059 |  2.67    5.760
               .33    7.542 |  1.17   54.049 |  2.00    9.285 |  2.83    5.280
               .50   10.159 |  1.33   27.319 |  2.17    8.024 |  3.00    4.879
               .67   15.969 |  1.50   18.240 |  2.33    7.080 |
               .83   40.655 |  1.67   13.737 |  2.50    6.347 |

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

```
001:0003---------------------------------------------------------------------
----------------------
| DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
----------------------   ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]    [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
-----------------------------------------------------------------------------
001:0004---------------------------------------------------------------------
*******************************
*          ORGAWORLD FILE     *
*******************************
* SUB-AREA No.1
----------------------
| CALIB  STANDHYD     |    Area     (ha)=     2.07
| 01:010     DT= 2.50 |    Total Imp(%)=    84.00    Dir. Conn.(%)=    84.00
----------------------
                           IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      1.74           .33
    Dep. Storage      (mm)=      1.57          4.67
    Average Slope      (%)=       .52          1.00
    Length             (m)=    204.72         20.00
    Mannings n            =      .030          .250

    Max.eff.Inten.(mm/hr)=     178.56         74.05
              over (min)         7.50         12.50
    Storage Coeff.  (min)=       6.26 (ii)    12.72 (ii)
    Unit Hyd. Tpeak (min)=       7.50         12.50
    Unit Hyd. peak  (cms)=        .17           .09
                                                         *TOTALS*
    PEAK FLOW        (cms)=       .66           .04        .685 (iii)
    TIME TO PEAK     (hrs)=      1.04          1.17       1.042
    RUNOFF VOLUME     (mm)=     70.09         35.46      64.553
    TOTAL RAINFALL    (mm)=     71.66         71.66      71.665
    RUNOFF COEFFICIENT   =        .98           .49        .901

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0005---------------------------------------------------------------------
*
* SUB-AREA No.2
----------------------
| CALIB  STANDHYD     |    Area     (ha)=     1.54
| 02:020     DT= 2.50 |    Total Imp(%)=    92.00    Dir. Conn.(%)=    92.00
----------------------
                           IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      1.42           .12
    Dep. Storage      (mm)=      1.57          4.67
    Average Slope      (%)=       .50          1.00
    Length             (m)=    244.34          5.00
    Mannings n            =      .030          .030

    Max.eff.Inten.(mm/hr)=     178.56         93.23
              over (min)         7.50          7.50
    Storage Coeff.  (min)=       7.04 (ii)     7.76 (ii)
    Unit Hyd. Tpeak (min)=       7.50          7.50
    Unit Hyd. peak  (cms)=        .16           .15
                                                         *TOTALS*
    PEAK FLOW        (cms)=       .51           .02        .534 (iii)
    TIME TO PEAK     (hrs)=      1.04          1.08       1.042
    RUNOFF VOLUME     (mm)=     70.09         35.46      67.324
    TOTAL RAINFALL    (mm)=     71.66         71.66      71.665
    RUNOFF COEFFICIENT   =        .98           .49        .939

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0006---------------------------------------------------------------------
*
* SUB-AREA No.3
----------------------
| CALIB  STANDHYD     |    Area     (ha)=     1.40
| 03:030     DT= 2.50 |    Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
----------------------
                           IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      1.36           .04
    Dep. Storage      (mm)=      1.57          4.67
    Average Slope      (%)=       .51          1.00
    Length             (m)=    225.63          5.00
    Mannings n            =      .030          .030

    Max.eff.Inten.(mm/hr)=     178.56         93.23
              over (min)         7.50          7.50
    Storage Coeff.  (min)=       6.67 (ii)     7.39 (ii)
    Unit Hyd. Tpeak (min)=       7.50          7.50
    Unit Hyd. peak  (cms)=        .16           .15
                                                         *TOTALS*
    PEAK FLOW        (cms)=       .50           .01        .509 (iii)
    TIME TO PEAK     (hrs)=      1.04          1.08       1.042
    RUNOFF VOLUME     (mm)=     70.09         35.46      69.056
    TOTAL RAINFALL    (mm)=     71.66         71.66      71.665
    RUNOFF COEFFICIENT   =        .98           .49        .964

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0007---------------------------------------------------------------------
--------------------
| ADD HYD (040    ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                 (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 01:010          2.07      .685     1.04   64.55     .000
                +ID2 02:020          1.54      .534     1.04   67.32     .000
                =========================================================
                 SUM 04:040          3.61     1.220     1.04   65.74     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0008---------------------------------------------------------------------
--------------------
| ADD HYD (050    ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                 (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 03:030          1.40      .509     1.04   69.06     .000
                +ID2 04:040          3.61     1.220     1.04   65.74     .000
                =========================================================
```

```
                 SUM 05:050          5.01     1.729     1.04   66.66     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0009---------------------------------------------------------------------
*
* SUB-AREA No.4
----------------------
| CALIB  STANDHYD     |    Area     (ha)=      .89
| 06:060     DT= 2.50 |    Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
----------------------
                           IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       .86           .03
    Dep. Storage      (mm)=      1.57          4.67
    Average Slope      (%)=       .93           .70
    Length             (m)=    164.82         40.00
    Mannings n            =      .030          .250

    Max.eff.Inten.(mm/hr)=     178.56         67.61
              over (min)         5.00         15.00
    Storage Coeff.  (min)=       4.62 (ii)    15.92 (ii)
    Unit Hyd. Tpeak (min)=       5.00         15.00
    Unit Hyd. peak  (cms)=        .24           .07
                                                         *TOTALS*
    PEAK FLOW        (cms)=       .37           .00        .374 (iii)
    TIME TO PEAK     (hrs)=      1.00          1.21       1.000
    RUNOFF VOLUME     (mm)=     70.09         35.46      69.056
    TOTAL RAINFALL    (mm)=     71.66         71.66      71.665
    RUNOFF COEFFICIENT   =        .98           .49        .964

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0010---------------------------------------------------------------------
*
* SUB-AREA No.5
----------------------
| CALIB  STANDHYD     |    Area     (ha)=     2.66
| 07:070     DT= 2.50 |    Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
----------------------
                           IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      2.58           .08
    Dep. Storage      (mm)=      1.57          4.67
    Average Slope      (%)=       .61          1.50
    Length             (m)=    207.25         20.00
    Mannings n            =      .030          .250

    Max.eff.Inten.(mm/hr)=     178.56         74.05
              over (min)         5.00         12.50
    Storage Coeff.  (min)=       6.01 (ii)    11.73 (ii)
    Unit Hyd. Tpeak (min)=       5.00         12.50
    Unit Hyd. peak  (cms)=        .20           .09
                                                         *TOTALS*
    PEAK FLOW        (cms)=      1.03           .01       1.034 (iii)
    TIME TO PEAK     (hrs)=      1.00          1.17       1.000
    RUNOFF VOLUME     (mm)=     70.09         35.46      69.056
    TOTAL RAINFALL    (mm)=     71.66         71.66      71.665
    RUNOFF COEFFICIENT   =        .98           .49        .964

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0011---------------------------------------------------------------------
--------------------
| ADD HYD (080    ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                 (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 06:060           .89      .374     1.00   69.06     .000
                +ID2 07:070          2.66     1.034     1.00   69.06     .000
                =========================================================
                 SUM 08:080          3.55     1.408     1.00   69.06     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0012---------------------------------------------------------------------
--------------------
| ADD HYD (090    ) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                 (ha)     (cms)    (hrs)    (mm)    (cms)
                 ID1 05:050          5.01     1.729     1.04   66.66     .000
                +ID2 08:080          3.55     1.408     1.00   69.06     .000
                =========================================================
                 SUM 09:090          8.56     3.067     1.04   67.66     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0013---------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>09:(090    )   |
| OUT<10:(POND   )   |    =========  OUTFLOW STORAGE TABLE  =========
--------------------       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)    (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00    |    .593  .6251E+00
                             .008  .6560E-01    |    .654  .6631E+00
                             .017  .1311E+00    |    .797  .7391E+00
                             .093  .2831E+00    |    .950  .8274E+00
                             .233  .3971E+00    |   1.304  .9157E+00
                             .337  .4731E+00    |   1.880  .1004E+01
                             .465  .5491E+00    |   2.577  .1092E+01
                             .531  .5871E+00    |    .000  .0000E+00

    ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
    -------------------          (ha)     (cms)     (hrs)        (mm)
    INFLOW >09: (090   )         8.56     3.067     1.042      67.655
    OUTFLOW<10: (POND  )         8.56      .283     1.861      67.653

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     9.214
                    TIME SHIFT OF PEAK FLOW         (min)=     49.17
                    MAXIMUM  STORAGE   USED      (ha.m.)=.4333E+00

-----------------------------------------------------------------------------
001:0014---------------------------------------------------------------------
*********************************************
*     Remaining Hawthorne Industrial Park   *
*********************************************
*
* SUB-AREA No.1
----------------------
| CALIB  STANDHYD     |    Area     (ha)=    19.90
| 01:HIP01  DT= 2.50  |    Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
----------------------
                           IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=     14.13          5.77
    Dep. Storage      (mm)=      1.57          4.67
    Average Slope      (%)=       .60          1.50
```

```
      Length            (m)=     580.00       100.00
      Mannings n           =       .030         .250

      Max.eff.Inten.(mm/hr)=     153.66       117.89
                over (min)        12.50        25.00
      Storage Coeff.  (min)=      11.89 (ii)   24.37 (ii)
      Unit Hyd. Tpeak (min)=      12.50        25.00
      Unit Hyd. peak  (cms)=        .09          .05
                                                          *TOTALS*
      PEAK FLOW       (cms)=       2.77         1.13        3.419 (iii)
      TIME TO PEAK    (hrs)=       1.13         1.38        1.167
      RUNOFF VOLUME    (mm)=      70.09        45.94       58.015
      TOTAL RAINFALL   (mm)=      71.66        71.66       71.665
      RUNOFF COEFFICIENT  =         .98          .64         .810

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0015-------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                  ID1 10:POND       8.56     .283    1.86  67.65    .000
                 +ID2 01:HIP01     19.90    3.419    1.17  58.02    .000
                  ===============================================
                  SUM 02:HIP02     28.46    3.554    1.17  60.91    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0016-------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=   50.00
 ---------------------
                             IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      12.07         4.93
      Dep. Storage     (mm)=       1.57         4.67
      Average Slope     (%)=        .65         1.50
      Length            (m)=     450.00       100.00
      Mannings n           =       .030         .250

      Max.eff.Inten.(mm/hr)=     178.56       126.60
                over (min)        10.00        22.50
      Storage Coeff.  (min)=       9.39 (ii)   21.52 (ii)
      Unit Hyd. Tpeak (min)=      10.00        22.50
      Unit Hyd. peak  (cms)=        .12          .05
                                                          *TOTALS*
      PEAK FLOW       (cms)=       2.68         1.05        3.203 (iii)
      TIME TO PEAK    (hrs)=       1.08         1.33        1.125
      RUNOFF VOLUME    (mm)=      70.09        45.94       58.015
      TOTAL RAINFALL   (mm)=      71.66        71.66       71.665
      RUNOFF COEFFICIENT  =         .98          .64         .810

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0017-------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    15.60
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=   50.00
 ---------------------
                             IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      11.08         4.52
      Dep. Storage     (mm)=       1.57         4.67
      Average Slope     (%)=        .50         1.50
      Length            (m)=     600.00       100.00
      Mannings n           =       .030         .250

      Max.eff.Inten.(mm/hr)=     153.66       117.89
                over (min)        12.50        25.00
      Storage Coeff.  (min)=      12.82 (ii)   25.30 (ii)
      Unit Hyd. Tpeak (min)=      12.50        25.00
      Unit Hyd. peak  (cms)=        .09          .04
                                                          *TOTALS*
      PEAK FLOW       (cms)=       2.10          .87        2.612 (iii)
      TIME TO PEAK    (hrs)=       1.13         1.38        1.167
      RUNOFF VOLUME    (mm)=      70.09        45.94       58.015
      TOTAL RAINFALL   (mm)=      71.66        71.66       71.665
      RUNOFF COEFFICIENT  =         .98          .64         .810

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0018-------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                  ID1 03:HIP03     17.00    3.203    1.13  58.02    .000
                 +ID2 04:HIP04     15.60    2.612    1.17  58.02    .000
                  ===============================================
                  SUM 05:HIP05     32.60    5.767    1.13  58.02    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0019-------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                  ID1 05:HIP05     32.60    5.767    1.13  58.02    .000
                 +ID2 02:HIP02     28.46    3.554    1.17  60.91    .000
                  ===============================================
                  SUM 06:HIP06     61.06    9.239    1.13  59.36    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0020-------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD     |   Area     (ha)=    12.20
 | 07:HIP07  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=   50.00
 ---------------------
                             IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       8.66         3.54
      Dep. Storage     (mm)=       1.57         4.67
      Average Slope     (%)=        .70         1.50
      Length            (m)=     210.00       100.00
      Mannings n           =       .030         .250

      Max.eff.Inten.(mm/hr)=     178.56       146.17
                over (min)         5.00        17.50
      Storage Coeff.  (min)=       5.81 (ii)   17.27 (ii)
      Unit Hyd. Tpeak (min)=       5.00        17.50
      Unit Hyd. peak  (cms)=        .20          .07
                                                          *TOTALS*
      PEAK FLOW       (cms)=       2.46          .87        2.793 (iii)
      TIME TO PEAK    (hrs)=       1.00         1.25        1.042
      RUNOFF VOLUME    (mm)=      70.09        45.94       58.015
      TOTAL RAINFALL   (mm)=      71.66        71.66       71.665
      RUNOFF COEFFICIENT  =         .98          .64         .810

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0021-------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ----------------------
 | DESIGN NASHYD       |   Area    (ha)=    4.00   Curve Number   (CN)=85.00
 | 08:Pond-B DT= 2.50  |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------    U.H. Tp(hrs)=    .170

      Unit Hyd Qpeak  (cms)=     .899

      PEAK FLOW       (cms)=     .649 (i)
      TIME TO PEAK    (hrs)=    1.125
      RUNOFF VOLUME    (mm)=   40.139
      TOTAL RAINFALL   (mm)=   71.665
      RUNOFF COEFFICIENT  =      .560

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

 ---------------------------------------------------------------------------
 001:0022-------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                  ID1 06:HIP06     61.06    9.239    1.13  59.36    .000
                 +ID2 07:HIP07     12.20    2.793    1.04  58.02    .000
                 +ID3 08:Pond-B     4.00     .649    1.13  40.14    .000
                  ===============================================
                  SUM 09:HIP08     77.26   12.109    1.13  58.16    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0023-------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 *
 ----------------------
 | DESIGN NASHYD       |   Area    (ha)=    2.70   Curve Number   (CN)=76.00
 | 01:A3     DT= 2.50  |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
 ----------------------    U.H. Tp(hrs)=    .800

      Unit Hyd Qpeak  (cms)=     .129

      PEAK FLOW       (cms)=     .114 (i)
      TIME TO PEAK    (hrs)=    1.958
      RUNOFF VOLUME    (mm)=   30.490
      TOTAL RAINFALL   (mm)=   71.665
      RUNOFF COEFFICIENT  =      .425

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

 ---------------------------------------------------------------------------
 001:0024-------------------------------------------------------------------
 --------------------
 | ADD HYD (Ultima) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                  ID1 09:HIP08     77.26   12.109    1.13  58.16    .000
                 +ID2 01:A3         2.70     .114    1.96  30.49    .000
                  ===============================================
                  SUM 02:Ultima    79.96   12.132    1.13  57.22    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0025-------------------------------------------------------------------
    FINISH
 ---------------------------------------------------------------------------
 ***************************************************************************
    WARNINGS / ERRORS / NOTES
    -------------------------
  Simulation ended on 2009-02-09     at 14:59:34
 ===========================================================================
```

A P P E N D I X 'F'

STAGE-STORAGE-DISCHARGE TABLE

Hawthorne Industrial Park
Configuration of Storage Facility

	RESTRICTOR FLOW (L/S)	RESTRICTOR FLOW (L/S)	WEIR FLOW (L/S)	TOTAL OUTFLOW (L/S)	Storage Cell Configuration		
					SWMHYMO DATA		
Invert Elevation (m):	82.90	84.80	86.15				
Dia. or Width (mm):	150	600	6000				
# of restrictors/weirs:	1	2	1				
Discharge Coeff. (C_d):	0.61	0.61	1.87		AREA	VOLUME	VOLUME
ELEV. (m)	DISCH. (L/S)	DISCH. (L/S)	DISCH. (L/S)		m^2	m^3	ha-m
82.900	0.0	0.0	0.0	0	0	0	0.0000
84.000	48.3	0.0	0.0	48	3093	574	0.0574
84.250	53.9	0.0	0.0	54	11192	2434	0.2434
84.500	59.0	0.0	0.0	59	16913	5834	0.5834
84.650	61.8	0.0	0.0	62	17299	8400	0.8400
84.800	64.5	0.0	0.0	64	17684	11024	1.1024
84.950	67.1	80.0	0.0	147	18070	13705	1.3705
85.100	69.6	210.0	0.0	280	18456	16444	1.6444
85.250	72.0	400.0	0.0	472	18842	19242	1.9242
85.400	74.3	650.0	0.0	724	19227	22097	2.2097
85.550	76.6	860.0	0.0	937	19613	25010	2.5010
85.700	78.8	1183.3	0.0	1262	19999	27981	2.7981
85.850	80.9	1323.0	0.0	1404	20384	31009	3.1009
86.000	83.0	1449.3	0.0	1532	20770	34096	3.4096
86.150	85.1	1565.4	0.0	1650	21156	37240	3.7240
86.300	87.1	1673.5	648.6	2409	21541	40442	4.0442
86.450	89.0	1775.0	1825.2	3689	21927	43702	4.3702

Note: Restrictor flows estimated by MTO Design Chart 2.32: Inlet Control for elevations ≤ 85.55 for double 600 mm culverts.

A P P E N D I X 'G'

SWMHYMO INPUT AND OUTPUT FILES
(Post-Development Controlled Phase 1 Conditions)

```
2     Metric units
*#*****************************************************************************
*#  Project Name : Hawthorne Industrial Park        Project Number:    [20983] *
*#  Date         : January, 2009                                              *
*#  Revised      : N/A                                                         *
*#  Developed by : Mark Buchanan, E.I.T.                                       *
*#  Reviewed by  : Guy Forget, P.Eng.                                          *
*#  Company      : J.L. Richards & Associates Limited                          *
*#  License #    : 4418403                                                     *
*#*****************************************************************************
*
*
*#*****************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT               *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE    *
*#*****************************************************************
*
****************************************************************************
*        SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE          *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS  *
****************************************************************************

*******************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*******************************************************

************************************************************
*        POST-DEVELOPMENT UNCONTROLLED CONDITIONS          *
************************************************************

************************************************************
*           CALCULATION OF 4 HR 25 MM STORM EVENT          *
************************************************************

START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [  ] <--storm filename, one per line for NSTORM time
READ STORM            STORM_FILENAME=["4HR25-15.STM"]
*%-----------------|-------------------------------------------------------|
DEFAULT VALUES        ICASEdef=[1],  read and print values
                      DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------|

***********************************
*           ORGAWORLD FILE        *
***********************************
*
* SUB-AREA No.1

CALIB STANDHYD        ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                      XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                           LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD        ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                      XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                           LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD        ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                           LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD        ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                           LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD        ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                           LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------|

ROUTE RESERVOIR       IDout=[10],   NHYD=["POND"],  IDin=[9],
                      RDT=[1.0](min),
                             TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                    [   0.000,  0.0000]
                                    [   0.008,  0.0656]
                                    [   0.017,  0.1311]
                                    [   0.093,  0.2831]
                                    [   0.233,  0.3971]
                                    [   0.337,  0.4731]
                                    [   0.465,  0.5491]
                                    [   0.531,  0.5871]
                                    [   0.593,  0.6251]
                                    [   0.654,  0.6631]
                                    [   0.797,  0.7391]
                                    [   0.950,  0.8274]
                                    [   1.304,  0.9157]
                                    [   1.880,  1.0040]
                                    [   2.577,  1.0923]
                                    [   -1   ,  -1    ]  (max twenty pts)

**********************************************
*     Remaining Hawthorne Industrial Park    *
**********************************************
*
* SUB-AREA No.1

CALIB STANDHYD        ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                           LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD        ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                           LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD        ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                           LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD         ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                      DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|


ADD HYD               IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|-------------------------------------------------------|

ROUTE RESERVOIR       IDout=[ 8 ],   NHYD=["HIP-POND"],  IDin=[ 7 ],
                      RDT=[1.0](min),
                             TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                    [   0.0  , 0.0    ]
                                    [   0.048, 0.0574 ]
                                    [   0.054, 0.2434 ]
                                    [   0.059, 0.5834 ]
                                    [   0.062, 0.8400 ]
                                    [   0.064, 1.1024 ]
                                    [   0.147, 1.3705 ]
                                    [   0.280, 1.6444 ]
                                    [   0.472, 1.9242 ]
                                    [   0.724, 2.2097 ]
                                    [   0.937, 2.5010 ]
                                    [   1.262, 2.7981 ]
                                    [   1.404, 3.1009 ]
                                    [   1.532, 3.4096 ]
                                    [   1.650, 3.7240 ]
                                    [   2.409, 4.0442 ]
                                    [   3.689, 4.3702 ]
                                    [   -1   ,  -1    ]  (max twenty pts)


*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No. 5
*
DESIGN NASHYD         ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD         ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD               IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
*%-----------------|-------------------------------------------------------|


****************************************************************
*        CALCULATION OF 3HR - 1:2 YEAR STORM EVENT             *
****************************************************************

START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
CHICAGO STORM         IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                      ICASEcs=[1],
                      A=[732.951],  B=[6.199], and C=[0.810],
*%-----------------|-------------------------------------------------------|
DEFAULT VALUES        ICASEdef=[1],  read and print values
                      DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------|

***********************************
*           ORGAWORLD FILE        *
***********************************
*
* SUB-AREA No.1

CALIB STANDHYD        ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                      XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                           LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD        ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                      XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
```

```
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                              LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------------|-----------------------------------------------------|
ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [   0.000,  0.0000]
                                        [   0.008,  0.0656]
                                        [   0.017,  0.1311]
                                        [   0.093,  0.2831]
                                        [   0.233,  0.3971]
                                        [   0.337,  0.4731]
                                        [   0.465,  0.5491]
                                        [   0.531,  0.5871]
                                        [   0.593,  0.6251]
                                        [   0.654,  0.6631]
                                        [   0.797,  0.7391]
                                        [   0.950,  0.8274]
                                        [   1.304,  0.9157]
                                        [   1.880,  1.0040]
                                        [   2.577,  1.0923]
                                        [   -1   ,  -1    ]  (max twenty pts)
***********************************************
*     Remaining Hawthorne Industrial Park     *
***********************************************
*
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                              LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                              LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                              LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------------|-----------------------------------------------------|
*
*SUB-AREA No.4
DESIGN NASHYD            ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                         DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------------|-----------------------------------------------------|
ROUTE RESERVOIR          IDout=[ 8 ],   NHYD=["HIP-POND"],  IDin=[ 7 ],
                         RDT=[1.0](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [   0.0  , 0.0    ]
                                        [   0.048, 0.0574 ]
                                        [   0.054, 0.2434 ]
                                        [   0.059, 0.5834 ]
                                        [   0.062, 0.8400 ]
                                        [   0.064, 1.1024 ]
                                        [   0.147, 1.3705 ]
                                        [   0.280, 1.6444 ]
                                        [   0.472, 1.9242 ]
                                        [   0.724, 2.2097 ]
                                        [   0.937, 2.5010 ]
                                        [   1.262, 2.7981 ]
                                        [   1.404, 3.1009 ]
                                        [   1.532, 3.4096 ]
                                        [   1.650, 3.7240 ]
                                        [   2.409, 4.0442 ]
                                        [   3.689, 4.3702 ]
                                        [   -1   , -1     ]  (max twenty pts)
*%-----------------------|-----------------------------------------------------|
*
*SUB-AREA No. 5
*
DESIGN NASHYD            ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------------|-----------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD            ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
*%-----------------------|-----------------------------------------------------|
*************************************************************
*          CALCULATION OF 3HR - 1:5 YEAR STORM EVENT        *
*************************************************************
START                    TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                        [  ] <--storm filename, one per line for NSTORM time
*%-----------------------|-----------------------------------------------------|
CHICAGO STORM            IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                         ICASEcs=[1],
                         A=[998.071],  B=[6.053], and C=[0.814],
*%-----------------------|-----------------------------------------------------|
DEFAULT VALUES           ICASEdef=[1],  read and print values
                         DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------------|-----------------------------------------------------|
**********************************
*         ORGAWORLD FILE         *
**********************************
*
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                         XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                              LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                         XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                              LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------------|-----------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------------|-----------------------------------------------------|
ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [   0.000,  0.0000]
                                        [   0.008,  0.0656]
                                        [   0.017,  0.1311]
                                        [   0.093,  0.2831]
                                        [   0.233,  0.3971]
                                        [   0.337,  0.4731]
                                        [   0.465,  0.5491]
                                        [   0.531,  0.5871]
                                        [   0.593,  0.6251]
```

```
                                              [   0.654,  0.6631]
                                              [   0.797,  0.7391]
                                              [   0.950,  0.8274]
                                              [   1.304,  0.9157]
                                              [   1.880,  1.0040]
                                              [   2.577,  1.0923]
                                              [   -1   ,  -1    ]   (max twenty pts)

*******************************************************
*     Remaining Hawthorne Industrial Park            *
*******************************************************
*
* SUB-AREA No.1

CALIB STANDHYD          ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                             LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD          ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                             LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD          ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                             LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD           ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                        DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------|


ADD HYD                 IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|---------------------------------------------------|

ROUTE RESERVOIR         IDout=[ 8 ],   NHYD=["HIP-POND"],  IDin=[ 7 ],
                        RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [  0.0   , 0.0    ]
                                        [  0.048, 0.0574 ]
                                        [  0.054, 0.2434 ]
                                        [  0.059, 0.5834 ]
                                        [  0.062, 0.8400 ]
                                        [  0.064, 1.1024 ]
                                        [  0.147, 1.3705 ]
                                        [  0.280, 1.6444 ]
                                        [  0.472, 1.9242 ]
                                        [  0.724, 2.2097 ]
                                        [  0.937, 2.5010 ]
                                        [  1.262, 2.7981 ]
                                        [  1.404, 3.1009 ]
                                        [  1.532, 3.4096 ]
                                        [  1.650, 3.7240 ]
                                        [  2.409, 4.0442 ]
                                        [  3.689, 4.3702 ]
                                        [  -1   , -1     ]   (max twenty pts)

*%-----------------|---------------------------------------------------|
*
*SUB-AREA No. 5
*
DESIGN NASHYD           ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                        DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD           ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                        DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
*%-----------------|---------------------------------------------------|

****************************************************************
*        CALCULATION OF 3HR - 1:10 YEAR STORM EVENT            *
****************************************************************

START                   TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                      [  ] <--storm filename, one per line for NSTORM time
*%-----------------|---------------------------------------------------|
CHICAGO STORM           IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                        ICASEcs=[1],
                        A=[1174.184],  B=[6.014],  and C=[0.816],
*%-----------------|---------------------------------------------------|
DEFAULT VALUES          ICASEdef=[1],  read and print values
                        DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|---------------------------------------------------|

*************************************
*          ORGAWORLD FILE           *
*************************************
*
* SUB-AREA No.1

CALIB STANDHYD          ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                        XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                             LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD          ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                        XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                             LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD          ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                             LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD          ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                             LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                             LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD          ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                             LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|---------------------------------------------------|

ROUTE RESERVOIR         IDout=[10],   NHYD=["POND"],   IDin=[9],
                        RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [   0.000,  0.0000]
                                        [   0.008,  0.0656]
                                        [   0.017,  0.1311]
                                        [   0.093,  0.2831]
                                        [   0.233,  0.3971]
                                        [   0.337,  0.4731]
                                        [   0.465,  0.5491]
                                        [   0.531,  0.5871]
                                        [   0.593,  0.6251]
                                        [   0.654,  0.6631]
                                        [   0.797,  0.7391]
                                        [   0.950,  0.8274]
                                        [   1.304,  0.9157]
                                        [   1.880,  1.0040]
                                        [   2.577,  1.0923]
                                        [   -1   ,  -1    ]   (max twenty pts)

*******************************************************
*     Remaining Hawthorne Industrial Park            *
*******************************************************
*
* SUB-AREA No.1

CALIB STANDHYD          ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                             LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD          ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                             LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD          ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                             LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr) ,  END=-1
*%-----------------|---------------------------------------------------|
ADD HYD                 IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|---------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD           ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                        DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                        RAINFALL=[ ,  ,  ,  ,  ](mm/hr), END=-1
*%-----------------|---------------------------------------------------|


ADD HYD                 IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|---------------------------------------------------|

ROUTE RESERVOIR         IDout=[ 8 ],   NHYD=["HIP-POND"],  IDin=[ 7 ],
                        RDT=[1.0](min),
                                TABLE of ( OUTFLOW-STORAGE ) values
```

```
                                            (cms) - (ha-m)
                                          [   0.0  , 0.0     ]
                                          [   0.048, 0.0574 ]
                                          [   0.054, 0.2434 ]
                                          [   0.059, 0.5834 ]
                                          [   0.062, 0.8400 ]
                                          [   0.064, 1.1024 ]
                                          [   0.147, 1.3705 ]
                                          [   0.280, 1.6444 ]
                                          [   0.472, 1.9242 ]
                                          [   0.724, 2.2097 ]
                                          [   0.937, 2.5010 ]
                                          [   1.262, 2.7981 ]
                                          [   1.404, 3.1009 ]
                                          [   1.532, 3.4096 ]
                                          [   1.650, 3.7240 ]
                                          [   2.409, 4.0442 ]
                                          [   3.689, 4.3702 ]
                                          [   -1   ,  -1    ]  (max twenty pts)

*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 5
*
DESIGN NASHYD        ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                     DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD        ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                     DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
*%-----------------|-------------------------------------------------------------|

***************************************************************
*          CALCULATION OF 3HR - 1:25 YEAR STORM EVENT         *
***************************************************************

START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------------|
CHICAGO STORM        IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                     ICASEcs=[1],
                     A=[1402.884],  B=[6.018], and C=[0.819],
*%-----------------|-------------------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------------|

**********************************
*          ORGAWORLD FILE        *
**********************************
*
* SUB-AREA No.1

CALIB STANDHYD       ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                     XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                          LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD       ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                     XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                          LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD       ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                     XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                          LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD       ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                     XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                          LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD       ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                     XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                          LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------------|

ROUTE RESERVOIR      IDout=[10],   NHYD=["POND"],  IDin=[9],
                     RDT=[1.0](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                  [   0.000,  0.0000]
                                  [   0.008,  0.0656]
                                  [   0.017,  0.1311]
                                  [   0.093,  0.2831]
                                  [   0.233,  0.3971]
                                  [   0.337,  0.4731]
                                  [   0.465,  0.5491]
                                  [   0.531,  0.5871]
                                  [   0.593,  0.6251]
                                  [   0.654,  0.6631]
                                  [   0.797,  0.7391]
                                  [   0.950,  0.8274]
                                  [   1.304,  0.9157]
                                  [   1.880,  1.0040]
                                  [   2.577,  1.0923]
                                  [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park    *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD       ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                     XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                          LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD       ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                     XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                          LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD       ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                     XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                          LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD        ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                     DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|


ADD HYD              IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|-------------------------------------------------------------|

ROUTE RESERVOIR      IDout=[ 8 ],   NHYD=["HIP-POND"],  IDin=[ 7 ],
                     RDT=[1.0](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                  [   0.0  , 0.0     ]
                                  [   0.048, 0.0574 ]
                                  [   0.054, 0.2434 ]
                                  [   0.059, 0.5834 ]
                                  [   0.062, 0.8400 ]
                                  [   0.064, 1.1024 ]
                                  [   0.147, 1.3705 ]
                                  [   0.280, 1.6444 ]
                                  [   0.472, 1.9242 ]
                                  [   0.724, 2.2097 ]
                                  [   0.937, 2.5010 ]
                                  [   1.262, 2.7981 ]
                                  [   1.404, 3.1009 ]
                                  [   1.532, 3.4096 ]
                                  [   1.650, 3.7240 ]
                                  [   2.409, 4.0442 ]
                                  [   3.689, 4.3702 ]
                                  [   -1   ,  -1    ]  (max twenty pts)

*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 5
*
DESIGN NASHYD        ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                     DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD        ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                     DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
*%-----------------|-------------------------------------------------------------|

***************************************************************
*          CALCULATION OF 3HR - 1:50 YEAR STORM EVENT         *
***************************************************************

START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------------|
CHICAGO STORM        IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                     ICASEcs=[1],
                     A=[1569.580],  B=[6.014], and C=[0.820],
*%-----------------|-------------------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------------|

**********************************
*          ORGAWORLD FILE        *
**********************************
*
* SUB-AREA No.1

CALIB STANDHYD       ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                     XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                          LGI=[204.72](m), MNI=[0.03 ), SCI=[0.0]
```

```
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                         XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                              LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------------|
ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)
**********************************************
*      Remaining Hawthorne Industrial Park    *
**********************************************
*
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                              LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                              LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                              LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No.4
DESIGN NASHYD            ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                         DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|-------------------------------------------------------------|
ROUTE RESERVOIR          IDout=[ 8 ],   NHYD=["HIP-POND"],  IDin=[ 7 ],
                         RDT=[1.0](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.0  , 0.0    ]
                                       [   0.048, 0.0574 ]
                                       [   0.054, 0.2434 ]
                                       [   0.059, 0.5834 ]
                                       [   0.062, 0.8400 ]
                                       [   0.064, 1.1024 ]
                                       [   0.147, 1.3705 ]
                                       [   0.280, 1.6444 ]
                                       [   0.472, 1.9242 ]
                                       [   0.724, 2.2097 ]
                                       [   0.937, 2.5010 ]
                                       [   1.262, 2.7981 ]
                                       [   1.404, 3.1009 ]
                                       [   1.532, 3.4096 ]
                                       [   1.650, 3.7240 ]
                                       [   2.409, 4.0442 ]
                                       [   3.689, 4.3702 ]
                                       [   -1  ,  -1    ]  (max twenty pts)
*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 5
*
DESIGN NASHYD            ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD            ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
*%-----------------|-------------------------------------------------------------|
**************************************************************
*        CALCULATION OF 3HR - 1:100 YEAR STORM EVENT         *
**************************************************************
START                    TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                        [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------------|
CHICAGO STORM            IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                         ICASEcs=[1],
                         A=[1735.688],  B=[6.014], and C=[0.820],
*%-----------------|-------------------------------------------------------------|
DEFAULT VALUES           ICASEdef=[1],  read and print values
                         DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------------|
**********************************
*          ORGAWORLD FILE        *
**********************************
*
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                         XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                              LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                         XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                              LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------------|
ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
```

```
                                        [    0.093,  0.2831]
                                        [    0.233,  0.3971]
                                        [    0.337,  0.4731]
                                        [    0.465,  0.5491]
                                        [    0.531,  0.5871]
                                        [    0.593,  0.6251]
                                        [    0.654,  0.6631]
                                        [    0.797,  0.7391]
                                        [    0.950,  0.8274]
                                        [    1.304,  0.9157]
                                        [    1.880,  1.0040]
                                        [    2.577,  1.0923]
                                        [    -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park     *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD        ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                           LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD               IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD        ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                           LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD        ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[18.1](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                           LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD               IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-----------------------------------------------------------|
*
*SUB-AREA No.4

DESIGN NASHYD         ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                      DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-----------------------------------------------------------|


ADD HYD               IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
*%-----------------|-----------------------------------------------------------|

ROUTE RESERVOIR       IDout=[ 8 ],   NHYD=["HIP-POND"],  IDin=[ 7 ],
                      RDT=[1.0](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [    0.0  , 0.0     ]
                                     [    0.048, 0.0574 ]
                                     [    0.054, 0.2434 ]
                                     [    0.059, 0.5834 ]
                                     [    0.062, 0.8400 ]
                                     [    0.064, 1.1024 ]
                                     [    0.147, 1.3705 ]
                                     [    0.280, 1.6444 ]
                                     [    0.472, 1.9242 ]
                                     [    0.724, 2.2097 ]
                                     [    0.937, 2.5010 ]
                                     [    1.262, 2.7981 ]
                                     [    1.404, 3.1009 ]
                                     [    1.532, 3.4096 ]
                                     [    1.650, 3.7240 ]
                                     [    2.409, 4.0442 ]
                                     [    3.689, 4.3702 ]
                                     [    -1   , -1     ]  (max twenty pts)

*%-----------------|-----------------------------------------------------------|
*
*SUB-AREA No. 5
*
DESIGN NASHYD         ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.37]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-----------------------------------------------------------|
*
*SUB-AREA No. 6
*
DESIGN NASHYD         ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.804]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD               IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
*%-----------------|-----------------------------------------------------------|


FINISH
```

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9 9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9 9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999  9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9     9 =========
                                                      9   9 9   9 # 4418403
      StormWater Management HYdrologic Model           999   999  =========

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

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: J. L. Richards & Associates Limited         +++++++
 +++++++                 Ottawa                 SERIAL#:4418403     +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


 *******************   D E T A I L E D   O U T P U T   *******************
 ***************************************************************************
 *      DATE: 2009-05-15      TIME: 08:57:02     RUN COUNTER: 000199       *
 ***************************************************************************
 * Input   filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\SWM-INT.dat          *
 * Output  filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\SWM-INT.out          *
 * Summary filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\SWM-INT.sum          *
 * User comments:                                                          *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ***************************************************************************

-----------------------------------------------------------------------------
001:0001---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name : Hawthorne Industrial Park        Project Number:    [20983] *
*#  Date         : January, 2009                                           *
*#  Revised      : N/A                                                      *
*#  Developed by : Mark Buchanan, E.I.T.                                    *
*#  Reviewed by  : Guy Forget, P.Eng.                                       *
*#  Company      : J.L. Richards & Associates Limited                       *
*#  License #    : 4418403                                                  *
*#****************************************************************************
*
*
*#****************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT              *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE    *
*#****************************************************************
*
*****************************************************************************
*          SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE         *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS   *
*****************************************************************************
*****************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*****************************************************
*************************************************************
*       POST-DEVELOPMENT UNCONTROLLED CONDITIONS             *
*************************************************************
*************************************************************
*          CALCULATION OF 4 HR 25 MM STORM EVENT             *
*************************************************************
-------------------
| START             |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
-------------------   Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=    0
-----------------------------------------------------------------------------
001:0002---------------------------------------------------------------------
-------------------
| READ STORM        |    Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\4HR25-
| Ptotal=  25.00 mm|    Comments: 4hr-15 min 25 MM STORM EVENT (CHICAGO DI
-------------------
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .25   1.777 |  1.25  45.631 |  2.25   3.138 |  3.25   1.675
                  .50   2.357 |  1.50  11.911 |  2.50   2.555 |  3.50   1.509
                  .75   3.618 |  1.75   6.051 |  2.75   2.165 |  3.75   1.376
                 1.00   8.975 |  2.00   4.108 |  3.00   1.885 |  4.00   1.266

-----------------------------------------------------------------------------
001:0003---------------------------------------------------------------------
---------------------
| DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
---------------------  ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
-----------------------------------------------------------------------------
001:0004---------------------------------------------------------------------
**********************************
*        ORGAWORLD FILE          *
**********************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD      |   Area    (ha)=    2.07
| 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.74          .33
     Dep. Storage      (mm)=        1.57         4.67
     Average Slope      (%)=         .52         1.00
     Length             (m)=      204.72        20.00
     Mannings n           =         .030         .250

     Max.eff.Inten.(mm/hr)=        45.63         5.37
                over (min)         10.00        30.00
     Storage Coeff.  (min)=        10.80 (ii)   29.27 (ii)
     Unit Hyd. Tpeak (min)=        10.00        30.00
     Unit Hyd. peak  (cms)=          .11          .04
                                                           *TOTALS*
     PEAK FLOW        (cms)=          .16          .00         .158 (iii)
     TIME TO PEAK     (hrs)=         1.29         1.75        1.292
     RUNOFF VOLUME     (mm)=        23.43         5.17       20.508
     TOTAL RAINFALL    (mm)=        25.00        25.00       24.999
     RUNOFF COEFFICIENT   =           .94          .21         .820

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0005---------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD      |   Area    (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.42          .12
     Dep. Storage      (mm)=        1.57         4.67
     Average Slope      (%)=         .50         1.00
     Length             (m)=      244.34         5.00
     Mannings n           =         .030         .030

     Max.eff.Inten.(mm/hr)=        45.63         7.24
                over (min)         12.50        15.00
     Storage Coeff.  (min)=        12.15 (ii)   14.15 (ii)
     Unit Hyd. Tpeak (min)=        12.50        15.00
     Unit Hyd. peak  (cms)=          .09          .08
                                                           *TOTALS*
     PEAK FLOW        (cms)=          .12          .00         .121 (iii)
     TIME TO PEAK     (hrs)=         1.33         1.46        1.333
     RUNOFF VOLUME     (mm)=        23.43         5.17       21.969
     TOTAL RAINFALL    (mm)=        25.00        25.00       24.999
     RUNOFF COEFFICIENT   =           .94          .21         .879

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0006---------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD      |   Area    (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.36          .04
     Dep. Storage      (mm)=        1.57         4.67
     Average Slope      (%)=         .51         1.00
     Length             (m)=      225.63         5.00
     Mannings n           =         .030         .030

     Max.eff.Inten.(mm/hr)=        45.63         7.97
                over (min)         12.50        12.50
     Storage Coeff.  (min)=        11.52 (ii)   13.44 (ii)
     Unit Hyd. Tpeak (min)=        12.50        12.50
     Unit Hyd. peak  (cms)=          .10          .09
                                                           *TOTALS*
     PEAK FLOW        (cms)=          .12          .00         .118 (iii)
     TIME TO PEAK     (hrs)=         1.33         1.42        1.333
     RUNOFF VOLUME     (mm)=        23.43         5.17       22.881
     TOTAL RAINFALL    (mm)=        25.00        25.00       24.999
     RUNOFF COEFFICIENT   =           .94          .21         .915

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0007---------------------------------------------------------------------
-------------------
| ADD HYD (040    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
-------------------                  (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 01:010        2.07      .158     1.29  20.51    .000
                  +ID2 02:020        1.54      .121     1.33  21.97    .000
                   ==================================================
                   SUM 04:040        3.61      .278     1.33  21.13    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0008---------------------------------------------------------------------
-------------------
| ADD HYD (050    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
-------------------                  (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 03:030        1.40      .118     1.33  22.88    .000
                  +ID2 04:040        3.61      .278     1.33  21.13    .000
                   ==================================================
                   SUM 05:050        5.01      .396     1.33  21.62    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0009---------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD      |   Area    (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .86          .03
     Dep. Storage      (mm)=        1.57         4.67
     Average Slope      (%)=         .93          .70
     Length             (m)=      164.82        40.00
     Mannings n           =         .030         .250

     Max.eff.Inten.(mm/hr)=        45.63         4.42
                over (min)          7.50        42.50
     Storage Coeff.  (min)=         7.97 (ii)   41.62 (ii)
     Unit Hyd. Tpeak (min)=         7.50        42.50
     Unit Hyd. peak  (cms)=          .14          .03
                                                           *TOTALS*
     PEAK FLOW        (cms)=          .09          .00         .089 (iii)
     TIME TO PEAK     (hrs)=         1.25         2.00        1.250
     RUNOFF VOLUME     (mm)=        23.43         5.17       22.882
     TOTAL RAINFALL    (mm)=        25.00        25.00       24.999
     RUNOFF COEFFICIENT   =           .94          .21         .915

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0010---------------------------------------------------------------------
*
* SUB-AREA No.5
----------------------
| CALIB STANDHYD      |   Area     (ha)=    2.66
| 07:070     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.58          .08
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .61         1.50
     Length             (m)=     207.25        20.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=       45.63         5.66
                over (min)        10.00        27.50
     Storage Coeff.   (min)=      10.37 (ii)   26.38 (ii)
     Unit Hyd. Tpeak (min)=       10.00        27.50
     Unit Hyd. peak   (cms)=        .11          .04
                                                             *TOTALS*
     PEAK FLOW        (cms)=        .24          .00            .238 (iii)
     TIME TO PEAK     (hrs)=       1.29         1.67           1.292
     RUNOFF VOLUME     (mm)=      23.43         5.17          22.882
     TOTAL RAINFALL    (mm)=      25.00        25.00          24.999
     RUNOFF COEFFICIENT    =        .94          .21            .915
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0011---------------------------------------------------------------------
--------------------
| ADD HYD (080    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                     ID1 06:060      .89       .089     1.25  22.88     .000
                    +ID2 07:070     2.66       .238     1.29  22.88     .000
                     ========================================================
                     SUM 08:080     3.55       .327     1.29  22.88     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
001:0012---------------------------------------------------------------------
--------------------
| ADD HYD (090    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                     ID1 05:050     5.01       .396     1.33  21.62     .000
                    +ID2 08:080     3.55       .327     1.29  22.88     .000
                     ========================================================
                     SUM 09:090     8.56       .716     1.29  22.14     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
001:0013---------------------------------------------------------------------
----------------------
| ROUTE RESERVOIR     |    Requested routing time step =  1.0 min.
|  IN>09:(090    )    |
| OUT<10:(POND   )    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)     (ha.m.)
                             .000  .0000E+00    |      .593  .6251E+00
                             .008  .6560E-01    |      .654  .6631E+00
                             .017  .1311E+00    |      .797  .7391E+00
                             .093  .2831E+00    |      .950  .8274E+00
                             .233  .3971E+00    |     1.304  .9157E+00
                             .337  .4731E+00    |     1.880  .1004E+01
                             .465  .5491E+00    |     2.577  .1092E+01
                             .531  .5871E+00    |      .000  .0000E+00
     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     -------------------          (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (090    )        8.56       .716      1.292      22.143
     OUTFLOW<10: (POND   )        8.56       .032      3.875      22.141
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.470
                    TIME SHIFT OF PEAK FLOW          (min)=  155.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1611E+00
-----------------------------------------------------------------------------
001:0014---------------------------------------------------------------------
**********************************************
*     Remaining Hawthorne Industrial Park     *
**********************************************
*
* SUB-AREA No.1
----------------------
| CALIB STANDHYD      |   Area     (ha)=   19.90
| 01:HIP01  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      14.13         5.77
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .60         1.50
     Length             (m)=     580.00       100.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=       34.39        11.90
                over (min)        22.50        52.50
     Storage Coeff.   (min)=      21.64 (ii)   52.88 (ii)
     Unit Hyd. Tpeak (min)=       22.50        52.50
     Unit Hyd. peak   (cms)=        .05          .02
                                                             *TOTALS*
     PEAK FLOW        (cms)=        .60          .11            .642 (iii)
     TIME TO PEAK     (hrs)=       1.50         2.13           1.542
     RUNOFF VOLUME     (mm)=      23.43         8.74          16.085
     TOTAL RAINFALL    (mm)=      25.00        25.00          24.999
     RUNOFF COEFFICIENT    =        .94          .35            .643
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0015---------------------------------------------------------------------
--------------------
| ADD HYD (HIP02 ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------               (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 10:POND     8.56       .032     3.88  22.14     .000
                   +ID2 01:HIP01   19.90       .642     1.54  16.08     .000
                    ========================================================
                    SUM 02:HIP02   28.46       .655     1.54  17.91     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
001:0016---------------------------------------------------------------------
*
* SUB-AREA No.2
----------------------
| CALIB STANDHYD      |   Area     (ha)=   17.00
| 03:HIP03  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      12.07         4.93
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .65         1.50
     Length             (m)=     450.00       100.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=       40.81        12.73
                over (min)        17.50        47.50
     Storage Coeff.   (min)=      16.94 (ii)   47.35 (ii)
     Unit Hyd. Tpeak (min)=       17.50        47.50
     Unit Hyd. peak   (cms)=        .07          .02
                                                             *TOTALS*
     PEAK FLOW        (cms)=        .60          .10            .625 (iii)
     TIME TO PEAK     (hrs)=       1.42         2.00           1.458
     RUNOFF VOLUME     (mm)=      23.43         8.74          16.085
     TOTAL RAINFALL    (mm)=      25.00        25.00          24.999
     RUNOFF COEFFICIENT    =        .94          .35            .643
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0017---------------------------------------------------------------------
*
* SUB-AREA No.3
----------------------
| CALIB STANDHYD      |   Area     (ha)=   18.10
| 04:HIP04  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      12.85         5.25
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .50         1.50
     Length             (m)=     600.00       100.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=       34.39        11.54
                over (min)        22.50        55.00
     Storage Coeff.   (min)=      23.33 (ii)   54.95 (ii)
     Unit Hyd. Tpeak (min)=       22.50        55.00
     Unit Hyd. peak   (cms)=        .05          .02
                                                             *TOTALS*
     PEAK FLOW        (cms)=        .53          .09            .562 (iii)
     TIME TO PEAK     (hrs)=       1.50         2.17           1.542
     RUNOFF VOLUME     (mm)=      23.43         8.74          16.085
     TOTAL RAINFALL    (mm)=      25.00        25.00          24.999
     RUNOFF COEFFICIENT    =        .94          .35            .643
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0018---------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------               (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 03:HIP03   17.00       .625     1.46  16.08     .000
                   +ID2 04:HIP04   18.10       .562     1.54  16.08     .000
                    ========================================================
                    SUM 05:HIP05   35.10      1.166     1.46  16.08     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
001:0019---------------------------------------------------------------------
*
*SUB-AREA No.4
----------------------
| DESIGN NASHYD       |   Area     (ha)=    4.00   Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50  |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=    .170
     Unit Hyd Qpeak   (cms)=      .899
     PEAK FLOW        (cms)=      .077 (i)
     TIME TO PEAK     (hrs)=     1.375
     RUNOFF VOLUME     (mm)=     6.343
     TOTAL RAINFALL    (mm)=    24.999
     RUNOFF COEFFICIENT    =      .254
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0020---------------------------------------------------------------------
--------------------
| ADD HYD (HIP06 ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------               (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 02:HIP02   28.46       .655     1.54  17.91     .000
                   +ID2 05:HIP05   35.10      1.166     1.46  16.08     .000
                   +ID3 06:Pond-B   4.00       .077     1.38   6.34     .000
                    ========================================================
                    SUM 07:HIP06   67.56      1.887     1.50  16.28     .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
001:0021---------------------------------------------------------------------
----------------------
| ROUTE RESERVOIR     |    Requested routing time step =  1.0 min.
|  IN>07:(HIP06 )     |
| OUT<08:(HIP-PO)     |    =========  OUTLFOW STORAGE TABLE  =========
----------------------     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)     (ha.m.)
                             .000  .0000E+00    |      .724  .2210E+01
                             .048  .5740E-01    |      .937  .2501E+01
                             .054  .2434E+00    |     1.262  .2798E+01
                             .059  .5834E+00    |     1.404  .3101E+01
                             .062  .8400E+00    |     1.532  .3410E+01
                             .064  .1102E+01    |     1.650  .3724E+01
                             .147  .1370E+01    |     2.409  .4044E+01
                             .280  .1644E+01    |     3.689  .4370E+01
                             .472  .1924E+01    |      .000  .0000E+00
     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     -------------------          (ha)      (cms)      (hrs)        (mm)
     INFLOW >07: (HIP06 )        67.56      1.887      1.500      16.275
     OUTFLOW<08: (HIP-PO)        67.56       .062      5.417      16.275
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.289
```

```
                    TIME SHIFT OF PEAK FLOW          (min)=   235.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=.8484E+00
--------------------------------------------------------------------------------
001:0022------------------------------------------------------------------------
*
*SUB-AREA No. 5
*
---------------------
| DESIGN NASHYD      |   Area     (ha)=     6.80   Curve Number   (CN)=76.00
| 09:A2     DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=      .370

      Unit Hyd Qpeak  (cms)=      .702

      PEAK FLOW       (cms)=      .053 (i)
      TIME TO PEAK    (hrs)=     1.708
      RUNOFF VOLUME    (mm)=     4.111
      TOTAL RAINFALL   (mm)=    24.999
      RUNOFF COEFFICIENT   =      .164

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
--------------------------------------------------------------------------------
001:0023------------------------------------------------------------------------
*
*SUB-AREA No. 6
*
---------------------
| DESIGN NASHYD      |   Area     (ha)=     5.30   Curve Number   (CN)=76.00
| 10:A3     DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=      .804

      Unit Hyd Qpeak  (cms)=      .252

      PEAK FLOW       (cms)=      .025 (i)
      TIME TO PEAK    (hrs)=     2.333
      RUNOFF VOLUME    (mm)=     4.110
      TOTAL RAINFALL   (mm)=    24.999
      RUNOFF COEFFICIENT   =      .164

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
--------------------------------------------------------------------------------
001:0024------------------------------------------------------------------------
--------------------
| ADD HYD (Interi) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
               ID1 08:HIP-PO       67.56     .062     5.42  16.28    .000
              +ID2 09:A2            6.80     .053     1.71   4.11    .000
              +ID3 10:A3            5.30     .025     2.33   4.11    .000
                  ==================================================
               SUM 01:Interi       79.66     .127     1.83  14.43    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
001:0025------------------------------------------------------------------------
******************************************************************
*      CALCULATION OF 3HR - 1:2 YEAR STORM EVENT                *
******************************************************************
--------------------
| START              |   Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------     Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
   TZERO =    .00 hrs on        0
   METOUT=    2 (output = METRIC)
   NRUN  = 001
   NSTORM=    0
--------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
--------------------
| CHICAGO STORM      |     IDF curve parameters: A= 732.951
| Ptotal= 31.86 mm  |                           B=   6.199
--------------------                            C=    .810
                          used in:    INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33

           TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
            hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
            .17   2.815 |   1.00  76.805 |   1.83   5.095 |   2.67   2.684
            .33   3.498 |   1.17  24.079 |   2.00   4.291 |   2.83   2.463
            .50   4.687 |   1.33  12.364 |   2.17   3.718 |   3.00   2.279
            .67   7.305 |   1.50   8.324 |   2.33   3.288 |
            .83  18.209 |   1.67   6.303 |   2.50   2.953 |
--------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
---------------------
| DEFAULT VALUES      |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
---------------------     ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=   .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
--------------------------------------------------------------------------------
001:0004------------------------------------------------------------------------
**********************************
*        ORGAWORLD FILE          *
**********************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |   Area    (ha)=     2.07
| 01:010    DT= 2.50 |   Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
---------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       1.74          .33
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .52         1.00
     Length             (m)=     204.72        20.00
     Mannings n            =       .030         .250

     Max.eff.Inten.(mm/hr)=       76.81        11.88
               over (min)         10.00        22.50
     Storage Coeff.  (min)=        8.77 (ii)   22.21 (ii)
     Unit Hyd. Tpeak (min)=       10.00        22.50
     Unit Hyd. peak  (cms)=         .12          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .24          .01         .245 (iii)
     TIME TO PEAK    (hrs)=        1.08         1.38        1.083
     RUNOFF VOLUME    (mm)=       30.29         8.52       26.807
     TOTAL RAINFALL   (mm)=       31.86        31.86       31.860
     RUNOFF COEFFICIENT   =         .95          .27         .841

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
--------------------------------------------------------------------------------
001:0005------------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area    (ha)=     1.54
| 02:020    DT= 2.50 |   Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
---------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       1.42          .12
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .50         1.00
     Length             (m)=     244.34         5.00
     Mannings n            =       .030         .030

     Max.eff.Inten.(mm/hr)=       76.81        15.07
               over (min)         10.00        12.50
     Storage Coeff.  (min)=        9.87 (ii)   11.36 (ii)
     Unit Hyd. Tpeak (min)=       10.00        12.50
     Unit Hyd. peak  (cms)=         .11          .10
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .19          .00         .192 (iii)
     TIME TO PEAK    (hrs)=        1.08         1.17        1.083
     RUNOFF VOLUME    (mm)=       30.29         8.52       28.548
     TOTAL RAINFALL   (mm)=       31.86        31.86       31.860
     RUNOFF COEFFICIENT   =         .95          .27         .896

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
--------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |   Area    (ha)=     1.40
| 03:030    DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
---------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       1.36          .04
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .51         1.00
     Length             (m)=     225.63         5.00
     Mannings n            =       .030         .030

     Max.eff.Inten.(mm/hr)=       76.81        16.59
               over (min)         10.00        10.00
     Storage Coeff.  (min)=        9.35 (ii)   10.79 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .12          .11
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .18          .00         .186 (iii)
     TIME TO PEAK    (hrs)=        1.08         1.13        1.083
     RUNOFF VOLUME    (mm)=       30.29         8.52       29.637
     TOTAL RAINFALL   (mm)=       31.86        31.86       31.860
     RUNOFF COEFFICIENT   =         .95          .27         .930

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
--------------------------------------------------------------------------------
001:0007------------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
               ID1 01:010           2.07      .245     1.08  26.81    .000
              +ID2 02:020           1.54      .192     1.08  28.55    .000
                  ==================================================
               SUM 04:040           3.61      .436     1.08  27.55    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
               ID1 03:030           1.40      .186     1.08  29.64    .000
              +ID2 04:040           3.61      .436     1.08  27.55    .000
                  ==================================================
               SUM 05:050           5.01      .623     1.08  28.13    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD     |   Area    (ha)=      .89
| 06:060    DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
---------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        .86          .03
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .93          .70
     Length             (m)=     164.82        40.00
     Mannings n            =       .030         .250

     Max.eff.Inten.(mm/hr)=       76.81        10.24
               over (min)          7.50        30.00
     Storage Coeff.  (min)=        6.47 (ii)   30.53 (ii)
     Unit Hyd. Tpeak (min)=        7.50        30.00
     Unit Hyd. peak  (cms)=         .16          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .14          .00         .139 (iii)
     TIME TO PEAK    (hrs)=        1.04         1.54        1.042
     RUNOFF VOLUME    (mm)=       30.29         8.52       29.637
     TOTAL RAINFALL   (mm)=       31.86        31.86       31.860
     RUNOFF COEFFICIENT   =         .95          .27         .930

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*
* SUB-AREA No.5
---------------------
| CALIB STANDHYD     |   Area    (ha)=     2.66
| 07:070    DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
---------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.58          .08
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .61         1.50
     Length            (m)=    207.25        20.00
     Mannings n           =      .030         .250

     Max.eff.Inten.(mm/hr)=     76.81        12.71
               over (min)        7.50        20.00
     Storage Coeff.  (min)=      8.42 (ii)   20.00 (ii)
     Unit Hyd. Tpeak (min)=      7.50        20.00
     Unit Hyd. peak  (cms)=       .14          .06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .38          .00        .379 (iii)
     TIME TO PEAK    (hrs)=      1.04         1.33       1.042
     RUNOFF VOLUME    (mm)=     30.29         8.52      29.637
     TOTAL RAINFALL   (mm)=     31.86        31.86      31.860
     RUNOFF COEFFICIENT   =       .95          .27        .930

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0011------------------------------------------------------------------
--------------------
| ADD HYD (080  ) | ID: NHYD     AREA    QPEAK   TPEAK   R.V.    DWF
--------------------             (ha)    (cms)   (hrs)   (mm)   (cms)
               ID1 06:060         .89     .139    1.04  29.64    .000
              +ID2 07:070        2.66     .379    1.04  29.64    .000
               ==================================================
               SUM 08:080        3.55     .518    1.04  29.64    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0012------------------------------------------------------------------
--------------------
| ADD HYD (090  ) | ID: NHYD     AREA    QPEAK   TPEAK   R.V.    DWF
--------------------             (ha)    (cms)   (hrs)   (mm)   (cms)
               ID1 05:050        5.01     .623    1.08  28.13    .000
              +ID2 08:080        3.55     .518    1.04  29.64    .000
               ==================================================
               SUM 09:090        8.56    1.118    1.08  28.76    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0013------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>09:(090   )   |
| OUT<10:(POND  )   |    ========= OUTLFOW STORAGE TABLE =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .000  .0000E+00    |     .593  .6251E+00
                           .008  .6560E-01    |     .654  .6631E+00
                           .017  .1311E+00    |     .797  .7391E+00
                           .093  .2831E+00    |     .950  .8274E+00
                           .233  .3971E+00    |    1.304  .9157E+00
                           .337  .4731E+00    |    1.880  .1004E+01
                           .465  .5491E+00    |    2.577  .1092E+01
                           .531  .5871E+00    |     .000  .0000E+00

     ROUTING RESULTS           AREA     QPEAK     TPEAK         R.V.
     ------------------        (ha)     (cms)     (hrs)         (mm)
     INFLOW >09: (090   )      8.56     1.118     1.083       28.757
     OUTFLOW<10: (POND  )      8.56      .056     3.000       28.754

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     5.030
                    TIME SHIFT OF PEAK FLOW        (min)=   115.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2095E+00

---------------------------------------------------------------------------
001:0014------------------------------------------------------------------
***********************************************************
*       Remaining Hawthorne Industrial Park               *
***********************************************************
*
* SUB-AREA No.1
--------------------
| CALIB STANDHYD    |    Area     (ha)=    19.90
| 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     14.13         5.77
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .60         1.50
     Length            (m)=    580.00       100.00
     Mannings n           =      .030         .250

     Max.eff.Inten.(mm/hr)=     54.21        23.06
               over (min)       17.50        42.50
     Storage Coeff.  (min)=     18.04 (ii)   42.02 (ii)
     Unit Hyd. Tpeak (min)=     17.50        42.50
     Unit Hyd. peak  (cms)=       .06          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .95          .21       1.020 (iii)
     TIME TO PEAK    (hrs)=      1.21         1.71       1.250
     RUNOFF VOLUME    (mm)=     30.29        13.34      21.814
     TOTAL RAINFALL   (mm)=     31.86        31.86      31.860
     RUNOFF COEFFICIENT   =       .95          .42        .685

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0015------------------------------------------------------------------
--------------------
| ADD HYD (HIP02 ) | ID: NHYD     AREA    QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)    (cms)   (hrs)   (mm)   (cms)
               ID1 10:POND        8.56     .056    3.00  28.75    .000
              +ID2 01:HIP01      19.90    1.020    1.25  21.81    .000
               ==================================================
               SUM 02:HIP02      28.46    1.039    1.25  23.90    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0016------------------------------------------------------------------
*
* SUB-AREA No.2
--------------------
| CALIB STANDHYD    |    Area     (ha)=    17.00
| 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     12.07         4.93
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .65         1.50
     Length            (m)=    450.00       100.00
     Mannings n           =      .030         .250

     Max.eff.Inten.(mm/hr)=     59.23        25.04
               over (min)       15.00        37.50
     Storage Coeff.  (min)=     14.60 (ii)   37.80 (ii)
     Unit Hyd. Tpeak (min)=     15.00        37.50
     Unit Hyd. peak  (cms)=       .08          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .91          .19        .978 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.63       1.167
     RUNOFF VOLUME    (mm)=     30.29        13.34      21.814
     TOTAL RAINFALL   (mm)=     31.86        31.86      31.860
     RUNOFF COEFFICIENT   =       .95          .42        .685

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0017------------------------------------------------------------------
*
* SUB-AREA No.3
--------------------
| CALIB STANDHYD    |    Area     (ha)=    18.10
| 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     12.85         5.25
     Dep. Storage     (mm)=      1.57         4.67
     Average Slope     (%)=       .50         1.50
     Length            (m)=    600.00       100.00
     Mannings n           =      .030         .250

     Max.eff.Inten.(mm/hr)=     50.44        22.17
               over (min)       20.00        45.00
     Storage Coeff.  (min)=     20.01 (ii)   44.37 (ii)
     Unit Hyd. Tpeak (min)=     20.00        45.00
     Unit Hyd. peak  (cms)=       .06          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .80          .18        .874 (iii)
     TIME TO PEAK    (hrs)=      1.25         1.79       1.292
     RUNOFF VOLUME    (mm)=     30.29        13.34      21.814
     TOTAL RAINFALL   (mm)=     31.86        31.86      31.860
     RUNOFF COEFFICIENT   =       .95          .42        .685

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0018------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD     AREA    QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)    (cms)   (hrs)   (mm)   (cms)
               ID1 03:HIP03      17.00     .978    1.17  21.81    .000
              +ID2 04:HIP04      18.10     .874    1.29  21.81    .000
               ==================================================
               SUM 05:HIP05      35.10    1.814    1.21  21.81    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0019------------------------------------------------------------------
*
*SUB-AREA No.4
--------------------
| DESIGN NASHYD     |    Area     (ha)=     4.00   Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .170

     Unit Hyd Qpeak  (cms)=      .899

     PEAK FLOW       (cms)=      .145 (i)
     TIME TO PEAK    (hrs)=     1.167
     RUNOFF VOLUME    (mm)=    10.266
     TOTAL RAINFALL   (mm)=    31.860
     RUNOFF COEFFICIENT   =      .322

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

---------------------------------------------------------------------------
001:0020------------------------------------------------------------------
--------------------
| ADD HYD (HIP06 ) | ID: NHYD     AREA    QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)    (cms)   (hrs)   (mm)   (cms)
               ID1 02:HIP02      28.46    1.039    1.25  23.90    .000
              +ID2 05:HIP05      35.10    1.814    1.21  21.81    .000
              +ID3 06:Pond-B      4.00     .145    1.17  10.27    .000
               ==================================================
               SUM 07:HIP06      67.56    2.992    1.21  22.01    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0021------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>07:(HIP06 )   |
| OUT<08:(HIP-PO)   |    ========= OUTFLOW STORAGE TABLE =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .000  .0000E+00    |     .724  .2210E+01
                           .048  .5740E-01    |     .937  .2501E+01
                           .054  .2434E+00    |    1.262  .2798E+01
                           .059  .5834E+00    |    1.404  .3101E+01
                           .062  .8400E+00    |    1.532  .3410E+01
                           .064  .1102E+01    |    1.650  .3724E+01
                           .147  .1370E+01    |    2.409  .4044E+01
                           .280  .1644E+01    |    3.689  .4370E+01
                           .472  .1924E+01    |     .000  .0000E+00

     ROUTING RESULTS           AREA     QPEAK     TPEAK         R.V.
     ------------------        (ha)     (cms)     (hrs)         (mm)
     INFLOW >07: (HIP06 )     67.56     2.992     1.208       22.009
     OUTFLOW<08: (HIP-PO)     67.56      .093     4.444       22.009

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     3.122
                    TIME SHIFT OF PEAK FLOW        (min)=   194.17
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1197E+01

---------------------------------------------------------------------------
001:0022------------------------------------------------------------------
*
*SUB-AREA No. 5
--------------------
| DESIGN NASHYD     |    Area     (ha)=     6.80   Curve Number   (CN)=76.00
| 09:A2     DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .370
```

```
     Unit Hyd Qpeak  (cms)=     .702

     PEAK FLOW       (cms)=     .102 (i)
     TIME TO PEAK    (hrs)=    1.458
     RUNOFF VOLUME    (mm)=    6.883
     TOTAL RAINFALL   (mm)=   31.860
     RUNOFF COEFFICIENT   =     .216

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

 ------------------------------------------------------------------------------
 001:0023----------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 *
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=    5.30   Curve Number    (CN)=76.00
 | 10:A3      DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=     .804

     Unit Hyd Qpeak  (cms)=     .252

     PEAK FLOW       (cms)=     .048 (i)
     TIME TO PEAK    (hrs)=    2.083
     RUNOFF VOLUME    (mm)=    6.883
     TOTAL RAINFALL   (mm)=   31.860
     RUNOFF COEFFICIENT   =     .216

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

 ------------------------------------------------------------------------------
 001:0024----------------------------------------------------------------------
 -------------------
 | ADD HYD (Interi) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
 -------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 08:HIP-PO    67.56     .093    4.44  22.01    .000
                +ID2 09:A2         6.80     .102    1.46   6.88    .000
                +ID3 10:A3         5.30     .048    2.08   6.88    .000
                 ==================================================
                 SUM 01:Interi    79.66     .194    1.58  19.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0025----------------------------------------------------------------------
 *****************************************************************
 *        CALCULATION OF 3HR - 1:5 YEAR STORM EVENT              *
 *****************************************************************
 -------------------
 | START              |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
 -------------------    Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
 ------------------------------------------------------------------------------
 001:0002----------------------------------------------------------------------
 -------------------
 | CHICAGO STORM     |     IDF curve parameters: A= 998.071
 | Ptotal= 42.51 mm |                            B=   6.053
 -------------------                             C=    .814
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33

              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   3.682 |   1.00 104.193 |   1.83   6.689 |   2.67   3.510
               .33   4.582 |   1.17  32.037 |   2.00   5.628 |   2.83   3.220
               .50   6.151 |   1.33  16.337 |   2.17   4.872 |   3.00   2.978
               .67   9.614 |   1.50  10.965 |   2.33   4.305 |
               .83  24.170 |   1.67   8.287 |   2.50   3.864 |

 ------------------------------------------------------------------------------
 001:0003----------------------------------------------------------------------
 ---------------------
 | DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
 ---------------------   ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 ------------------------------------------------------------------------------
 001:0004----------------------------------------------------------------------
 **********************************
 *          ORGAWORLD FILE        *
 **********************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    2.07
 | 01:010     DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.74          .33
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .52         1.00
     Length             (m)=       204.72        20.00
     Mannings n            =         .030         .250

     Max.eff.Inten.(mm/hr)=        104.19        24.26
                over (min)          7.50        17.50
     Storage Coeff.  (min)=         7.76 (ii)   17.86 (ii)
     Unit Hyd. Tpeak (min)=         7.50        17.50
     Unit Hyd. peak  (cms)=          .15          .06
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .36          .01           .362 (iii)
     TIME TO PEAK    (hrs)=         1.04         1.25          1.042
     RUNOFF VOLUME    (mm)=        40.94        14.70         36.745
     TOTAL RAINFALL   (mm)=        42.51        42.51         42.514
     RUNOFF COEFFICIENT   =          .96          .35           .864

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0005----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    1.54
 | 02:020     DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.42          .12
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .50         1.00
     Length             (m)=       244.34         5.00
     Mannings n            =         .030         .030

     Max.eff.Inten.(mm/hr)=        104.19        31.02
                over (min)          7.50        10.00
     Storage Coeff.  (min)=         8.73 (ii)    9.85 (ii)
     Unit Hyd. Tpeak (min)=         7.50        10.00
     Unit Hyd. peak  (cms)=          .14          .11
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .28          .01           .283 (iii)
     TIME TO PEAK    (hrs)=         1.04         1.13          1.042
     RUNOFF VOLUME    (mm)=        40.94        14.70         38.845
     TOTAL RAINFALL   (mm)=        42.51        42.51         42.514
     RUNOFF COEFFICIENT   =          .96          .35           .914

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0006----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    1.40
 | 03:030     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.36          .04
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .51         1.00
     Length             (m)=       225.63         5.00
     Mannings n            =         .030         .030

     Max.eff.Inten.(mm/hr)=        104.19        31.02
                over (min)          7.50        10.00
     Storage Coeff.  (min)=         8.28 (ii)    9.39 (ii)
     Unit Hyd. Tpeak (min)=         7.50        10.00
     Unit Hyd. peak  (cms)=          .14          .12
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .27          .00           .274 (iii)
     TIME TO PEAK    (hrs)=         1.04         1.13          1.042
     RUNOFF VOLUME    (mm)=        40.94        14.70         40.157
     TOTAL RAINFALL   (mm)=        42.51        42.51         42.514
     RUNOFF COEFFICIENT   =          .96          .35           .945

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0007----------------------------------------------------------------------
 -------------------
 | ADD HYD (040   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
 -------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 01:010        2.07     .362    1.04  36.75    .000
                +ID2 02:020        1.54     .283    1.04  38.84    .000
                 ==================================================
                 SUM 04:040        3.61     .645    1.04  37.64    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0008----------------------------------------------------------------------
 -------------------
 | ADD HYD (050   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
 -------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 03:030        1.40     .274    1.04  40.16    .000
                +ID2 04:040        3.61     .645    1.04  37.64    .000
                 ==================================================
                 SUM 05:050        5.01     .918    1.04  38.34    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0009----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=     .89
 | 06:060     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=          .86          .03
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .93          .70
     Length             (m)=       164.82        40.00
     Mannings n            =         .030         .250

     Max.eff.Inten.(mm/hr)=        104.19        20.32
                over (min)          5.00        25.00
     Storage Coeff.  (min)=         5.72 (ii)   24.02 (ii)
     Unit Hyd. Tpeak (min)=         5.00        25.00
     Unit Hyd. peak  (cms)=          .20          .05
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .20          .00           .205 (iii)
     TIME TO PEAK    (hrs)=         1.00         1.38          1.000
     RUNOFF VOLUME    (mm)=        40.94        14.70         40.157
     TOTAL RAINFALL   (mm)=        42.51        42.51         42.514
     RUNOFF COEFFICIENT   =          .96          .35           .945

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0010----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    2.66
 | 07:070     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         2.58          .08
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .61         1.50
     Length             (m)=       207.25        20.00
     Mannings n            =         .030         .250

     Max.eff.Inten.(mm/hr)=        104.19        24.26
                over (min)          7.50        17.50
     Storage Coeff.  (min)=         7.45 (ii)   16.40 (ii)
     Unit Hyd. Tpeak (min)=         7.50        17.50
     Unit Hyd. peak  (cms)=          .15          .07
                                                              *TOTALS*
```

```
      PEAK FLOW          (cms)=        .54            .00           .538 (iii)
      TIME TO PEAK       (hrs)=       1.04           1.25          1.042
      RUNOFF VOLUME       (mm)=      40.94          14.70         40.157
      TOTAL RAINFALL      (mm)=      42.51          42.51         42.514
      RUNOFF COEFFICIENT    =         .96            .35           .945

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0011---------------------------------------------------------------------
 --------------------
 | ADD HYD (080  ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 06:060        .89      .205     1.00   40.16     .000
                 +ID2 07:070       2.66      .538     1.04   40.16     .000
                  ===================================================
                  SUM 08:080       3.55      .733     1.04   40.16     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0012---------------------------------------------------------------------
 --------------------
 | ADD HYD (090  ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 05:050       5.01      .918     1.04   38.34     .000
                 +ID2 08:080       3.55      .733     1.04   40.16     .000
                  ===================================================
                  SUM 09:090       8.56     1.651     1.04   39.10     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0013---------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR    |      Requested routing time step =  1.0 min.
 |  IN>09:(090   )    |
 | OUT<10:(POND  )    |      =========  OUTFLOW STORAGE TABLE  =========
 ---------------------       OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                              (cms)      (ha.m.)    |   (cms)      (ha.m.)
                               .000   .0000E+00     |     .593  .6251E+00
                               .008   .6560E-01     |     .654  .6631E+00
                               .017   .1311E+00     |     .797  .7391E+00
                               .093   .2831E+00     |     .950  .8274E+00
                               .233   .3971E+00     |    1.304  .9157E+00
                               .337   .4731E+00     |    1.880  .1004E+01
                               .465   .5491E+00     |    2.577  .1092E+01
                               .531   .5871E+00     |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     -------------------          (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (090   )         8.56      1.651      1.042      39.096
     OUTFLOW<10: (POND  )         8.56       .089      2.625      39.093

                    PEAK    FLOW    REDUCTION [Qout/Qin](%)=     5.413
                    TIME SHIFT OF PEAK FLOW           (min)=     95.00
                    MAXIMUM   STORAGE   USED         (ha.m.)=.2758E+00

 -----------------------------------------------------------------------------
 001:0014---------------------------------------------------------------------
 *******************************************************
 *     Remaining Hawthorne Industrial Park        *
 *******************************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=    19.90
 | 01:HIP01  DT= 2.50 |    Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
 ---------------------
                               IMPERVIOUS     PERVIOUS (i)
      Surface Area      (ha)=     14.13           5.77
      Dep. Storage      (mm)=      1.57           4.67
      Average Slope      (%)=       .60           1.50
      Length             (m)=    580.00         100.00
      Mannings n            =      .030           .250

      Max.eff.Inten.(mm/hr)=      80.14          42.65
                 over (min)      15.00          35.00
      Storage Coeff.   (min)=     15.43 (ii)     34.18 (ii)
      Unit Hyd. Tpeak  (min)=     15.00          35.00
      Unit Hyd. peak   (cms)=       .07            .03
                                                              *TOTALS*
      PEAK FLOW         (cms)=      1.41            .40          1.572 (iii)
      TIME TO PEAK      (hrs)=      1.17           1.54          1.208
      RUNOFF VOLUME      (mm)=     40.94          21.31         31.126
      TOTAL RAINFALL     (mm)=     42.51          42.51         42.514
      RUNOFF COEFFICIENT    =        .96            .50           .732

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0015---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 10:POND       8.56      .089     2.63   39.09     .000
                 +ID2 01:HIP01     19.90     1.572     1.21   31.13     .000
                  ===================================================
                  SUM 02:HIP02     28.46     1.615     1.21   33.52     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0016---------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=    17.00
 | 03:HIP03  DT= 2.50 |    Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
 ---------------------
                               IMPERVIOUS     PERVIOUS (i)
      Surface Area      (ha)=     12.07           4.93
      Dep. Storage      (mm)=      1.57           4.67
      Average Slope      (%)=       .65           1.50
      Length             (m)=    450.00         100.00
      Mannings n            =      .030           .250

      Max.eff.Inten.(mm/hr)=      89.76          47.48
                 over (min)      12.50          30.00
      Storage Coeff.   (min)=     12.36 (ii)     30.32 (ii)
      Unit Hyd. Tpeak  (min)=     12.50          30.00
      Unit Hyd. peak   (cms)=       .09            .04
                                                              *TOTALS*
      PEAK FLOW         (cms)=      1.36            .37          1.504 (iii)
      TIME TO PEAK      (hrs)=      1.13           1.46          1.167
      RUNOFF VOLUME      (mm)=     40.94          21.31         31.126
      TOTAL RAINFALL     (mm)=     42.51          42.51         42.514
      RUNOFF COEFFICIENT    =        .96            .50           .732

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0017---------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=    18.10
 | 04:HIP04  DT= 2.50 |    Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
 ---------------------
                               IMPERVIOUS     PERVIOUS (i)
      Surface Area      (ha)=     12.85           5.25
      Dep. Storage      (mm)=      1.57           4.67
      Average Slope      (%)=       .50           1.50
      Length             (m)=    600.00         100.00
      Mannings n            =      .030           .250

      Max.eff.Inten.(mm/hr)=      73.27          42.65
                 over (min)      17.50          35.00
      Storage Coeff.   (min)=     17.24 (ii)     35.98 (ii)
      Unit Hyd. Tpeak  (min)=     17.50          35.00
      Unit Hyd. peak   (cms)=       .07            .03
                                                              *TOTALS*
      PEAK FLOW         (cms)=      1.19            .35          1.364 (iii)
      TIME TO PEAK      (hrs)=      1.21           1.54          1.250
      RUNOFF VOLUME      (mm)=     40.94          21.31         31.126
      TOTAL RAINFALL     (mm)=     42.51          42.51         42.514
      RUNOFF COEFFICIENT    =        .96            .50           .732

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0018---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 03:HIP03     17.00     1.504     1.17   31.13     .000
                 +ID2 04:HIP04     18.10     1.364     1.25   31.13     .000
                  ===================================================
                  SUM 05:HIP05     35.10     2.800     1.17   31.13     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0019---------------------------------------------------------------------
 *
 *SUB-AREA No.4
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=     4.00   Curve Number   (CN)=85.00
 | 06:Pond-B DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=      .170

     Unit Hyd Qpeak   (cms)=      .899

     PEAK FLOW        (cms)=      .260 (i)
     TIME TO PEAK     (hrs)=     1.167
     RUNOFF VOLUME     (mm)=    17.325
     TOTAL RAINFALL    (mm)=    42.514
     RUNOFF COEFFICIENT    =      .408

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

 -----------------------------------------------------------------------------
 001:0020---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------              (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 02:HIP02     28.46     1.615     1.21   33.52     .000
                 +ID2 05:HIP05     35.10     2.800     1.17   31.13     .000
                 +ID3 06:Pond-B     4.00      .260     1.17   17.32     .000
                  ===================================================
                  SUM 07:HIP06     67.56     4.661     1.17   31.32     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0021---------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR    |      Requested routing time step =  1.0 min.
 |  IN>07:(HIP06 )    |
 | OUT<08:(HIP-PO)    |      =========  OUTFLOW STORAGE TABLE  =========
 ---------------------       OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                              (cms)      (ha.m.)    |   (cms)      (ha.m.)
                               .000   .0000E+00     |     .724  .2210E+01
                               .048   .5740E-01     |     .937  .2501E+01
                               .054   .2434E+00     |    1.262  .2798E+01
                               .059   .5834E+00     |    1.404  .3101E+01
                               .062   .8400E+00     |    1.532  .3410E+01
                               .064   .1102E+01     |    1.650  .3724E+01
                               .147   .1370E+01     |    2.409  .4044E+01
                               .280   .1644E+01     |    3.689  .4370E+01
                               .472   .1924E+01     |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     -------------------          (ha)      (cms)      (hrs)        (mm)
     INFLOW >07: (HIP06 )        67.56      4.661      1.167      31.317
     OUTFLOW<08: (HIP-PO)        67.56       .288      3.597      31.317

                    PEAK    FLOW    REDUCTION [Qout/Qin](%)=     6.182
                    TIME SHIFT OF PEAK FLOW           (min)=    145.83
                    MAXIMUM   STORAGE   USED         (ha.m.)=.1656E+01

 -----------------------------------------------------------------------------
 001:0022---------------------------------------------------------------------
 *
 *SUB-AREA No. 5
 *
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=     6.80   Curve Number   (CN)=76.00
 | 09:A2     DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=      .370

     Unit Hyd Qpeak   (cms)=      .702

     PEAK FLOW        (cms)=      .187 (i)
     TIME TO PEAK     (hrs)=     1.458
     RUNOFF VOLUME     (mm)=    12.131
     TOTAL RAINFALL    (mm)=    42.514
     RUNOFF COEFFICIENT    =      .285

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

 -----------------------------------------------------------------------------
 001:0023---------------------------------------------------------------------
 *
```

```
*SUB-AREA No. 6
*
---------------------
| DESIGN NASHYD      |   Area      (ha)=     5.30   Curve Number   (CN)=76.00
| 10:A3      DT= 2.50 |   Ia        (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=     .804

     Unit Hyd Qpeak  (cms)=      .252

     PEAK FLOW       (cms)=      .086 (i)
     TIME TO PEAK    (hrs)=     2.042
     RUNOFF VOLUME    (mm)=    12.131
     TOTAL RAINFALL   (mm)=    42.514
     RUNOFF COEFFICIENT   =      .285

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

----------------------------------------------------------------------------
001:0024--------------------------------------------------------------------
--------------------
| ADD HYD (Interi) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)      (cms)   (hrs)   (mm)   (cms)
                   ID1 08:HIP-PO   67.56      .288    3.60  31.32    .000
                  +ID2 09:A2        6.80      .187    1.46  12.13    .000
                  +ID3 10:A3        5.30      .086    2.04  12.13    .000
                   ===================================================
                   SUM 01:Interi   79.66      .359    3.08  28.40    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0025--------------------------------------------------------------------
*****************************************************************
*         CALCULATION OF 3HR - 1:10 YEAR STORM EVENT            *
*****************************************************************
--------------------
| START              |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------   Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
----------------------------------------------------------------------------
001:0002--------------------------------------------------------------------
--------------------
| CHICAGO STORM     |    IDF curve parameters: A=1174.184
| Ptotal= 49.50 mm |                          B=   6.014
--------------------                          C=    .816
                     used in:   INTENSITY =  A / (t + B)^C

                     Duration of storm  =  3.00 hrs
                     Storm time step    = 10.00 min
                     Time to peak ratio =   .33

            TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
             .17   4.248 |  1.00 122.142 |  1.83   7.733 |  2.67   4.049
             .33   5.290 |  1.17  37.285 |  2.00   6.502 |  2.83   3.714
             .50   7.108 |  1.33  18.954 |  2.17   5.625 |  3.00   3.434
             .67  11.130 |  1.50  12.700 |  2.33   4.969 |
             .83  28.100 |  1.67   9.588 |  2.50   4.458 |

----------------------------------------------------------------------------
001:0003--------------------------------------------------------------------
---------------------
| DEFAULT VALUES     |  Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
---------------------  ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
----------------------------------------------------------------------------
001:0004--------------------------------------------------------------------
*********************************
*         ORGAWORLD FILE        *
*********************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |   Area     (ha)=    2.07
| 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.74         .33
     Dep. Storage     (mm)=        1.57        4.67
     Average Slope     (%)=         .52        1.00
     Length            (m)=      204.72       20.00
     Mannings n           =        .030        .250

     Max.eff.Inten.(mm/hr)=      122.14       34.69
               over (min)        7.50       15.00
     Storage Coeff.  (min)=        7.28 (ii)  16.04 (ii)
     Unit Hyd. Tpeak (min)=        7.50       15.00
     Unit Hyd. peak  (cms)=         .15         .07
                                                        *TOTALS*
     PEAK FLOW       (cms)=         .43         .02       .437 (iii)
     TIME TO PEAK    (hrs)=        1.04        1.21      1.042
     RUNOFF VOLUME    (mm)=       47.93       19.25     43.345
     TOTAL RAINFALL   (mm)=       49.50       49.50     49.505
     RUNOFF COEFFICIENT   =         .97         .39       .876

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
----------------------------------------------------------------------------
001:0005--------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area     (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.42         .12
     Dep. Storage     (mm)=        1.57        4.67
     Average Slope     (%)=         .50        1.00
     Length            (m)=      244.34        5.00
     Mannings n           =        .030        .030

     Max.eff.Inten.(mm/hr)=      122.14       42.32
               over (min)        7.50       10.00
     Storage Coeff.  (min)=        8.20 (ii)   9.18 (ii)
     Unit Hyd. Tpeak (min)=        7.50       10.00
     Unit Hyd. peak  (cms)=         .14         .12
                                                        *TOTALS*
     PEAK FLOW       (cms)=         .33         .01       .341 (iii)
     TIME TO PEAK    (hrs)=        1.04        1.13      1.042
     RUNOFF VOLUME    (mm)=       47.93       19.25     45.640
     TOTAL RAINFALL   (mm)=       49.50       49.50     49.505
     RUNOFF COEFFICIENT   =         .97         .39       .922

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0006--------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |   Area     (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.36         .04
     Dep. Storage     (mm)=        1.57        4.67
     Average Slope     (%)=         .51        1.00
     Length            (m)=      225.63        5.00
     Mannings n           =        .030        .030

     Max.eff.Inten.(mm/hr)=      122.14       48.18
               over (min)        7.50        7.50
     Storage Coeff.  (min)=        7.77 (ii)   8.70 (ii)
     Unit Hyd. Tpeak (min)=        7.50        7.50
     Unit Hyd. peak  (cms)=         .15         .14
                                                        *TOTALS*
     PEAK FLOW       (cms)=         .33         .00       .329 (iii)
     TIME TO PEAK    (hrs)=        1.04        1.08      1.042
     RUNOFF VOLUME    (mm)=       47.93       19.25     47.074
     TOTAL RAINFALL   (mm)=       49.50       49.50     49.505
     RUNOFF COEFFICIENT   =         .97         .39       .951

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0007--------------------------------------------------------------------
--------------------
| ADD HYD (040    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                    ID1 01:010      2.07       .437    1.04  43.35    .000
                   +ID2 02:020      1.54       .341    1.04  45.64    .000
                    ===================================================
                    SUM 04:040      3.61       .778    1.04  44.32    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0008--------------------------------------------------------------------
--------------------
| ADD HYD (050    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                    ID1 03:030      1.40       .329    1.04  47.07    .000
                   +ID2 04:040      3.61       .778    1.04  44.32    .000
                    ===================================================
                    SUM 05:050      5.01      1.107    1.04  45.09    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0009--------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD     |   Area     (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .86         .03
     Dep. Storage     (mm)=        1.57        4.67
     Average Slope     (%)=         .93         .70
     Length            (m)=      164.82       40.00
     Mannings n           =        .030        .250

     Max.eff.Inten.(mm/hr)=      122.14       31.19
               over (min)        5.00       20.00
     Storage Coeff.  (min)=        5.37 (ii)  20.78 (ii)
     Unit Hyd. Tpeak (min)=        5.00       20.00
     Unit Hyd. peak  (cms)=         .21         .06
                                                        *TOTALS*
     PEAK FLOW       (cms)=         .24         .00       .245 (iii)
     TIME TO PEAK    (hrs)=        1.00        1.29      1.000
     RUNOFF VOLUME    (mm)=       47.93       19.25     47.074
     TOTAL RAINFALL   (mm)=       49.50       49.50     49.505
     RUNOFF COEFFICIENT   =         .97         .39       .951

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0010--------------------------------------------------------------------
*
* SUB-AREA No.5
---------------------
| CALIB STANDHYD     |   Area     (ha)=    2.66
| 07:070    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.58         .08
     Dep. Storage     (mm)=        1.57        4.67
     Average Slope     (%)=         .61        1.50
     Length            (m)=      207.25       20.00
     Mannings n           =        .030        .250

     Max.eff.Inten.(mm/hr)=      122.14       34.69
               over (min)        7.50       15.00
     Storage Coeff.  (min)=        7.00 (ii)  14.75 (ii)
     Unit Hyd. Tpeak (min)=        7.50       15.00
     Unit Hyd. peak  (cms)=         .16         .08
                                                        *TOTALS*
     PEAK FLOW       (cms)=         .64         .00       .645 (iii)
     TIME TO PEAK    (hrs)=        1.04        1.21      1.042
     RUNOFF VOLUME    (mm)=       47.93       19.25     47.074
     TOTAL RAINFALL   (mm)=       49.50       49.50     49.505
     RUNOFF COEFFICIENT   =         .97         .39       .951

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

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001:0011--------------------------------------------------------------------------
--------------------
| ADD HYD (080  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 06:060           .89      .245    1.00  47.07    .000
                 +ID2 07:070          2.66      .645    1.04  47.07    .000
                  ==================================================
                  SUM 08:080          3.55      .876    1.04  47.07    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
001:0012--------------------------------------------------------------------------
--------------------
| ADD HYD (090  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 05:050          5.01     1.107    1.04  45.09    .000
                 +ID2 08:080          3.55      .876    1.04  47.07    .000
                  ==================================================
                  SUM 09:090          8.56     1.984    1.04  45.91    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
001:0013--------------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
|  IN>09:(090   )   |
| OUT<10:(POND  )   |     =========  OUTFLOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            .000   .0000E+00    |     .593   .6251E+00
                            .008   .6560E-01    |     .654   .6631E+00
                            .017   .1311E+00    |     .797   .7391E+00
                            .093   .2831E+00    |     .950   .8274E+00
                            .233   .3971E+00    |    1.304   .9157E+00
                            .337   .4731E+00    |    1.880   .1004E+01
                            .465   .5491E+00    |    2.577   .1092E+01
                            .531   .5871E+00    |     .000   .0000E+00

   ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
   --------------------         (ha)      (cms)      (hrs)        (mm)
   INFLOW >09: (090   )         8.56      1.984      1.042       45.914
   OUTFLOW<10: (POND  )         8.56       .132      2.278       45.912

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=     6.640
                  TIME SHIFT OF PEAK FLOW          (min)=    74.17
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3146E+00

-----------------------------------------------------------------------------------
001:0014--------------------------------------------------------------------------
**********************************************
*     Remaining Hawthorne Industrial Park     *
**********************************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |    Area     (ha)=    19.90
| 01:HIP01  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                              IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       14.13          5.77
    Dep. Storage      (mm)=        1.57          4.67
    Average Slope      (%)=         .60          1.50
    Length             (m)=      580.00        100.00
    Mannings n            =        .030          .250

    Max.eff.Inten.(mm/hr)=       93.86         60.56
               over (min)        15.00         30.00
    Storage Coeff.  (min)=       14.48 (ii)    30.78 (ii)
    Unit Hyd. Tpeak (min)=       15.00         30.00
    Unit Hyd. peak  (cms)=         .08           .04
                                                            *TOTALS*
    PEAK FLOW        (cms)=        1.70           .55          1.983 (iii)
    TIME TO PEAK     (hrs)=        1.17          1.46          1.208
    RUNOFF VOLUME     (mm)=       47.93         26.92         37.426
    TOTAL RAINFALL    (mm)=       49.50         49.50         49.505
    RUNOFF COEFFICIENT    =         .97           .54           .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------------
001:0015--------------------------------------------------------------------------
--------------------
| ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 10:POND          8.56      .132    2.28  45.91    .000
                 +ID2 01:HIP01        19.90     1.983    1.21  37.43    .000
                  ==================================================
                  SUM 02:HIP02        28.46     2.044    1.21  39.98    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
001:0016--------------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |    Area     (ha)=    17.00
| 03:HIP03  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                              IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       12.07          4.93
    Dep. Storage      (mm)=        1.57          4.67
    Average Slope      (%)=         .65          1.50
    Length             (m)=      450.00        100.00
    Mannings n            =        .030          .250

    Max.eff.Inten.(mm/hr)=      105.17         63.81
               over (min)        12.50         27.50
    Storage Coeff.  (min)=       11.60 (ii)    27.56 (ii)
    Unit Hyd. Tpeak (min)=       12.50         27.50
    Unit Hyd. peak  (cms)=         .09           .04
                                                            *TOTALS*
    PEAK FLOW        (cms)=        1.63           .51          1.865 (iii)
    TIME TO PEAK     (hrs)=        1.13          1.42          1.167
    RUNOFF VOLUME     (mm)=       47.93         26.92         37.426
    TOTAL RAINFALL    (mm)=       49.50         49.50         49.505
    RUNOFF COEFFICIENT    =         .97           .54           .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------------
001:0017--------------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |    Area     (ha)=    18.10
| 04:HIP04  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                              IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       12.85          5.25
    Dep. Storage      (mm)=        1.57          4.67
    Average Slope      (%)=         .50          1.50
    Length             (m)=      600.00        100.00
    Mannings n            =        .030          .250

    Max.eff.Inten.(mm/hr)=       93.86         57.19
               over (min)        15.00         32.50
    Storage Coeff.  (min)=       15.61 (ii)    32.28 (ii)
    Unit Hyd. Tpeak (min)=       15.00         32.50
    Unit Hyd. peak  (cms)=         .07           .03
                                                            *TOTALS*
    PEAK FLOW        (cms)=        1.49           .48          1.723 (iii)
    TIME TO PEAK     (hrs)=        1.17          1.50          1.208
    RUNOFF VOLUME     (mm)=       47.93         26.92         37.426
    TOTAL RAINFALL    (mm)=       49.50         49.50         49.505
    RUNOFF COEFFICIENT    =         .97           .54           .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------------
001:0018--------------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 03:HIP03        17.00     1.865    1.17  37.43    .000
                 +ID2 04:HIP04        18.10     1.723    1.21  37.43    .000
                  ==================================================
                  SUM 05:HIP05        35.10     3.572    1.17  37.43    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
001:0019--------------------------------------------------------------------------
*
*SUB-AREA No.4
---------------------
| DESIGN NASHYD      |    Area     (ha)=     4.00    Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50 |    Ia       (mm)=    4.670    # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=      .170

    Unit Hyd Qpeak  (cms)=      .899

    PEAK FLOW       (cms)=      .345 (i)
    TIME TO PEAK    (hrs)=     1.167
    RUNOFF VOLUME    (mm)=    22.420
    TOTAL RAINFALL   (mm)=    49.505
    RUNOFF COEFFICIENT   =      .453

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

-----------------------------------------------------------------------------------
001:0020--------------------------------------------------------------------------
--------------------
| ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 02:HIP02        28.46     2.044    1.21  39.98    .000
                 +ID2 05:HIP05        35.10     3.572    1.17  37.43    .000
                 +ID3 06:Pond-B        4.00      .345    1.17  22.42    .000
                  ==================================================
                  SUM 07:HIP06        67.56     5.939    1.17  37.61    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
001:0021--------------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
|  IN>07:(HIP06 )   |
| OUT<08:(HIP-PO)   |     =========  OUTFLOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            .000   .0000E+00    |     .724   .2210E+01
                            .048   .5740E-01    |     .937   .2501E+01
                            .054   .2434E+00    |    1.262   .2798E+01
                            .059   .5834E+00    |    1.404   .3101E+01
                            .062   .8400E+00    |    1.532   .3410E+01
                            .064   .1102E+01    |    1.650   .3724E+01
                            .147   .1370E+01    |    2.409   .4044E+01
                            .280   .1644E+01    |    3.689   .4370E+01
                            .472   .1924E+01    |     .000   .0000E+00

   ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
   --------------------         (ha)      (cms)      (hrs)        (mm)
   INFLOW >07: (HIP06 )        67.56      5.939      1.167       37.611
   OUTFLOW<08: (HIP-PO)        67.56       .487      3.361       37.611

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=     8.200
                  TIME SHIFT OF PEAK FLOW          (min)=   131.67
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1941E+01

-----------------------------------------------------------------------------------
001:0022--------------------------------------------------------------------------
*
*SUB-AREA No. 5
*
---------------------
| DESIGN NASHYD      |    Area     (ha)=     6.80    Curve Number   (CN)=76.00
| 09:A2      DT= 2.50 |   Ia       (mm)=    4.670    # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=      .370

    Unit Hyd Qpeak  (cms)=      .702

    PEAK FLOW       (cms)=      .252 (i)
    TIME TO PEAK    (hrs)=     1.417
    RUNOFF VOLUME    (mm)=    16.075
    TOTAL RAINFALL   (mm)=    49.505
    RUNOFF COEFFICIENT   =      .325

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

-----------------------------------------------------------------------------------
001:0023--------------------------------------------------------------------------
*
*SUB-AREA No. 6
*
---------------------
| DESIGN NASHYD      |    Area     (ha)=     5.30    Curve Number   (CN)=76.00
| 10:A3      DT= 2.50 |   Ia       (mm)=    4.670    # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=      .804

    Unit Hyd Qpeak  (cms)=      .252

    PEAK FLOW       (cms)=      .115 (i)
    TIME TO PEAK    (hrs)=     2.000
    RUNOFF VOLUME    (mm)=    16.075
    TOTAL RAINFALL   (mm)=    49.505
```

```
     RUNOFF COEFFICIENT   =     .325
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
------------------------------------------------------------------------------
001:0024----------------------------------------------------------------------
--------------------
| ADD HYD (Interi) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 08:HIP-PO   67.56     .487    3.36  37.61    .000
                   +ID2 09:A2        6.80     .252    1.42  16.08    .000
                   +ID3 10:A3        5.30     .115    2.00  16.08    .000
                    ==================================================
                    SUM 01:Interi   79.66     .589    3.04  34.34    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
001:0025----------------------------------------------------------------------
*****************************************************************
*        CALCULATION OF 3HR - 1:25 YEAR STORM EVENT             *
*****************************************************************
--------------------
| START              |   Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------     Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
--------------------
| CHICAGO STORM     |     IDF curve parameters: A=1402.884
| Ptotal= 58.23 mm |                            B=   6.018
--------------------                            C=    .819
                          used in:   INTENSITY =  A / (t + B)^C
                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .17   4.934 |  1.00 144.693 |  1.83   9.014 |  2.67   4.701
                .33   6.152 |  1.17  43.904 |  2.00   7.571 |  2.83   4.310
                .50   8.282 |  1.33  22.224 |  2.17   6.544 |  3.00   3.983
                .67  13.006 |  1.50  14.852 |  2.33   5.776 |
                .83  33.041 |  1.67  11.192 |  2.50   5.179 |
------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
----------------------
| DEFAULT VALUES      |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
----------------------    ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
**********************************
*        ORGAWORLD FILE          *
**********************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |   Area    (ha)=    2.07
| 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=       1.74          .33
     Dep. Storage       (mm)=       1.57         4.67
     Average Slope       (%)=        .52         1.00
     Length              (m)=     204.72        20.00
     Mannings n             =       .030         .250
     Max.eff.Inten.(mm/hr)=       144.69        47.07
                over (min)          7.50        15.00
     Storage Coeff.    (min)=       6.81 (ii)   14.56 (ii)
     Unit Hyd. Tpeak  (min)=        7.50        15.00
     Unit Hyd. peak   (cms)=         .16          .08
                                                            *TOTALS*
     PEAK FLOW         (cms)=        .52          .03         .532 (iii)
     TIME TO PEAK      (hrs)=       1.04         1.21        1.042
     RUNOFF VOLUME      (mm)=      56.66        25.35       51.647
     TOTAL RAINFALL     (mm)=      58.23        58.23       58.226
     RUNOFF COEFFICIENT   =          .97          .44         .887
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
------------------------------------------------------------------------------
001:0005----------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area    (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=        .12          .12
     Dep. Storage       (mm)=       1.57         4.67
     Average Slope       (%)=        .50         1.00
     Length              (m)=     244.34         5.00
     Mannings n             =       .030         .030
     Max.eff.Inten.(mm/hr)=       144.69        65.19
                over (min)          7.50         7.50
     Storage Coeff.    (min)=       7.66 (ii)    8.49 (ii)
     Unit Hyd. Tpeak  (min)=        7.50         7.50
     Unit Hyd. peak   (cms)=         .15          .14
                                                            *TOTALS*
     PEAK FLOW         (cms)=        .40          .01         .418 (iii)
     TIME TO PEAK      (hrs)=       1.04         1.08        1.042
     RUNOFF VOLUME      (mm)=      56.66        25.35       54.152
     TOTAL RAINFALL     (mm)=      58.23        58.23       58.226
     RUNOFF COEFFICIENT   =          .97          .44         .930
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
------------------------------------------------------------------------------
001:0006----------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |   Area    (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=       1.36          .04
     Dep. Storage       (mm)=       1.57         4.67
     Average Slope       (%)=        .51         1.00
     Length              (m)=     225.63         5.00
     Mannings n             =       .030         .030
     Max.eff.Inten.(mm/hr)=       144.69        65.19
                over (min)          7.50         7.50
     Storage Coeff.    (min)=       7.26 (ii)    8.09 (ii)
     Unit Hyd. Tpeak  (min)=        7.50         7.50
     Unit Hyd. peak   (cms)=         .15          .14
                                                            *TOTALS*
     PEAK FLOW         (cms)=        .40          .00         .400 (iii)
     TIME TO PEAK      (hrs)=       1.04         1.08        1.042
     RUNOFF VOLUME      (mm)=      56.66        25.35       55.717
     TOTAL RAINFALL     (mm)=      58.23        58.23       58.226
     RUNOFF COEFFICIENT   =          .97          .44         .957
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
------------------------------------------------------------------------------
001:0007----------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:010       2.07     .532    1.04  51.65    .000
                   +ID2 02:020       1.54     .418    1.04  54.15    .000
                    ==================================================
                    SUM 04:040       3.61     .950    1.04  52.72    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
001:0008----------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 03:030       1.40     .400    1.04  55.72    .000
                   +ID2 04:040       3.61     .950    1.04  52.72    .000
                    ==================================================
                    SUM 05:050       5.01    1.350    1.04  53.55    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
001:0009----------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=        .86          .03
     Dep. Storage       (mm)=       1.57         4.67
     Average Slope       (%)=        .93          .70
     Length              (m)=     164.82        40.00
     Mannings n             =       .030         .250
     Max.eff.Inten.(mm/hr)=       144.69        44.12
                over (min)          5.00        17.50
     Storage Coeff.    (min)=       5.02 (ii)   18.44 (ii)
     Unit Hyd. Tpeak  (min)=        5.00        17.50
     Unit Hyd. peak   (cms)=         .22          .06
                                                            *TOTALS*
     PEAK FLOW         (cms)=        .30          .00         .296 (iii)
     TIME TO PEAK      (hrs)=       1.00         1.25        1.000
     RUNOFF VOLUME      (mm)=      56.66        25.35       55.717
     TOTAL RAINFALL     (mm)=      58.23        58.23       58.226
     RUNOFF COEFFICIENT   =          .97          .44         .957
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
------------------------------------------------------------------------------
001:0010----------------------------------------------------------------------
*
* SUB-AREA No.5
---------------------
| CALIB STANDHYD     |   Area    (ha)=    2.66
| 07:070    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=       2.58          .08
     Dep. Storage       (mm)=       1.57         4.67
     Average Slope       (%)=        .61         1.50
     Length              (m)=     207.25        20.00
     Mannings n             =       .030         .250
     Max.eff.Inten.(mm/hr)=       144.69        51.33
                over (min)          7.50        12.50
     Storage Coeff.    (min)=       6.54 (ii)   13.16 (ii)
     Unit Hyd. Tpeak  (min)=        7.50        12.50
     Unit Hyd. peak   (cms)=         .16          .09
                                                            *TOTALS*
     PEAK FLOW         (cms)=        .78          .01         .783 (iii)
     TIME TO PEAK      (hrs)=       1.04         1.17        1.042
     RUNOFF VOLUME      (mm)=      56.66        25.35       55.717
     TOTAL RAINFALL     (mm)=      58.23        58.23       58.226
     RUNOFF COEFFICIENT   =          .97          .44         .957
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
------------------------------------------------------------------------------
001:0011----------------------------------------------------------------------
--------------------
| ADD HYD (080   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 06:060        .89     .296    1.00  55.72    .000
                   +ID2 07:070       2.66     .783    1.04  55.72    .000
                    ==================================================
                    SUM 08:080       3.55    1.060    1.04  55.72    .000
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
001:0012----------------------------------------------------------------------
```

```
--------------------
| ADD HYD (090    ) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.     DWF
--------------------                  (ha)      (cms)   (hrs)    (mm)    (cms)
                   ID1 05:050          5.01     1.350    1.04   53.55    .000
                  +ID2 08:080          3.55     1.060    1.04   55.72    .000
                   =====================================================
                   SUM 09:090          8.56     2.410    1.04   54.45    .000
  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
001:0013--------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
|  IN>09:(090    )  |
| OUT<10:(POND   )  |     =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            .000  .0000E+00     |     .593  .6251E+00
                            .008  .6560E-01     |     .654  .6631E+00
                            .017  .1311E+00     |     .797  .7391E+00
                            .093  .2831E+00     |     .950  .8274E+00
                            .233  .3971E+00     |    1.304  .9157E+00
                            .337  .4731E+00     |    1.880  .1004E+01
                            .465  .5491E+00     |    2.577  .1092E+01
                            .531  .5871E+00     |     .000  .0000E+00
     ROUTING RESULTS             AREA      QPEAK      TPEAK        R.V.
     -------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (090    )       8.56      2.410      1.042       54.451
     OUTFLOW<10: (POND   )       8.56       .189      2.056       54.449
                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=     7.838
                      TIME SHIFT OF PEAK FLOW          (min)=    60.83
                      MAXIMUM  STORAGE   USED       (ha.m.)=.3612E+00
----------------------------------------------------------------------------
001:0014--------------------------------------------------------------------
*********************************************
*     Remaining Hawthorne Industrial Park     *
*********************************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD      |    Area     (ha)=    19.90
| 01:HIP01  DT= 2.50  |    Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      14.13         5.77
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .60         1.50
     Length             (m)=     580.00       100.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=     124.54        81.98
                 over (min)      12.50        27.50
     Storage Coeff.  (min)=      12.93 (ii)   27.37 (ii)
     Unit Hyd. Tpeak (min)=      12.50        27.50
     Unit Hyd. peak  (cms)=        .09          .04
                                                         *TOTALS*
     PEAK FLOW        (cms)=       2.16          .77       2.548 (iii)
     TIME TO PEAK     (hrs)=       1.13         1.42       1.167
     RUNOFF VOLUME     (mm)=      56.66        34.22      45.437
     TOTAL RAINFALL    (mm)=      58.23        58.23      58.226
     RUNOFF COEFFICIENT   =        .97          .59        .780
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
----------------------------------------------------------------------------
001:0015--------------------------------------------------------------------
--------------------
| ADD HYD (HIP02 ) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.     DWF
--------------------                  (ha)      (cms)   (hrs)    (mm)    (cms)
                   ID1 10:POND         8.56      .189    2.06   54.45    .000
                  +ID2 01:HIP01       19.90     2.548    1.17   45.44    .000
                   =====================================================
                   SUM 02:HIP02       28.46     2.622    1.17   48.15    .000
  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
001:0016--------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD      |    Area     (ha)=    17.00
| 03:HIP03  DT= 2.50  |    Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      12.07         4.93
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .65         1.50
     Length             (m)=     450.00       100.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=     144.69        87.13
                 over (min)      10.00        25.00
     Storage Coeff.  (min)=      10.21 (ii)   24.30 (ii)
     Unit Hyd. Tpeak (min)=      10.00        25.00
     Unit Hyd. peak  (cms)=        .11          .05
                                                         *TOTALS*
     PEAK FLOW        (cms)=       2.10          .71       2.398 (iii)
     TIME TO PEAK     (hrs)=       1.08         1.38       1.125
     RUNOFF VOLUME     (mm)=      56.66        34.22      45.437
     TOTAL RAINFALL    (mm)=      58.23        58.23      58.226
     RUNOFF COEFFICIENT   =        .97          .59        .780
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
----------------------------------------------------------------------------
001:0017--------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD      |    Area     (ha)=    18.10
| 04:HIP04  DT= 2.50  |    Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      12.85         5.25
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .50         1.50
     Length             (m)=     600.00       100.00
     Mannings n            =       .030         .250
     Max.eff.Inten.(mm/hr)=     111.10        77.71
                 over (min)      15.00        30.00
     Storage Coeff.  (min)=      14.59 (ii)   29.34 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=        .08          .04
                                                         *TOTALS*
     PEAK FLOW        (cms)=       1.82          .67       2.180 (iii)
     TIME TO PEAK     (hrs)=       1.17         1.46       1.208
     RUNOFF VOLUME     (mm)=      56.66        34.22      45.437
     TOTAL RAINFALL    (mm)=      58.23        58.23      58.226
     RUNOFF COEFFICIENT   =        .97          .59        .780
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
----------------------------------------------------------------------------
001:0018--------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.     DWF
--------------------                  (ha)      (cms)   (hrs)    (mm)    (cms)
                   ID1 03:HIP03       17.00     2.398    1.13   45.44    .000
                  +ID2 04:HIP04       18.10     2.180    1.21   45.44    .000
                   =====================================================
                   SUM 05:HIP05       35.10     4.439    1.13   45.44    .000
  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
001:0019--------------------------------------------------------------------
*
*SUB-AREA No.4
---------------------
| DESIGN NASHYD       |    Area     (ha)=    4.00   Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50  |    Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
---------------------      U.H. Tp(hrs)=     .170
     Unit Hyd Qpeak  (cms)=      .899
     PEAK FLOW        (cms)=     .459 (i)
     TIME TO PEAK     (hrs)=    1.167
     RUNOFF VOLUME     (mm)=   29.155
     TOTAL RAINFALL    (mm)=   58.226
     RUNOFF COEFFICIENT   =      .501
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
----------------------------------------------------------------------------
001:0020--------------------------------------------------------------------
--------------------
| ADD HYD (HIP06 ) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.     DWF
--------------------                  (ha)      (cms)   (hrs)    (mm)    (cms)
                   ID1 02:HIP02       28.46     2.622    1.17   48.15    .000
                  +ID2 05:HIP05       35.10     4.439    1.13   45.44    .000
                  +ID3 06:Pond-B       4.00      .459    1.17   29.15    .000
                   =====================================================
                   SUM 07:HIP06       67.56     7.499    1.17   45.61    .000
  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
001:0021--------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
|  IN>07:(HIP06 )   |
| OUT<08:(HIP-PO)   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            .000  .0000E+00     |     .724  .2210E+01
                            .048  .5740E-01     |     .937  .2501E+01
                            .054  .2434E+00     |    1.262  .2798E+01
                            .059  .5834E+00     |    1.404  .3101E+01
                            .062  .8400E+00     |    1.532  .3410E+01
                            .064  .1102E+01     |    1.650  .3724E+01
                            .147  .1370E+01     |    2.409  .4044E+01
                            .280  .1644E+01     |    3.689  .4370E+01
                            .472  .1924E+01     |     .000  .0000E+00
     ROUTING RESULTS             AREA      QPEAK      TPEAK        R.V.
     -------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >07: (HIP06 )       67.56      7.499      1.167       45.613
     OUTFLOW<08: (HIP-PO)       67.56       .773      3.181       45.613
                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=    10.306
                      TIME SHIFT OF PEAK FLOW          (min)=   120.83
                      MAXIMUM  STORAGE   USED       (ha.m.)=.2276E+01
----------------------------------------------------------------------------
001:0022--------------------------------------------------------------------
*
*SUB-AREA No. 5
*
---------------------
| DESIGN NASHYD       |    Area     (ha)=    6.80   Curve Number   (CN)=76.00
| 09:A2     DT= 2.50  |    Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
---------------------      U.H. Tp(hrs)=     .370
     Unit Hyd Qpeak  (cms)=      .702
     PEAK FLOW        (cms)=     .343 (i)
     TIME TO PEAK     (hrs)=    1.417
     RUNOFF VOLUME     (mm)=   21.442
     TOTAL RAINFALL    (mm)=   58.226
     RUNOFF COEFFICIENT   =      .368
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
----------------------------------------------------------------------------
001:0023--------------------------------------------------------------------
*
*SUB-AREA No. 6
*
---------------------
| DESIGN NASHYD       |    Area     (ha)=    5.30   Curve Number   (CN)=76.00
| 10:A3     DT= 2.50  |    Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
---------------------      U.H. Tp(hrs)=     .804
     Unit Hyd Qpeak  (cms)=      .252
     PEAK FLOW        (cms)=     .155 (i)
     TIME TO PEAK     (hrs)=    2.000
     RUNOFF VOLUME     (mm)=   21.442
     TOTAL RAINFALL    (mm)=   58.226
     RUNOFF COEFFICIENT   =      .368
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
----------------------------------------------------------------------------
001:0024--------------------------------------------------------------------
--------------------
| ADD HYD (Interi) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.     DWF
--------------------                  (ha)      (cms)   (hrs)    (mm)    (cms)
                   ID1 08:HIP-PO      67.56      .773    3.18   45.61    .000
                  +ID2 09:A2           6.80      .343    1.42   21.44    .000
                  +ID3 10:A3           5.30      .155    2.00   21.44    .000
                   =====================================================
```

```
                  SUM 01:Interi    79.66    .939    2.60  41.94    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0025----------------------------------------------------------------------
 *************************************************************
 *        CALCULATION OF 3HR - 1:50 YEAR STORM EVENT         *
 *************************************************************
 --------------------
 | START            |    Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
 --------------------    Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
     TZERO =   .00 hrs on         0
     METOUT=   2 (output = METRIC)
     NRUN  = 001
     NSTORM=   0
 ------------------------------------------------------------------------------
 001:0002----------------------------------------------------------------------
 --------------------
 | CHICAGO STORM    |      IDF curve parameters: A=1569.580
 | Ptotal= 64.81 mm |                            B=   6.014
 --------------------                            C=    .820
                           used in:   INTENSITY =  A / (t + B)^C

                           Duration of storm  =  3.00 hrs
                           Storm time step    = 10.00 min
                           Time to peak ratio =   .33

           TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
            .17   5.467 |  1.00 161.471 |  1.83  10.000 |  2.67   5.209
            .33   6.820 |  1.17  48.876 |  2.00   8.397 |  2.83   4.774
            .50   9.187 |  1.33  24.704 |  2.17   7.256 |  3.00   4.412
            .67  14.441 |  1.50  16.495 |  2.33   6.403 |
            .83  36.764 |  1.67  12.422 |  2.50   5.740 |
 ------------------------------------------------------------------------------
 001:0003----------------------------------------------------------------------
 ----------------------
 | DEFAULT VALUES     |    Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
 ----------------------    ICASEdv = 1 (read and print data)
     FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
     Horton's infiltration equation parameters:
     [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=   .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=    4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=    1.57 mm] [CLI= 1.50]    [MNI= .035]
     Parameters used in NASHYD:
     [Ia=    4.67 mm] [N= 3.00]
 ------------------------------------------------------------------------------
 001:0004----------------------------------------------------------------------
 **********************************
 *        ORGAWORLD FILE          *
 **********************************
 *
 * SUB-AREA No.1
 ----------------------
 | CALIB STANDHYD     |    Area    (ha)=     2.07
 | 01:010     DT= 2.50 |    Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
 ----------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      1.74          .33
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .52         1.00
     Length             (m)=    204.72        20.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=     161.47        62.27
                over (min)        7.50        12.50
     Storage Coeff.   (min)=      6.51 (ii)   13.44 (ii)
     Unit Hyd. Tpeak (min)=       7.50        12.50
     Unit Hyd. peak  (cms)=        .16          .09
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .59          .03          .609 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.17         1.042
     RUNOFF VOLUME     (mm)=     63.24        30.21        57.952
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .894

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0005----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ----------------------
 | CALIB STANDHYD     |    Area    (ha)=     1.54
 | 02:020     DT= 2.50 |    Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
 ----------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      1.42          .12
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .50         1.00
     Length             (m)=    244.34         5.00
     Mannings n           =       .030         .030

     Max.eff.Inten.(mm/hr)=     161.47        78.73
                over (min)        7.50         7.50
     Storage Coeff.   (min)=      7.33 (ii)    8.10 (ii)
     Unit Hyd. Tpeak (min)=       7.50         7.50
     Unit Hyd. peak  (cms)=        .15          .14
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .46          .02          .475 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.08         1.042
     RUNOFF VOLUME     (mm)=     63.24        30.21        60.594
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .935

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0006----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ----------------------
 | CALIB STANDHYD     |    Area    (ha)=     1.40
 | 03:030     DT= 2.50 |    Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      1.36          .04
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .51         1.00
     Length             (m)=    225.63         5.00
     Mannings n           =       .030         .030

     Max.eff.Inten.(mm/hr)=     161.47        78.73
                over (min)        7.50         7.50
     Storage Coeff.   (min)=      6.95 (ii)    7.72 (ii)
     Unit Hyd. Tpeak (min)=       7.50         7.50
     Unit Hyd. peak  (cms)=        .16          .15
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .45          .01          .454 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.08         1.042
     RUNOFF VOLUME     (mm)=     63.24        30.21        62.245
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .960

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0007----------------------------------------------------------------------
 --------------------
 | ADD HYD (040   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 01:010            2.07      .609    1.04  57.95     .000
             +ID2 02:020            1.54      .475    1.04  60.59     .000
              ==================================================
              SUM 04:040            3.61     1.084    1.04  59.08     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0008----------------------------------------------------------------------
 --------------------
 | ADD HYD (050   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 03:030            1.40      .454    1.04  62.25     .000
             +ID2 04:040            3.61     1.084    1.04  59.08     .000
              ==================================================
              SUM 05:050            5.01     1.538    1.04  59.96     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0009----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ----------------------
 | CALIB STANDHYD     |    Area    (ha)=      .89
 | 06:060     DT= 2.50 |    Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       .86          .03
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .93          .70
     Length             (m)=    164.82        40.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=     161.47        53.28
                over (min)        5.00        17.50
     Storage Coeff.   (min)=      4.80 (ii)   17.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.50
     Unit Hyd. peak  (cms)=        .23          .07
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .33          .00          .335 (iii)
     TIME TO PEAK     (hrs)=      1.00         1.25         1.000
     RUNOFF VOLUME     (mm)=     63.24        30.21        62.245
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .960

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0010----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ----------------------
 | CALIB STANDHYD     |    Area    (ha)=     2.66
 | 07:070     DT= 2.50 |    Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      2.58          .08
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .61         1.50
     Length             (m)=    207.25        20.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=     161.47        62.27
                over (min)        7.50        12.50
     Storage Coeff.   (min)=      6.26 (ii)   12.39 (ii)
     Unit Hyd. Tpeak (min)=       7.50        12.50
     Unit Hyd. peak  (cms)=        .17          .09
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .88          .01          .886 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.17         1.042
     RUNOFF VOLUME     (mm)=     63.24        30.21        62.245
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT   =        .98          .47          .960

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  81.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0011----------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 06:060             .89      .335    1.00  62.25     .000
             +ID2 07:070            2.66      .886    1.04  62.25     .000
              ==================================================
              SUM 08:080            3.55     1.197    1.04  62.25     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0012----------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 05:050            5.01     1.538    1.04  59.96     .000
             +ID2 08:080            3.55     1.197    1.04  62.25     .000
              ==================================================
              SUM 09:090            8.56     2.735    1.04  60.91     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0013----------------------------------------------------------------------
 --------------------
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```
| ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
|  IN>09:(090     )  |
| OUT<10:(POND    )  |     =========  OUTFLOW STORAGE TABLE  =========
---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00    |     .593  .6251E+00
                             .008  .6560E-01    |     .654  .6631E+00
                             .017  .1311E+00    |     .797  .7391E+00
                             .093  .2831E+00    |     .950  .8274E+00
                             .233  .3971E+00    |    1.304  .9157E+00
                             .337  .4731E+00    |    1.880  .1004E+01
                             .465  .5491E+00    |    2.577  .1092E+01
                             .531  .5871E+00    |     .000  .0000E+00

     ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
     -------------------          (ha)     (cms)     (hrs)        (mm)
     INFLOW >09: (090    )        8.56     2.735     1.042      60.910
     OUTFLOW<10: (POND   )        8.56      .233     1.944      60.908

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.503
                   TIME SHIFT OF PEAK FLOW          (min)=   54.17
                   MAXIMUM  STORAGE   USED         (ha.m.)=.3967E+00

----------------------------------------------------------------------------
001:0014--------------------------------------------------------------------
**********************************************
*     Remaining Hawthorne Industrial Park     *
**********************************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD      |   Area     (ha)=    19.90
| 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                               IMPERVIOUS     PERVIOUS (i)
    Surface Area       (ha)=      14.13          5.77
    Dep. Storage       (mm)=       1.57          4.67
    Average Slope       (%)=        .60          1.50
    Length              (m)=     580.00        100.00
    Mannings n             =       .030          .250

    Max.eff.Inten.(mm/hr)=       138.95        102.13
               over (min)         12.50         25.00
    Storage Coeff.   (min)=       12.38 (ii)    25.60 (ii)
    Unit Hyd. Tpeak  (min)=       12.50         25.00
    Unit Hyd. peak   (cms)=         .09           .04
                                                             *TOTALS*
    PEAK FLOW          (cms)=      2.46           .95          3.001 (iii)
    TIME TO PEAK       (hrs)=      1.13          1.38          1.167
    RUNOFF VOLUME       (mm)=     63.24         39.90         51.566
    TOTAL RAINFALL      (mm)=     64.81         64.81         64.806
    RUNOFF COEFFICIENT     =        .98           .62           .796

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0015--------------------------------------------------------------------
---------------------
| ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 10:POND     8.56      .233     1.94   60.91    .000
                    +ID2 01:HIP01   19.90     3.001     1.17   51.57    .000
                    ==================================================
                     SUM 02:HIP02   28.46     3.092     1.17   54.37    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0016--------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD      |   Area     (ha)=    17.00
| 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                               IMPERVIOUS     PERVIOUS (i)
    Surface Area       (ha)=      12.07          4.93
    Dep. Storage       (mm)=       1.57          4.67
    Average Slope       (%)=        .65          1.50
    Length              (m)=     450.00        100.00
    Mannings n             =       .030          .250

    Max.eff.Inten.(mm/hr)=       161.47        109.61
               over (min)         10.00         22.50
    Storage Coeff.   (min)=        9.77 (ii)    22.63 (ii)
    Unit Hyd. Tpeak  (min)=       10.00         22.50
    Unit Hyd. peak   (cms)=         .11           .05
                                                             *TOTALS*
    PEAK FLOW          (cms)=      2.38           .88          2.819 (iii)
    TIME TO PEAK       (hrs)=      1.08          1.33          1.125
    RUNOFF VOLUME       (mm)=     63.24         39.90         51.566
    TOTAL RAINFALL      (mm)=     64.81         64.81         64.806
    RUNOFF COEFFICIENT     =        .98           .62           .796

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0017--------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD      |   Area     (ha)=    18.10
| 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
---------------------
                               IMPERVIOUS     PERVIOUS (i)
    Surface Area       (ha)=      12.85          5.25
    Dep. Storage       (mm)=       1.57          4.67
    Average Slope       (%)=        .50          1.50
    Length              (m)=     600.00        100.00
    Mannings n             =       .030          .250

    Max.eff.Inten.(mm/hr)=       138.95         96.02
               over (min)         12.50         27.50
    Storage Coeff.   (min)=       13.34 (ii)    26.90 (ii)
    Unit Hyd. Tpeak  (min)=       12.50         27.50
    Unit Hyd. peak   (cms)=         .09           .04
                                                             *TOTALS*
    PEAK FLOW          (cms)=      2.16           .83          2.596 (iii)
    TIME TO PEAK       (hrs)=      1.13          1.42          1.167
    RUNOFF VOLUME       (mm)=     63.24         39.90         51.566
    TOTAL RAINFALL      (mm)=     64.81         64.81         64.806
    RUNOFF COEFFICIENT     =        .98           .62           .796

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
```

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

----------------------------------------------------------------------------
001:0018--------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 03:HIP03   17.00     2.819     1.13   51.57    .000
                    +ID2 04:HIP04   18.10     2.596     1.17   51.57    .000
                    ==================================================
                     SUM 05:HIP05   35.10     5.372     1.13   51.57    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0019--------------------------------------------------------------------
*
*SUB-AREA No.4
---------------------
| DESIGN NASHYD       |   Area     (ha)=     4.00   Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=      .170

    Unit Hyd Qpeak   (cms)=       .899

    PEAK FLOW        (cms)=       .551 (i)
    TIME TO PEAK     (hrs)=      1.125
    RUNOFF VOLUME     (mm)=     34.455
    TOTAL RAINFALL    (mm)=     64.806
    RUNOFF COEFFICIENT   =        .532

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

----------------------------------------------------------------------------
001:0020--------------------------------------------------------------------
--------------------
| ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 02:HIP02   28.46     3.092     1.17   54.37    .000
                    +ID2 05:HIP05   35.10     5.372     1.13   51.57    .000
                    +ID3 06:Pond-B   4.00      .551     1.13   34.45    .000
                    ==================================================
                     SUM 07:HIP06   67.56     8.958     1.13   51.73    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0021--------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
|  IN>07:(HIP06 )    |
| OUT<08:(HIP-PO)    |     ========  OUTLFOW STORAGE TABLE  ========
---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00    |     .724  .2210E+01
                             .048  .5740E-01    |     .937  .2501E+01
                             .054  .2434E+00    |    1.262  .2798E+01
                             .059  .5834E+00    |    1.404  .3101E+01
                             .062  .8400E+00    |    1.532  .3410E+01
                             .064  .1102E+01    |    1.650  .3724E+01
                             .147  .1370E+01    |    2.409  .4044E+01
                             .280  .1644E+01    |    3.689  .4370E+01
                             .472  .1924E+01    |     .000  .0000E+00

     ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
     -------------------          (ha)     (cms)     (hrs)        (mm)
     INFLOW >07: (HIP06 )        67.56     8.958     1.125      51.735
     OUTFLOW<08: (HIP-PO)        67.56      .973     3.097      51.735

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   10.864
                   TIME SHIFT OF PEAK FLOW          (min)=  118.33
                   MAXIMUM  STORAGE   USED         (ha.m.)=.2534E+01

----------------------------------------------------------------------------
001:0022--------------------------------------------------------------------
*
*SUB-AREA No. 5
*
---------------------
| DESIGN NASHYD       |   Area     (ha)=     6.80   Curve Number   (CN)=76.00
| 09:A2      DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=      .370

    Unit Hyd Qpeak   (cms)=       .702

    PEAK FLOW        (cms)=       .417 (i)
    TIME TO PEAK     (hrs)=      1.417
    RUNOFF VOLUME     (mm)=     25.767
    TOTAL RAINFALL    (mm)=     64.806
    RUNOFF COEFFICIENT   =        .398

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

----------------------------------------------------------------------------
001:0023--------------------------------------------------------------------
*
*SUB-AREA No. 6
*
---------------------
| DESIGN NASHYD       |   Area     (ha)=     5.30   Curve Number   (CN)=76.00
| 10:A3      DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=      .804

    Unit Hyd Qpeak   (cms)=       .252

    PEAK FLOW        (cms)=       .188 (i)
    TIME TO PEAK     (hrs)=      2.000
    RUNOFF VOLUME     (mm)=     25.767
    TOTAL RAINFALL    (mm)=     64.806
    RUNOFF COEFFICIENT   =        .398

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

----------------------------------------------------------------------------
001:0024--------------------------------------------------------------------
--------------------
| ADD HYD (Interi) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                     ID1 08:HIP-PO  67.56      .973     3.10   51.73    .000
                    +ID2 09:A2       6.80      .417     1.42   25.77    .000
                    +ID3 10:A3       5.30      .188     2.00   25.77    .000
                    ==================================================
                     SUM 01:Interi  79.66     1.191     2.31   47.79    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0025--------------------------------------------------------------------
************************************************************
*       CALCULATION OF 3HR - 1:100 YEAR STORM EVENT        *
************************************************************
--------------------
| START              |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------     Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =   .00 hrs on       0
```

```
     METOUT=   2 (output = METRIC)
     NRUN  = 001
     NSTORM=   0
 -------------------------------------------------------------------------------
 001:0002-----------------------------------------------------------------------
 --------------------
 | CHICAGO STORM    |    IDF curve parameters: A=1735.688
 | Ptotal= 71.66 mm |                          B=   6.014
 --------------------                          C=    .820
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =   .33

              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   6.046 |   1.00 178.559 |   1.83  11.059 |   2.67   5.760
               .33   7.542 |   1.17  54.049 |   2.00   9.285 |   2.83   5.280
               .50  10.159 |   1.33  27.319 |   2.17   8.024 |   3.00   4.879
               .67  15.969 |   1.50  18.240 |   2.33   7.080 |
               .83  40.655 |   1.67  13.737 |   2.50   6.347 |

 -------------------------------------------------------------------------------
 001:0003-----------------------------------------------------------------------
 ----------------------
 | DEFAULT VALUES     |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
 ----------------------   ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 -------------------------------------------------------------------------------
 001:0004-----------------------------------------------------------------------
 **********************************
 *          ORGAWORLD FILE        *
 **********************************
 *
 * SUB-AREA No.1
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=    2.07
 | 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
 ----------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       1.74          .33
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .52         1.00
      Length             (m)=     204.72        20.00
      Mannings n            =       .030         .250

      Max.eff.Inten.(mm/hr)=      178.56        74.05
                 over (min)         7.50        12.50
      Storage Coeff.  (min)=        6.26 (ii)   12.72 (ii)
      Unit Hyd. Tpeak (min)=        7.50        12.50
      Unit Hyd. peak  (cms)=         .17          .09
                                                            *TOTALS*
      PEAK FLOW       (cms)=         .66          .04          .685 (iii)
      TIME TO PEAK    (hrs)=        1.04         1.17         1.042
      RUNOFF VOLUME    (mm)=       70.09        35.46        64.553
      TOTAL RAINFALL   (mm)=       71.66        71.66        71.665
      RUNOFF COEFFICIENT   =         .98          .49          .901

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0005-----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=    1.54
 | 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
 ----------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       1.42          .12
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .50         1.00
      Length             (m)=     244.34         5.00
      Mannings n            =       .030         .030

      Max.eff.Inten.(mm/hr)=      178.56        93.23
                 over (min)         7.50         7.50
      Storage Coeff.  (min)=        7.04 (ii)    7.76 (ii)
      Unit Hyd. Tpeak (min)=        7.50         7.50
      Unit Hyd. peak  (cms)=         .16          .15
                                                            *TOTALS*
      PEAK FLOW       (cms)=         .51          .02          .534 (iii)
      TIME TO PEAK    (hrs)=        1.04         1.08         1.042
      RUNOFF VOLUME    (mm)=       70.09        35.46        67.324
      TOTAL RAINFALL   (mm)=       71.66        71.66        71.665
      RUNOFF COEFFICIENT   =         .98          .49          .939

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0006-----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=    1.40
 | 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ----------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       1.36          .04
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .51         1.00
      Length             (m)=     225.63         5.00
      Mannings n            =       .030         .030

      Max.eff.Inten.(mm/hr)=      178.56        93.23
                 over (min)         7.50         7.50
      Storage Coeff.  (min)=        6.67 (ii)    7.39 (ii)
      Unit Hyd. Tpeak (min)=        7.50         7.50
      Unit Hyd. peak  (cms)=         .16          .15
                                                            *TOTALS*
      PEAK FLOW       (cms)=         .50          .01          .509 (iii)
      TIME TO PEAK    (hrs)=        1.04         1.08         1.042
      RUNOFF VOLUME    (mm)=       70.09        35.46        69.056
      TOTAL RAINFALL   (mm)=       71.66        71.66        71.665
      RUNOFF COEFFICIENT   =         .98          .49          .964

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0007-----------------------------------------------------------------------
 --------------------
 | ADD HYD (040   ) | ID: NHYD      AREA     QPEAK   TPEAK    R.V.    DWF
 --------------------               (ha)     (cms)   (hrs)    (mm)   (cms)
                   ID1 01:010       2.07      .685    1.04   64.55    .000
                  +ID2 02:020       1.54      .534    1.04   67.32    .000
                  ===================================================
                   SUM 04:040       3.61     1.220    1.04   65.74    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0008-----------------------------------------------------------------------
 --------------------
 | ADD HYD (050   ) | ID: NHYD      AREA     QPEAK   TPEAK    R.V.    DWF
 --------------------               (ha)     (cms)   (hrs)    (mm)   (cms)
                   ID1 03:030       1.40      .509    1.04   69.06    .000
                  +ID2 04:040       3.61     1.220    1.04   65.74    .000
                  ===================================================
                   SUM 05:050       5.01     1.729    1.04   66.66    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0009-----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=     .89
 | 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ----------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=        .86          .03
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .93          .70
      Length             (m)=     164.82        40.00
      Mannings n            =       .030         .250

      Max.eff.Inten.(mm/hr)=      178.56        67.61
                 over (min)         5.00        15.00
      Storage Coeff.  (min)=        4.62 (ii)   15.92 (ii)
      Unit Hyd. Tpeak (min)=        5.00        15.00
      Unit Hyd. peak  (cms)=         .24          .07
                                                            *TOTALS*
      PEAK FLOW       (cms)=         .37          .00          .374 (iii)
      TIME TO PEAK    (hrs)=        1.00         1.21         1.000
      RUNOFF VOLUME    (mm)=       70.09        35.46        69.056
      TOTAL RAINFALL   (mm)=       71.66        71.66        71.665
      RUNOFF COEFFICIENT   =         .98          .49          .964

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0010-----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=    2.66
 | 07:070    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ----------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       2.58          .08
      Dep. Storage      (mm)=       1.57         4.67
      Average Slope      (%)=        .61         1.50
      Length             (m)=     207.25        20.00
      Mannings n            =       .030         .250

      Max.eff.Inten.(mm/hr)=      178.56        74.05
                 over (min)         5.00        12.50
      Storage Coeff.  (min)=        6.01 (ii)   11.73 (ii)
      Unit Hyd. Tpeak (min)=        5.00        12.50
      Unit Hyd. peak  (cms)=         .20          .09
                                                            *TOTALS*
      PEAK FLOW       (cms)=        1.03          .01         1.034 (iii)
      TIME TO PEAK    (hrs)=        1.00         1.17         1.000
      RUNOFF VOLUME    (mm)=       70.09        35.46        69.056
      TOTAL RAINFALL   (mm)=       71.66        71.66        71.665
      RUNOFF COEFFICIENT   =         .98          .49          .964

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0011-----------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD      AREA     QPEAK   TPEAK    R.V.    DWF
 --------------------               (ha)     (cms)   (hrs)    (mm)   (cms)
                   ID1 06:060        .89      .374    1.00   69.06    .000
                  +ID2 07:070       2.66     1.034    1.00   69.06    .000
                  ===================================================
                   SUM 08:080       3.55     1.408    1.00   69.06    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0012-----------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD      AREA     QPEAK   TPEAK    R.V.    DWF
 --------------------               (ha)     (cms)   (hrs)    (mm)   (cms)
                   ID1 05:050       5.01     1.729    1.04   66.66    .000
                  +ID2 08:080       3.55     1.408    1.00   69.06    .000
                  ===================================================
                   SUM 09:090       8.56     3.067    1.04   67.66    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0013-----------------------------------------------------------------------
 ---------------------
 | ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
 |  IN>09:(090   )   |
 | OUT<10:(POND  )   |     =========  OUTFLOW STORAGE TABLE  =========
 ---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000   .0000E+00   |     .593   .6251E+00
                              .008   .6560E-01   |     .654   .6631E+00
                              .017   .1311E+00   |     .797   .7391E+00
                              .093   .2831E+00   |     .950   .8274E+00
                              .233   .3971E+00   |    1.304   .9157E+00
                              .337   .4731E+00   |    1.880   .1004E+01
                              .465   .5491E+00   |    2.577   .1092E+01
                              .531   .5871E+00   |     .000   .0000E+00
```

```
          ROUTING RESULTS               AREA      QPEAK      TPEAK        R.V.
          --------------------          (ha)      (cms)      (hrs)        (mm)
          INFLOW >09: (090   )          8.56      3.067      1.042      67.655
          OUTFLOW<10: (POND  )          8.56       .283      1.861      67.653

                        PEAK   FLOW    REDUCTION [Qout/Qin](%)=     9.214
                        TIME SHIFT OF PEAK FLOW          (min)=     49.17
                        MAXIMUM  STORAGE   USED       (ha.m.)=.4333E+00

------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
***********************************************
*     Remaining Hawthorne Industrial Park     *
***********************************************
*
* SUB-AREA No.1
----------------------
| CALIB STANDHYD      |   Area      (ha)=    19.90
| 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      14.13         5.77
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .60         1.50
     Length             (m)=     580.00       100.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=     153.66       117.89
                over (min)      12.50        25.00
     Storage Coeff.   (min)=     11.89 (ii)   24.37 (ii)
     Unit Hyd. Tpeak (min)=     12.50        25.00
     Unit Hyd. peak  (cms)=       .09          .05
                                                          *TOTALS*
     PEAK FLOW        (cms)=       2.77         1.13         3.419 (iii)
     TIME TO PEAK     (hrs)=       1.13         1.38         1.167
     RUNOFF VOLUME     (mm)=      70.09        45.94        58.015
     TOTAL RAINFALL    (mm)=      71.66        71.66        71.665
     RUNOFF COEFFICIENT   =        .98          .64          .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0015----------------------------------------------------------------------
--------------------
| ADD HYD (HIP02 ) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.      DWF
--------------------                (ha)      (cms)   (hrs)    (mm)     (cms)
                  ID1 10:POND       8.56       .283    1.86   67.65      .000
                 +ID2 01:HIP01     19.90      3.419    1.17   58.02      .000
                 ===================================================
                  SUM 02:HIP02     28.46      3.554    1.17   60.91      .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0016----------------------------------------------------------------------
*
* SUB-AREA No.2
----------------------
| CALIB STANDHYD      |   Area      (ha)=    17.00
| 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      12.07         4.93
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .65         1.50
     Length             (m)=     450.00       100.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=     178.56       126.60
                over (min)      10.00        22.50
     Storage Coeff.   (min)=      9.39 (ii)   21.52 (ii)
     Unit Hyd. Tpeak (min)=     10.00        22.50
     Unit Hyd. peak  (cms)=       .12          .05
                                                          *TOTALS*
     PEAK FLOW        (cms)=       2.68         1.05         3.203 (iii)
     TIME TO PEAK     (hrs)=       1.08         1.33         1.125
     RUNOFF VOLUME     (mm)=      70.09        45.94        58.015
     TOTAL RAINFALL    (mm)=      71.66        71.66        71.665
     RUNOFF COEFFICIENT   =        .98          .64          .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0017----------------------------------------------------------------------
*
* SUB-AREA No.3
----------------------
| CALIB STANDHYD      |   Area      (ha)=    18.10
| 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      12.85         5.25
     Dep. Storage      (mm)=       1.57         4.67
     Average Slope      (%)=        .50         1.50
     Length             (m)=     600.00       100.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=     153.66       117.89
                over (min)      12.50        25.00
     Storage Coeff.   (min)=     12.82 (ii)   25.30 (ii)
     Unit Hyd. Tpeak (min)=     12.50        25.00
     Unit Hyd. peak  (cms)=       .09          .04
                                                          *TOTALS*
     PEAK FLOW        (cms)=       2.43         1.01         3.031 (iii)
     TIME TO PEAK     (hrs)=       1.13         1.38         1.167
     RUNOFF VOLUME     (mm)=      70.09        45.94        58.015
     TOTAL RAINFALL    (mm)=      71.66        71.66        71.665
     RUNOFF COEFFICIENT   =        .98          .64          .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0018----------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.      DWF
--------------------                (ha)      (cms)   (hrs)    (mm)     (cms)
                  ID1 03:HIP03     17.00      3.203    1.13   58.02      .000
                 +ID2 04:HIP04     18.10      3.031    1.17   58.02      .000
                 ===================================================
                  SUM 05:HIP05     35.10      6.178    1.13   58.02      .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0019----------------------------------------------------------------------
*
*SUB-AREA No.4
----------------------
| DESIGN NASHYD       |   Area      (ha)=     4.00   Curve Number   (CN)=85.00
| 06:Pond-B DT= 2.50 |   Ia         (mm)=    4.670   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=      .170

     Unit Hyd Qpeak  (cms)=       .899

     PEAK FLOW        (cms)=       .649 (i)
     TIME TO PEAK     (hrs)=      1.125
     RUNOFF VOLUME     (mm)=     40.139
     TOTAL RAINFALL    (mm)=     71.665
     RUNOFF COEFFICIENT   =       .560

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

------------------------------------------------------------------------------
001:0020----------------------------------------------------------------------
--------------------
| ADD HYD (HIP06 ) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.      DWF
--------------------                (ha)      (cms)   (hrs)    (mm)     (cms)
                  ID1 02:HIP02     28.46      3.554    1.17   60.91      .000
                 +ID2 05:HIP05     35.10      6.178    1.13   58.02      .000
                 +ID3 06:Pond-B     4.00       .649    1.13   40.14      .000
                 ===================================================
                  SUM 07:HIP06     67.56     10.299    1.13   58.18      .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0021----------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
| IN>07:(HIP06 )     |
| OUT<08:(HIP-PO)    |     ========= OUTFLOW STORAGE TABLE =========
--------------------       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000   .0000E+00   |    .724   .2210E+01
                             .048   .5740E-01   |    .937   .2501E+01
                             .054   .2434E+00   |   1.262   .2798E+01
                             .059   .5834E+00   |   1.404   .3101E+01
                             .062   .8400E+00   |   1.532   .3410E+01
                             .064   .1102E+01   |   1.650   .3724E+01
                             .147   .1370E+01   |   2.409   .4044E+01
                             .280   .1644E+01   |   3.689   .4370E+01
                             .472   .1924E+01   |    .000   .0000E+00

     ROUTING RESULTS               AREA      QPEAK      TPEAK        R.V.
     --------------------          (ha)      (cms)      (hrs)        (mm)
     INFLOW >07: (HIP06 )         67.56     10.299      1.125      58.176
     OUTFLOW<08: (HIP-PO)         67.56      1.246      2.958      58.176

                   PEAK   FLOW    REDUCTION [Qout/Qin](%)=    12.102
                   TIME SHIFT OF PEAK FLOW          (min)=    110.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.2784E+01

------------------------------------------------------------------------------
001:0022----------------------------------------------------------------------
*
*SUB-AREA No. 5
*
----------------------
| DESIGN NASHYD       |   Area      (ha)=     6.80   Curve Number   (CN)=76.00
| 09:A2      DT= 2.50 |   Ia         (mm)=    4.670   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=      .370

     Unit Hyd Qpeak  (cms)=       .702

     PEAK FLOW        (cms)=       .497 (i)
     TIME TO PEAK     (hrs)=      1.417
     RUNOFF VOLUME     (mm)=     30.490
     TOTAL RAINFALL    (mm)=     71.665
     RUNOFF COEFFICIENT   =       .425

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

------------------------------------------------------------------------------
001:0023----------------------------------------------------------------------
*
*SUB-AREA No. 6
*
----------------------
| DESIGN NASHYD       |   Area      (ha)=     5.30   Curve Number   (CN)=76.00
| 10:A3      DT= 2.50 |   Ia         (mm)=    4.670   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=      .804

     Unit Hyd Qpeak  (cms)=       .252

     PEAK FLOW        (cms)=       .223 (i)
     TIME TO PEAK     (hrs)=      1.958
     RUNOFF VOLUME     (mm)=     30.490
     TOTAL RAINFALL    (mm)=     71.665
     RUNOFF COEFFICIENT   =       .425

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

------------------------------------------------------------------------------
001:0024----------------------------------------------------------------------
--------------------
| ADD HYD (Interi) | ID: NHYD       AREA      QPEAK   TPEAK    R.V.      DWF
--------------------                (ha)      (cms)   (hrs)    (mm)     (cms)
                  ID1 08:HIP-PO    67.56      1.246    2.96   58.18      .000
                 +ID2 09:A2         6.80       .497    1.42   30.49      .000
                 +ID3 10:A3         5.30       .223    1.96   30.49      .000
                 ===================================================
                  SUM 01:Interi    79.66      1.531    2.39   53.97      .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0025----------------------------------------------------------------------
     FINISH
------------------------------------------------------------------------------
******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2009-05-15      at 08:57:05
==============================================================================
```

APPENDIX 'H'

SWMHYMO INPUT AND OUTPUT FILES
(Post-Development Controlled Phase 2 Conditions)

```
2     Metric units
*#*************************************************************************
*#  Project Name : Hawthorne Industrial Park        Project Number:    [20983] *
*#  Date         : January, 2009                                           *
*#  Revised      : N/A                                                     *
*#  Developed by : Mark Buchanan, E.I.T.                                   *
*#  Reviewed by  : Guy Forget, P.Eng.                                      *
*#  Company      : J.L. Richards & Associates Limited                      *
*#  License #    : 4418403                                                 *
*#*************************************************************************
*
*
*#*************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT            *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE    *
*#*************************************************************
*
**************************************************************************
*        SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE         *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS   *
**************************************************************************
*****************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*****************************************************
************************************************************
*        POST-DEVELOPMENT UNCONTROLLED CONDITIONS           *
************************************************************
************************************************************
*             CALCULATION OF 4 HR 25 MM STORM EVENT         *
************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [  ] <--storm filename, one per line for NSTORM time
READ STORM           STORM_FILENAME=["4HR25-15.STM"]
*%-----------------|----------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|----------------------------------------------------|
************************************
*           ORGAWORLD FILE          *
************************************
*
* SUB-AREA No.1
CALIB STANDHYD       ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                     XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                          LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD       ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                     XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                          LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD       ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                     XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                          LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|----------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD       ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                     XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                          LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD       ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                     XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                          LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|----------------------------------------------------|
ROUTE RESERVOIR      IDout=[10],   NHYD=["POND"],  IDin=[9],
                     RDT=[1.0](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                 [   0.000,  0.0000]
                                 [   0.008,  0.0656]
                                 [   0.017,  0.1311]
                                 [   0.093,  0.2831]
                                 [   0.233,  0.3971]
                                 [   0.337,  0.4731]
                                 [   0.465,  0.5491]
                                 [   0.531,  0.5871]
                                 [   0.593,  0.6251]
                                 [   0.654,  0.6631]
                                 [   0.797,  0.7391]
                                 [   0.950,  0.8274]
                                 [   1.304,  0.9157]
                                 [   1.880,  1.0040]
                                 [   2.577,  1.0923]
                                 [   -1    ,  -1    ]  (max twenty pts)
**********************************************
*     Remaining Hawthorne Industrial Park     *
**********************************************
*
* SUB-AREA No.1
CALIB STANDHYD       ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                     XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                          LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|----------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD       ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                     XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                          LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD       ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                     XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                          LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|----------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD       ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                     XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                          LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                          LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------|
*
*SUB-AREA No.5
DESIGN NASHYD        ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                     DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|----------------------------------------------------|
ROUTE RESERVOIR      IDout=[ 10 ],   NHYD=["HIP-POND"],  IDin=[ 9 ],
                     RDT=[1.0](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                 [   0.0  , 0.0     ]
                                 [   0.048, 0.0574 ]
                                 [   0.054, 0.2434 ]
                                 [   0.059, 0.5834 ]
                                 [   0.062, 0.8400 ]
                                 [   0.064, 1.1024 ]
                                 [   0.147, 1.3705 ]
                                 [   0.280, 1.6444 ]
                                 [   0.472, 1.9242 ]
                                 [   0.724, 2.2097 ]
                                 [   0.937, 2.5010 ]
                                 [   1.262, 2.7981 ]
                                 [   1.404, 3.1009 ]
                                 [   1.532, 3.4096 ]
                                 [   1.650, 3.7240 ]
                                 [   2.409, 4.0442 ]
                                 [   3.689, 4.3702 ]
                                 [   -1  ,  -1    ]  (max twenty pts)
*%-----------------|----------------------------------------------------|
*
*SUB-AREA No. 6
DESIGN NASHYD        ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                     DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|----------------------------------------------------|
ADD HYD              IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|----------------------------------------------------|
************************************************************
*         CALCULATION OF 3HR - 1:2 YEAR STORM EVENT         *
************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [  ] <--storm filename, one per line for NSTORM time
*%-----------------|----------------------------------------------------|
CHICAGO STORM        IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                     ICASEcs=[1],
                     A=[732.951],  B=[6.199], and C=[0.810],
*%-----------------|----------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|----------------------------------------------------|
************************************
*           ORGAWORLD FILE          *
************************************
*
* SUB-AREA No.1
CALIB STANDHYD       ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                     XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                     SCS curve number CN=[81],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                          LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                          LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
```

```
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD          ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                        XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                             LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD          ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                             LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD          ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                             LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                             LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD          ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                             LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR         IDout=[10],    NHYD=["POND"],  IDin=[9],
                        RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [   0.000,  0.0000]
                                     [   0.008,  0.0656]
                                     [   0.017,  0.1311]
                                     [   0.093,  0.2831]
                                     [   0.233,  0.3971]
                                     [   0.337,  0.4731]
                                     [   0.465,  0.5491]
                                     [   0.531,  0.5871]
                                     [   0.593,  0.6251]
                                     [   0.654,  0.6631]
                                     [   0.797,  0.7391]
                                     [   0.950,  0.8274]
                                     [   1.304,  0.9157]
                                     [   1.880,  1.0040]
                                     [   2.577,  1.0923]
                                     [   -1   ,  -1    ]  (max twenty pts)
*********************************************
*     Remaining Hawthorne Industrial Park    *
*********************************************
*
* SUB-AREA No.1
CALIB STANDHYD          ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                             LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD          ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                             LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD          ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                             LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD          ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                        XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                             LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
*SUB-AREA No.5
DESIGN NASHYD           ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                        DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                        RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR         IDout=[ 10 ],    NHYD=["HIP-POND"],  IDin=[ 9 ],
                        RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [   0.0  , 0.0    ]
                                     [   0.048, 0.0574 ]
                                     [   0.054, 0.2434 ]
                                     [   0.059, 0.5834 ]
                                     [   0.062, 0.8400 ]
                                     [   0.064, 1.1024 ]
                                     [   0.147, 1.3705 ]
                                     [   0.280, 1.6444 ]
                                     [   0.472, 1.9242 ]
                                     [   0.724, 2.2097 ]
                                     [   0.937, 2.5010 ]
                                     [   1.262, 2.7981 ]
                                     [   1.404, 3.1009 ]
                                     [   1.532, 3.4096 ]
                                     [   1.650, 3.7240 ]
                                     [   2.409, 4.0442 ]
                                     [   3.689, 4.3702 ]
                                     [   -1  ,  -1    ]  (max twenty pts)
*%-----------------|-----------------------------------------------------------|
*
*SUB-AREA No. 6
DESIGN NASHYD           ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                        DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                        RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|-----------------------------------------------------------|
***************************************************************
*        CALCULATION OF 3HR - 1:5 YEAR STORM EVENT            *
***************************************************************
START                   TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                       [ ] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
CHICAGO STORM           IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                        ICASEcs=[1],
                        A=[998.071],  B=[6.053], and C=[0.814],
*%-----------------|-----------------------------------------------------------|
DEFAULT VALUES          ICASEdef=[1],  read and print values
                        DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-----------------------------------------------------------|
************************************
*           ORGAWORLD FILE         *
************************************
*
* SUB-AREA No.1
CALIB STANDHYD          ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                        XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                             LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD          ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                        XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                             LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD          ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                             LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                             LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD          ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                             LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                             LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD          ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                        XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                        SCS curve number CN=[81],
                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                             LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                             LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                        RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-----------------------------------------------------------|
ADD HYD                 IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-----------------------------------------------------------|
```

```

ROUTE RESERVOIR     IDout=[10],    NHYD=["POND"],   IDin=[9],
                    RDT=[1.0](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                   (cms) - (ha-m)
                                 [   0.000,  0.0000]
                                 [   0.008,  0.0656]
                                 [   0.017,  0.1311]
                                 [   0.093,  0.2831]
                                 [   0.233,  0.3971]
                                 [   0.337,  0.4731]
                                 [   0.465,  0.5491]
                                 [   0.531,  0.5871]
                                 [   0.593,  0.6251]
                                 [   0.654,  0.6631]
                                 [   0.797,  0.7391]
                                 [   0.950,  0.8274]
                                 [   1.304,  0.9157]
                                 [   1.880,  1.0040]
                                 [   2.577,  1.0923]
                                 [   -1   ,  -1    ]  (max twenty pts)

**********************************************
*     Remaining Hawthorne Industrial Park     *
**********************************************
*
* SUB-AREA No.1

CALIB STANDHYD      ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                         LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD      ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                         LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD      ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                         LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD      ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                         LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD       ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                    DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|

ADD HYD             IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-------------------------------------------------------------|

ROUTE RESERVOIR     IDout=[ 10 ],   NHYD=["HIP-POND"],  IDin=[ 9 ],
                    RDT=[1.0](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                   (cms) - (ha-m)
                                 [   0.0  , 0.0    ]
                                 [   0.048, 0.0574 ]
                                 [   0.054, 0.2434 ]
                                 [   0.059, 0.5834 ]
                                 [   0.062, 0.8400 ]
                                 [   0.064, 1.1024 ]
                                 [   0.147, 1.3705 ]
                                 [   0.280, 1.6444 ]
                                 [   0.472, 1.9242 ]
                                 [   0.724, 2.2097 ]
                                 [   0.937, 2.5010 ]
                                 [   1.262, 2.7981 ]
                                 [   1.404, 3.1009 ]
                                 [   1.532, 3.4096 ]
                                 [   1.650, 3.7240 ]
                                 [   2.409, 4.0442 ]
                                 [   3.689, 4.3702 ]
                                 [   -1  ,  -1     ]  (max twenty pts)

*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 6

DESIGN NASHYD       ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                    DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|

ADD HYD             IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------------|

*************************************************************
*         CALCULATION OF 3HR - 1:10 YEAR STORM EVENT         *
*************************************************************

START               TZERO=[0.0],   METOUT=[2],   NSTORM=[0],   NRUN=[0]
*%                   [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------------|
CHICAGO STORM       IUNITS=[2],   TD=[3.0](hrs), TPRAT=[0.333],   CSDT=[10.0](min)
                    ICASEcs=[1],
                    A=[1174.184],  B=[6.014], and C=[0.816],
*%-----------------|-------------------------------------------------------------|
DEFAULT VALUES      ICASEdef=[1],  read and print values
                    DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------------|

************************************
*          ORGAWORLD FILE          *
************************************
*
* SUB-AREA No.1

CALIB STANDHYD      ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                    XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                         LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                         LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD      ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                    XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                         LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                         LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD      ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                    XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                         LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                         LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD      ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                    XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                         LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD      ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                    XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                         LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------------|

ROUTE RESERVOIR     IDout=[10],    NHYD=["POND"],   IDin=[9],
                    RDT=[1.0](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                   (cms) - (ha-m)
                                 [   0.000,  0.0000]
                                 [   0.008,  0.0656]
                                 [   0.017,  0.1311]
                                 [   0.093,  0.2831]
                                 [   0.233,  0.3971]
                                 [   0.337,  0.4731]
                                 [   0.465,  0.5491]
                                 [   0.531,  0.5871]
                                 [   0.593,  0.6251]
                                 [   0.654,  0.6631]
                                 [   0.797,  0.7391]
                                 [   0.950,  0.8274]
                                 [   1.304,  0.9157]
                                 [   1.880,  1.0040]
                                 [   2.577,  1.0923]
                                 [   -1   ,  -1    ]  (max twenty pts)

**********************************************
*     Remaining Hawthorne Industrial Park     *
**********************************************
*
* SUB-AREA No.1

CALIB STANDHYD      ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                         LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD      ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                         LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                         LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD      ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                    XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[81],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
```

```
                                                 LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                                 LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD           ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                                 LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                                 LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD            ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                         DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|

ADD HYD                  IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-------------------------------------------------------------|

ROUTE RESERVOIR          IDout=[ 10 ],   NHYD=["HIP-POND"],  IDin=[ 9 ],
                         RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                     [   0.0  , 0.0    ]
                                     [   0.048, 0.0574 ]
                                     [   0.054, 0.2434 ]
                                     [   0.059, 0.5834 ]
                                     [   0.062, 0.8400 ]
                                     [   0.064, 1.1024 ]
                                     [   0.147, 1.3705 ]
                                     [   0.280, 1.6444 ]
                                     [   0.472, 1.9242 ]
                                     [   0.724, 2.2097 ]
                                     [   0.937, 2.5010 ]
                                     [   1.262, 2.7981 ]
                                     [   1.404, 3.1009 ]
                                     [   1.532, 3.4096 ]
                                     [   1.650, 3.7240 ]
                                     [   2.409, 4.0442 ]
                                     [   3.689, 4.3702 ]
                                     [   -1  ,  -1    ]  (max twenty pts)

*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No. 6

DESIGN NASHYD            ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|

ADD HYD                  IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------------|


***************************************************************
*         CALCULATION OF 3HR - 1:25 YEAR STORM EVENT          *
***************************************************************

START                    TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                        [ ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------------|
CHICAGO STORM            IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                         ICASEcs=[1],
                         A=[1402.884],  B=[6.018], and C=[0.819],
*%-----------------|-------------------------------------------------------------|
DEFAULT VALUES           ICASEdef=[1],  read and print values
                         DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|-------------------------------------------------------------|

**********************************
*          ORGAWORLD FILE        *
**********************************
*
* SUB-AREA No.1

CALIB STANDHYD           ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                         XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                                 LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                                 LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD           ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                         XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                                 LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                                 LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD           ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                                 LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                                 LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                                 LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                                 LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                                 LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                                 LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------------|

ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                     [   0.000,  0.0000]
                                     [   0.008,  0.0656]
                                     [   0.017,  0.1311]
                                     [   0.093,  0.2831]
                                     [   0.233,  0.3971]
                                     [   0.337,  0.4731]
                                     [   0.465,  0.5491]
                                     [   0.531,  0.5871]
                                     [   0.593,  0.6251]
                                     [   0.654,  0.6631]
                                     [   0.797,  0.7391]
                                     [   0.950,  0.8274]
                                     [   1.304,  0.9157]
                                     [   1.880,  1.0040]
                                     [   2.577,  1.0923]
                                     [   -1   ,  -1    ]  (max twenty pts)

*********************************************
*     Remaining Hawthorne Industrial Park   *
*********************************************
*
* SUB-AREA No.1

CALIB STANDHYD           ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                                 LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                                 LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD           ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                                 LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                                 LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD           ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                                 LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                                 LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD           ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                                 LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                                 LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|-------------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD            ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                         DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|

ADD HYD                  IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-------------------------------------------------------------|

ROUTE RESERVOIR          IDout=[ 10 ],   NHYD=["HIP-POND"],  IDin=[ 9 ],
                         RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                     [   0.0  , 0.0    ]
                                     [   0.048, 0.0574 ]
                                     [   0.054, 0.2434 ]
                                     [   0.059, 0.5834 ]
                                     [   0.062, 0.8400 ]
                                     [   0.064, 1.1024 ]
                                     [   0.147, 1.3705 ]
                                     [   0.280, 1.6444 ]
                                     [   0.472, 1.9242 ]
                                     [   0.724, 2.2097 ]
                                     [   0.937, 2.5010 ]
                                     [   1.262, 2.7981 ]
                                     [   1.404, 3.1009 ]
                                     [   1.532, 3.4096 ]
                                     [   1.650, 3.7240 ]
                                     [   2.409, 4.0442 ]
                                     [   3.689, 4.3702 ]
                                     [   -1  ,  -1    ]  (max twenty pts)

*%-----------------|-------------------------------------------------------------|
```

```
*
*SUB-AREA No. 6

DESIGN NASHYD          ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                       DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|------------------------------------------------------------|

ADD HYD                IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|------------------------------------------------------------|

****************************************************************
*        CALCULATION OF 3HR - 1:50 YEAR STORM EVENT            *
****************************************************************

START                  TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                      [  ] <--storm filename, one per line for NSTORM time
*%-----------------|------------------------------------------------------------|
CHICAGO STORM          IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                       ICASEcs=[1],
                       A=[1569.580],  B=[6.014], and C=[0.820],
*%-----------------|------------------------------------------------------------|
DEFAULT VALUES         ICASEdef=[1],  read and print values
                       DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|------------------------------------------------------------|

************************************
*          ORGAWORLD FILE          *
************************************
*
* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                       XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                            LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                       XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                            LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                            LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
ADD HYD                IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|------------------------------------------------------------|
ADD HYD                IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD         ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                            LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                            LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD         ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                            LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
ADD HYD                IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|------------------------------------------------------------|
ADD HYD                IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|------------------------------------------------------------|

ROUTE RESERVOIR        IDout=[10],   NHYD=["POND"],  IDin=[9],
                       RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                     [   0.000,  0.0000]
                                     [   0.008,  0.0656]
                                     [   0.017,  0.1311]
                                     [   0.093,  0.2831]
                                     [   0.233,  0.3971]
                                     [   0.337,  0.4731]
                                     [   0.465,  0.5491]
                                     [   0.531,  0.5871]
                                     [   0.593,  0.6251]
                                     [   0.654,  0.6631]
                                     [   0.797,  0.7391]
                                     [   0.950,  0.8274]
                                     [   1.304,  0.9157]
                                     [   1.880,  1.0040]
                                     [   2.577,  1.0923]
                                     [   -1   ,  -1    ]  (max twenty pts)

**********************************************
*     Remaining Hawthorne Industrial Park    *
**********************************************
*
* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                            LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
ADD HYD                IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                            LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                            LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
ADD HYD                IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|------------------------------------------------------------|
ADD HYD                IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD         ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                       XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                            LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                            LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|------------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD          ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                       DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|------------------------------------------------------------|

ADD HYD                IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|------------------------------------------------------------|

ROUTE RESERVOIR        IDout=[ 10 ],   NHYD=["HIP-POND"],  IDin=[ 9 ],
                       RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                     [   0.0  , 0.0    ]
                                     [   0.048, 0.0574 ]
                                     [   0.054, 0.2434 ]
                                     [   0.059, 0.5834 ]
                                     [   0.062, 0.8400 ]
                                     [   0.064, 1.1024 ]
                                     [   0.147, 1.3705 ]
                                     [   0.280, 1.6444 ]
                                     [   0.472, 1.9242 ]
                                     [   0.724, 2.2097 ]
                                     [   0.937, 2.5010 ]
                                     [   1.262, 2.7981 ]
                                     [   1.404, 3.1009 ]
                                     [   1.532, 3.4096 ]
                                     [   1.650, 3.7240 ]
                                     [   2.409, 4.0442 ]
                                     [   3.689, 4.3702 ]
                                     [   -1   , -1     ]  (max twenty pts)

*%-----------------|------------------------------------------------------------|
*
*SUB-AREA No. 6

DESIGN NASHYD          ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                       DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                       RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|------------------------------------------------------------|

ADD HYD                IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|------------------------------------------------------------|

****************************************************************
*        CALCULATION OF 3HR - 1:100 YEAR STORM EVENT           *
****************************************************************

START                  TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                      [  ] <--storm filename, one per line for NSTORM time
*%-----------------|------------------------------------------------------------|
CHICAGO STORM          IUNITS=[2],  TD=[3.0](hrs), TPRAT=[0.333],  CSDT=[10.0](min)
                       ICASEcs=[1],
                       A=[1735.688],  B=[6.014], and C=[0.820],
*%-----------------|------------------------------------------------------------|
DEFAULT VALUES         ICASEdef=[1],  read and print values
                       DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|------------------------------------------------------------|

************************************
*          ORGAWORLD FILE          *
************************************
*
* SUB-AREA No.1

CALIB STANDHYD         ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                       XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                            LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD         ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                       XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                       SCS curve number CN=[81],
                       Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                            LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                       Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                            LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                       RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD         ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                       XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
```

```
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                              LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                              LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD           ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                              LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                              LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.5
CALIB STANDHYD           ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                         XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                              LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR          IDout=[10],   NHYD=["POND"],  IDin=[9],
                         RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.000,  0.0000]
                                       [   0.008,  0.0656]
                                       [   0.017,  0.1311]
                                       [   0.093,  0.2831]
                                       [   0.233,  0.3971]
                                       [   0.337,  0.4731]
                                       [   0.465,  0.5491]
                                       [   0.531,  0.5871]
                                       [   0.593,  0.6251]
                                       [   0.654,  0.6631]
                                       [   0.797,  0.7391]
                                       [   0.950,  0.8274]
                                       [   1.304,  0.9157]
                                       [   1.880,  1.0040]
                                       [   2.577,  1.0923]
                                       [   -1   ,  -1    ]  (max twenty pts)
*********************************************
*     Remaining Hawthorne Industrial Park     *
*********************************************
*
* SUB-AREA No.1
CALIB STANDHYD           ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                              LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.2
CALIB STANDHYD           ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                              LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.3
CALIB STANDHYD           ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                              LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------|
*
* SUB-AREA No.4
CALIB STANDHYD           ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                         XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                         SCS curve number CN=[81],
                         Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                              LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                         Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                              LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No.5
DESIGN NASHYD            ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                         DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR          IDout=[ 10 ],   NHYD=["HIP-POND"],  IDin=[ 9 ],
                         RDT=[1.0](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                         (cms) - (ha-m)
                                       [   0.0  , 0.0    ]
                                       [   0.048, 0.0574 ]
                                       [   0.054, 0.2434 ]
                                       [   0.059, 0.5834 ]
                                       [   0.062, 0.8400 ]
                                       [   0.064, 1.1024 ]
                                       [   0.147, 1.3705 ]
                                       [   0.280, 1.6444 ]
                                       [   0.472, 1.9242 ]
                                       [   0.724, 2.2097 ]
                                       [   0.937, 2.5010 ]
                                       [   1.262, 2.7981 ]
                                       [   1.404, 3.1009 ]
                                       [   1.532, 3.4096 ]
                                       [   1.650, 3.7240 ]
                                       [   2.409, 4.0442 ]
                                       [   3.689, 4.3702 ]
                                       [   -1  ,  -1    ]  (max twenty pts)
*%-----------------|-------------------------------------------------------|
*
*SUB-AREA No. 6
DESIGN NASHYD            ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                         DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD                  IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|-------------------------------------------------------|
FINISH
```

```
 ==============================================================================
 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O ## 9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9 =========
                                                     9   9  9   9 # 4418403
       StormWater Management HYdrologic Model         999   999  =========
 **************************************************************************
 *************************** SWMHYMO-99 Ver/4.02 **************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                  *******
 **************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                 Ottawa,  Ontario: (613) 727-5199            *******
 *******                 Gatineau, Quebec: (819) 243-6858            *******
 *******                 E-Mail: swmhymo@jfsa.Com                    *******
 **************************************************************************
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: J. L. Richards & Associates Limited          +++++++
 +++++++                 Ottawa                 SERIAL#:4418403     +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 **************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
 *******           Maximum value for ID numbers  :    10             *******
 *******           Max. number of rainfall points:  15000            *******
 *******           Max. number of flow points    :  15000            *******
 **************************************************************************
 ********************   D E T A I L E D   O U T P U T   *******************
 **************************************************************************
 *       DATE: 2009-05-15     TIME: 08:45:21     RUN COUNTER: 000198      *
 **************************************************************************
 * Input   filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\SWM-ALL.dat        *
 * Output  filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\SWM-ALL.out        *
 * Summary filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\SWM-ALL.sum        *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 **************************************************************************
-----------------------------------------------------------------------------
001:0001---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name : Hawthorne Industrial Park        Project Number:    [20983] *
*#  Date         : January, 2009                                             *
*#  Revised      : N/A                                                        *
*#  Developed by : Mark Buchanan, E.I.T.                                      *
*#  Reviewed by  : Guy Forget, P.Eng.                                         *
*#  Company      : J.L. Richards & Associates Limited                         *
*#  License #    : 4418403                                                    *
*#****************************************************************************
*
*
*#*****************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT                *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE     *
*#*****************************************************************
*
******************************************************************************
*          SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE          *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS  *
******************************************************************************
*****************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*****************************************************
**************************************************************
*         POST-DEVELOPMENT UNCONTROLLED CONDITIONS           *
**************************************************************
**************************************************************
*            CALCULATION OF 4 HR 25 MM STORM EVENT           *
**************************************************************
--------------------
| START              |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------  Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=    0
-----------------------------------------------------------------------------
001:0002---------------------------------------------------------------------
--------------------
| READ STORM        |    Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\4HR25-
| Ptotal=  25.00 mm|    Comments: 4hr-15 min 25 MM STORM EVENT (CHICAGO DI
--------------------
                 TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                  hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                  .25   1.777 |   1.25  45.631 |   2.25   3.138 |   3.25   1.675
                  .50   2.357 |   1.50  11.911 |   2.50   2.555 |   3.50   1.509
                  .75   3.618 |   1.75   6.051 |   2.75   2.165 |   3.75   1.376
                 1.00   8.975 |   2.00   4.108 |   3.00   1.885 |   4.00   1.266
-----------------------------------------------------------------------------
001:0003---------------------------------------------------------------------
---------------------
| DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
---------------------  ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
-----------------------------------------------------------------------------
001:0004---------------------------------------------------------------------
**********************************
*          ORGAWORLD FILE        *
**********************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |   Area    (ha)=    2.07
| 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.74          .33
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .52         1.00
     Length            (m)=     204.72        20.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=      45.63         5.37
              over (min)        10.00        30.00
     Storage Coeff.  (min)=      10.80 (ii)   29.27 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=        .11          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .16          .00          .158 (iii)
     TIME TO PEAK    (hrs)=       1.29         1.75         1.292
     RUNOFF VOLUME    (mm)=      23.43         5.17        20.508
     TOTAL RAINFALL   (mm)=      25.00        25.00        24.999
     RUNOFF COEFFICIENT   =        .94          .21          .820

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0005---------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area    (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.42          .12
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .50         1.00
     Length            (m)=     244.34         5.00
     Mannings n           =       .030         .030

     Max.eff.Inten.(mm/hr)=      45.63         7.24
              over (min)        12.50        15.00
     Storage Coeff.  (min)=      12.15 (ii)   14.15 (ii)
     Unit Hyd. Tpeak (min)=      12.50        15.00
     Unit Hyd. peak  (cms)=        .09          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .12          .00          .121 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.46         1.333
     RUNOFF VOLUME    (mm)=      23.43         5.17        21.969
     TOTAL RAINFALL   (mm)=      25.00        25.00        24.999
     RUNOFF COEFFICIENT   =        .94          .21          .879

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0006---------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |   Area    (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.36          .04
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .51         1.00
     Length            (m)=     225.63         5.00
     Mannings n           =       .030         .030

     Max.eff.Inten.(mm/hr)=      45.63         7.97
              over (min)        12.50        12.50
     Storage Coeff.  (min)=      11.52 (ii)   13.44 (ii)
     Unit Hyd. Tpeak (min)=      12.50        12.50
     Unit Hyd. peak  (cms)=        .10          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .12          .00          .118 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.333
     RUNOFF VOLUME    (mm)=      23.43         5.17        22.881
     TOTAL RAINFALL   (mm)=      25.00        25.00        24.999
     RUNOFF COEFFICIENT   =        .94          .21          .915

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0007---------------------------------------------------------------------
--------------------
| ADD HYD (040    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                  ID1 01:010        2.07      .158     1.29  20.51     .000
                 +ID2 02:020        1.54      .121     1.33  21.97     .000
                 ==========================================================
                  SUM 04:040        3.61      .278     1.33  21.13     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0008---------------------------------------------------------------------
--------------------
| ADD HYD (050    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                  ID1 03:030        1.40      .118     1.33  22.88     .000
                 +ID2 04:040        3.61      .278     1.33  21.13     .000
                 ==========================================================
                  SUM 05:050        5.01      .396     1.33  21.62     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0009---------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .86          .03
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=        .93          .70
     Length            (m)=     164.82        40.00
     Mannings n           =       .030         .250

     Max.eff.Inten.(mm/hr)=      45.63         4.42
              over (min)         7.50        42.50
     Storage Coeff.  (min)=       7.97 (ii)   41.62 (ii)
     Unit Hyd. Tpeak (min)=       7.50        42.50
     Unit Hyd. peak  (cms)=        .14          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .09          .00          .089 (iii)
     TIME TO PEAK    (hrs)=       1.25         2.00         1.250
     RUNOFF VOLUME    (mm)=      23.43         5.17        22.882
     TOTAL RAINFALL   (mm)=      25.00        25.00        24.999
     RUNOFF COEFFICIENT   =        .94          .21          .915

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0010------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD    |    Area     (ha)=      2.66
 | 07:070    DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      2.58          .08
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .61         1.50
     Length             (m)=    207.25        20.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      45.63         5.66
                over (min)       10.00        27.50
     Storage Coeff.  (min)=      10.37 (ii)   26.38 (ii)
     Unit Hyd. Tpeak (min)=      10.00        27.50
     Unit Hyd. peak  (cms)=        .11          .04
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .24          .00        .238 (iii)
     TIME TO PEAK    (hrs)=       1.29         1.67       1.292
     RUNOFF VOLUME    (mm)=      23.43         5.17      22.882
     TOTAL RAINFALL   (mm)=      25.00        25.00      24.999
     RUNOFF COEFFICIENT   =        .94          .21        .915

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0011------------------------------------------------------------------
 ---------------------
 | ADD HYD (080    ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
              ID1 06:060              .89      .089     1.25    22.88     .000
             +ID2 07:070             2.66      .238     1.29    22.88     .000
              ==========================================================
              SUM 08:080             3.55      .327     1.29    22.88     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0012------------------------------------------------------------------
 ---------------------
 | ADD HYD (090    ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
              ID1 05:050             5.01      .396     1.33    21.62     .000
             +ID2 08:080             3.55      .327     1.29    22.88     .000
              ==========================================================
              SUM 09:090             8.56      .716     1.29    22.14     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0013------------------------------------------------------------------
 ---------------------
 | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
 |  IN>09:(090    )  |
 | OUT<10:(POND   )  |     =========  OUTFLOW STORAGE TABLE  =========
 ---------------------     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)     (ha.m.)
                             .000  .0000E+00    |      .593  .6251E+00
                             .008  .6560E-01    |      .654  .6631E+00
                             .017  .1311E+00    |      .797  .7391E+00
                             .093  .2831E+00    |      .950  .8274E+00
                             .233  .3971E+00    |     1.304  .9157E+00
                             .337  .4731E+00    |     1.880  .1004E+01
                             .465  .5491E+00    |     2.577  .1092E+01
                             .531  .5871E+00    |      .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK      TPEAK        R.V.
     --------------------       (ha)     (cms)      (hrs)        (mm)
     INFLOW >09: (090   )       8.56      .716      1.292      22.143
     OUTFLOW<10: (POND  )       8.56      .032      3.875      22.141

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=     4.470
                 TIME SHIFT OF PEAK FLOW         (min)=    155.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=.1611E+00

 ---------------------------------------------------------------------------
 001:0014------------------------------------------------------------------
 *********************************************
 *    Remaining Hawthorne Industrial Park     *
 *********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD    |    Area     (ha)=     19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     14.13         5.77
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .60         1.50
     Length             (m)=    580.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      34.39        11.90
                over (min)       22.50        52.50
     Storage Coeff.  (min)=      21.64 (ii)   52.88 (ii)
     Unit Hyd. Tpeak (min)=      22.50        52.50
     Unit Hyd. peak  (cms)=        .05          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .60          .11        .642 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.13       1.542
     RUNOFF VOLUME    (mm)=      23.43         8.74      16.085
     TOTAL RAINFALL   (mm)=      25.00        25.00      24.999
     RUNOFF COEFFICIENT   =        .94          .35        .643

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0015------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
              ID1 10:POND            8.56      .032     3.88    22.14     .000
             +ID2 01:HIP01          19.90      .642     1.54    16.08     .000
              ==========================================================
              SUM 02:HIP02          28.46      .655     1.54    17.91     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


 ---------------------------------------------------------------------------
 001:0016------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD    |    Area     (ha)=     17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     12.07         4.93
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .65         1.50
     Length             (m)=    450.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      40.81        12.73
                over (min)       17.50        47.50
     Storage Coeff.  (min)=      16.94 (ii)   47.35 (ii)
     Unit Hyd. Tpeak (min)=      17.50        47.50
     Unit Hyd. peak  (cms)=        .07          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .60          .10        .625 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.00       1.458
     RUNOFF VOLUME    (mm)=      23.43         8.74      16.085
     TOTAL RAINFALL   (mm)=      25.00        25.00      24.999
     RUNOFF COEFFICIENT   =        .94          .35        .643

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0017------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD    |    Area     (ha)=     15.60
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     11.08         4.52
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .50         1.50
     Length             (m)=    600.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      34.39        11.54
                over (min)       22.50        55.00
     Storage Coeff.  (min)=      23.33 (ii)   54.95 (ii)
     Unit Hyd. Tpeak (min)=      22.50        55.00
     Unit Hyd. peak  (cms)=        .05          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .45          .08        .484 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17       1.542
     RUNOFF VOLUME    (mm)=      23.43         8.74      16.085
     TOTAL RAINFALL   (mm)=      25.00        25.00      24.999
     RUNOFF COEFFICIENT   =        .94          .35        .643

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0018------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
              ID1 03:HIP03          17.00      .625     1.46    16.08     .000
             +ID2 04:HIP04          15.60      .484     1.54    16.08     .000
              ==========================================================
              SUM 05:HIP05          32.60     1.091     1.46    16.08     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0019------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 ---------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
              ID1 05:HIP05          32.60     1.091     1.46    16.08     .000
             +ID2 02:HIP02          28.46      .655     1.54    17.91     .000
              ==========================================================
              SUM 06:HIP06          61.06     1.740     1.50    16.93     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0020------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD    |    Area     (ha)=     12.20
 | 07:HIP07  DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      8.66         3.54
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .70         1.50
     Length             (m)=    210.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=      45.63        14.15
                over (min)       10.00        40.00
     Storage Coeff.  (min)=      10.03 (ii)   39.18 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=        .11          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .57          .08        .585 (iii)
     TIME TO PEAK    (hrs)=       1.29         1.88       1.292
     RUNOFF VOLUME    (mm)=      23.43         8.74      16.085
     TOTAL RAINFALL   (mm)=      25.00        25.00      24.999
     RUNOFF COEFFICIENT   =        .94          .35        .643

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0021------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ---------------------
 | DESIGN NASHYD      |   Area    (ha)=     4.00   Curve Number   (CN)=85.00
 | 08:Pond-B DT= 2.50 |   Ia      (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .170

     Unit Hyd Qpeak  (cms)=      .899

```

```
      PEAK FLOW          (cms)=      .077 (i)
      TIME TO PEAK       (hrs)=     1.375
      RUNOFF VOLUME       (mm)=     6.343
      TOTAL RAINFALL      (mm)=    24.999
      RUNOFF COEFFICIENT    =        .254

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

 ---------------------------------------------------------------------------
 001:0022-------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 06:HIP06    61.06     1.740    1.50  16.93   .000
                    +ID2 07:HIP07    12.20      .585    1.29  16.08   .000
                    +ID3 08:Pond-B    4.00      .077    1.38   6.34   .000
                    ==================================================
                     SUM 09:HIP08    77.26     2.227    1.46  16.25   .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0023-------------------------------------------------------------------
 ----------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
 |  IN>09:(HIP08 )    |
 | OUT<10:(HIP-PO)    |     ========  OUTFLOW STORAGE TABLE  ========
 ----------------------     OUTFLOW     STORAGE    |  OUTFLOW    STORAGE
                              (cms)     (ha.m.)    |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .724  .2210E+01
                              .048  .5740E-01    |     .937  .2501E+01
                              .054  .2434E+00    |    1.262  .2798E+01
                              .059  .5834E+00    |    1.404  .3101E+01
                              .062  .8400E+00    |    1.532  .3410E+01
                              .064  .1102E+01    |    1.650  .3724E+01
                              .147  .1370E+01    |    2.409  .4044E+01
                              .280  .1644E+01    |    3.689  .4370E+01
                              .472  .1924E+01    |     .000  .0000E+00

      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
      --------------------         (ha)      (cms)      (hrs)        (mm)
      INFLOW >09: (HIP08 )        77.26      2.227      1.458      16.251
      OUTFLOW<10: (HIP-PO)        77.26       .063      5.431      16.251

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.839
                  TIME SHIFT OF PEAK FLOW        (min)=   238.33
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1001E+01

 ---------------------------------------------------------------------------
 001:0024-------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=     2.70   Curve Number   (CN)=76.00
 | 01:A3     DT= 2.50 |   Ia        (mm)=    4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=      .800

      Unit Hyd Qpeak  (cms)=       .129

      PEAK FLOW          (cms)=      .013 (i)
      TIME TO PEAK       (hrs)=     2.292
      RUNOFF VOLUME       (mm)=     4.110
      TOTAL RAINFALL      (mm)=    24.999
      RUNOFF COEFFICIENT    =        .164

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

 ---------------------------------------------------------------------------
 001:0025-------------------------------------------------------------------
 --------------------
 | ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 10:HIP-PO   77.26      .063    5.43  16.25   .000
                    +ID2 01:A3        2.70      .013    2.29   4.11   .000
                    ==================================================
                     SUM 02:Ultima   79.96      .073    2.50  15.84   .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0026-------------------------------------------------------------------
 **************************************************************
 *        CALCULATION OF 3HR - 1:2 YEAR STORM EVENT           *
 **************************************************************
 --------------------
 | START             |   Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
 --------------------    Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
     TZERO =    .00 hrs on        0
     METOUT=    2 (output = METRIC)
     NRUN  = 001
     NSTORM=    0
 ---------------------------------------------------------------------------
 001:0002-------------------------------------------------------------------
 --------------------
 | CHICAGO STORM     |     IDF curve parameters: A= 732.951
 | Ptotal= 31.86 mm  |                           B=    6.199
 --------------------                            C=     .810
                           used in:    INTENSITY =  A / (t + B)^C

                           Duration of storm  =  3.00 hrs
                           Storm time step    = 10.00 min
                           Time to peak ratio =   .33

           TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME    RAIN
            hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs   mm/hr
            .17    2.815 |   1.00   76.805 |   1.83    5.095 |   2.67   2.684
            .33    3.498 |   1.17   24.079 |   2.00    4.291 |   2.83   2.463
            .50    4.687 |   1.33   12.364 |   2.17    3.718 |   3.00   2.279
            .67    7.305 |   1.50    8.324 |   2.33    3.288 |
            .83   18.209 |   1.67    6.303 |   2.50    2.953 |

 ---------------------------------------------------------------------------
 001:0003-------------------------------------------------------------------
 ----------------------
 | DEFAULT VALUES      |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
 ----------------------    ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]    [MNI= .035]
      Parameters used in NASHYD:
      [Ia=    4.67 mm] [N= 3.00]
 ---------------------------------------------------------------------------
 001:0004-------------------------------------------------------------------
 **********************************
 *          ORGAWORLD FILE        *
 **********************************
 *
 * SUB-AREA No.1
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=     2.07
```

```
 | 01:010     DT= 2.50 |   Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
 ----------------------
                              IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=       1.74           .33
      Dep. Storage      (mm)=       1.57          4.67
      Average Slope      (%)=        .52          1.00
      Length             (m)=     204.72         20.00
      Mannings n           =        .030          .250

      Max.eff.Inten.(mm/hr)=       76.81         11.88
                 over (min)        10.00         22.50
      Storage Coeff.   (min)=       8.77 (ii)    22.21 (ii)
      Unit Hyd. Tpeak  (min)=      10.00         22.50
      Unit Hyd. peak   (cms)=        .12           .05
                                                            *TOTALS*
      PEAK FLOW        (cms)=        .24           .01         .245 (iii)
      TIME TO PEAK     (hrs)=       1.08          1.38        1.083
      RUNOFF VOLUME     (mm)=      30.29          8.52       26.807
      TOTAL RAINFALL    (mm)=      31.86         31.86       31.860
      RUNOFF COEFFICIENT   =         .95           .27         .841

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0005-------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=     1.54
 | 02:020     DT= 2.50 |   Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
 ----------------------
                              IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=       1.42           .12
      Dep. Storage      (mm)=       1.57          4.67
      Average Slope      (%)=        .50          1.00
      Length             (m)=     244.34          5.00
      Mannings n           =        .030          .030

      Max.eff.Inten.(mm/hr)=       76.81         15.07
                 over (min)        10.00         12.50
      Storage Coeff.   (min)=       9.87 (ii)    11.36 (ii)
      Unit Hyd. Tpeak  (min)=      10.00         12.50
      Unit Hyd. peak   (cms)=        .11           .10
                                                            *TOTALS*
      PEAK FLOW        (cms)=        .19           .00         .192 (iii)
      TIME TO PEAK     (hrs)=       1.08          1.17        1.083
      RUNOFF VOLUME     (mm)=      30.29          8.52       28.548
      TOTAL RAINFALL    (mm)=      31.86         31.86       31.860
      RUNOFF COEFFICIENT   =         .95           .27         .896

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0006-------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=     1.40
 | 03:030     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                              IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=       1.36           .04
      Dep. Storage      (mm)=       1.57          4.67
      Average Slope      (%)=        .51          1.00
      Length             (m)=     225.63          5.00
      Mannings n           =        .030          .030

      Max.eff.Inten.(mm/hr)=       76.81         16.59
                 over (min)        10.00         10.00
      Storage Coeff.   (min)=       9.35 (ii)    10.79 (ii)
      Unit Hyd. Tpeak  (min)=      10.00         10.00
      Unit Hyd. peak   (cms)=        .12           .11
                                                            *TOTALS*
      PEAK FLOW        (cms)=        .18           .00         .186 (iii)
      TIME TO PEAK     (hrs)=       1.08          1.13        1.083
      RUNOFF VOLUME     (mm)=      30.29          8.52       29.637
      TOTAL RAINFALL    (mm)=      31.86         31.86       31.860
      RUNOFF COEFFICIENT   =         .95           .27         .930

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0007-------------------------------------------------------------------
 --------------------
 | ADD HYD (040    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:010       2.07      .245    1.08  26.81   .000
                    +ID2 02:020       1.54      .192    1.08  28.55   .000
                    ==================================================
                     SUM 04:040       3.61      .436    1.08  27.55   .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0008-------------------------------------------------------------------
 --------------------
 | ADD HYD (050    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 03:030       1.40      .186    1.08  29.64   .000
                    +ID2 04:040       3.61      .436    1.08  27.55   .000
                    ==================================================
                     SUM 05:050       5.01      .623    1.08  28.13   .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0009-------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ----------------------
 | CALIB STANDHYD      |   Area     (ha)=      .89
 | 06:060     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                              IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=        .86           .03
      Dep. Storage      (mm)=       1.57          4.67
      Average Slope      (%)=        .93           .70
      Length             (m)=     164.82         40.00
      Mannings n           =        .030          .250

      Max.eff.Inten.(mm/hr)=       76.81         10.24
                 over (min)         7.50         30.00
      Storage Coeff.   (min)=       6.47 (ii)    30.53 (ii)
```

```
      Unit Hyd. Tpeak (min)=        7.50          30.00
      Unit Hyd. peak  (cms)=         .16            .04
                                                              *TOTALS*
      PEAK FLOW        (cms)=        .14            .00          .139 (iii)
      TIME TO PEAK     (hrs)=       1.04           1.54         1.042
      RUNOFF VOLUME     (mm)=      30.29           8.52        29.637
      TOTAL RAINFALL    (mm)=      31.86          31.86        31.860
      RUNOFF COEFFICIENT   =         .95            .27          .930

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0010-------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=     2.66
 | 07:070     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ---------------------
                             IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=     2.58            .08
      Dep. Storage      (mm)=     1.57           4.67
      Average Slope      (%)=      .61           1.50
      Length             (m)=   207.25          20.00
      Mannings n            =     .030           .250

      Max.eff.Inten.(mm/hr)=     76.81          12.71
                 over (min)      7.50          20.00
      Storage Coeff.   (min)=     8.42 (ii)     20.00 (ii)
      Unit Hyd. Tpeak (min)=      7.50          20.00
      Unit Hyd. peak  (cms)=       .14            .06
                                                              *TOTALS*
      PEAK FLOW        (cms)=       .38            .00          .379 (iii)
      TIME TO PEAK     (hrs)=      1.04           1.33         1.042
      RUNOFF VOLUME     (mm)=     30.29           8.52        29.637
      TOTAL RAINFALL    (mm)=     31.86          31.86        31.860
      RUNOFF COEFFICIENT   =        .95            .27          .930

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0011-------------------------------------------------------------------
 ---------------------
 | ADD HYD (080   ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 ---------------------              (ha)      (cms)    (hrs)    (mm)    (cms)
                 ID1 06:060          .89       .139     1.04   29.64    .000
                +ID2 07:070         2.66       .379     1.04   29.64    .000
                 ==========================================================
                 SUM 08:080         3.55       .518     1.04   29.64    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0012-------------------------------------------------------------------
 ---------------------
 | ADD HYD (090   ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 ---------------------              (ha)      (cms)    (hrs)    (mm)    (cms)
                 ID1 05:050         5.01       .623     1.08   28.13    .000
                +ID2 08:080         3.55       .518     1.04   29.64    .000
                 ==========================================================
                 SUM 09:090         8.56      1.118     1.08   28.76    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0013-------------------------------------------------------------------
 ---------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
 |   IN>09:(090    )  |
 | OUT<10:(POND   )   |     ========= OUTFLOW STORAGE TABLE =========
 ---------------------        OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
                               (cms)      (ha.m.)   |    (cms)      (ha.m.)
                                .000  .0000E+00     |     .593  .6251E+00
                                .008  .6560E-01     |     .654  .6631E+00
                                .017  .1311E+00     |     .797  .7391E+00
                                .093  .2831E+00     |     .950  .8274E+00
                                .233  .3971E+00     |    1.304  .9157E+00
                                .337  .4731E+00     |    1.880  .1004E+01
                                .465  .5491E+00     |    2.577  .1092E+01
                                .531  .5871E+00     |     .000  .0000E+00

      ROUTING RESULTS              AREA      QPEAK       TPEAK         R.V.
      -------------------           (ha)      (cms)       (hrs)         (mm)
      INFLOW >09: (090   )          8.56      1.118       1.083       28.757
      OUTFLOW<10: (POND  )          8.56       .056       3.000       28.754

                          PEAK    FLOW    REDUCTION [Qout/Qin](%)=     5.030
                          TIME SHIFT OF PEAK FLOW          (min)=   115.00
                          MAXIMUM   STORAGE   USED        (ha.m.)=.2095E+00

 ---------------------------------------------------------------------------
 001:0014-------------------------------------------------------------------
 *********************************************
 *      Remaining Hawthorne Industrial Park     *
 *********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=    19.90
 | 01:HIP01   DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                             IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=    14.13           5.77
      Dep. Storage      (mm)=     1.57           4.67
      Average Slope      (%)=      .60           1.50
      Length             (m)=   580.00         100.00
      Mannings n            =     .030           .250

      Max.eff.Inten.(mm/hr)=     54.21          23.06
                 over (min)     17.50          42.50
      Storage Coeff.   (min)=    18.04 (ii)     42.02 (ii)
      Unit Hyd. Tpeak (min)=     17.50          42.50
      Unit Hyd. peak  (cms)=       .06            .03
                                                              *TOTALS*
      PEAK FLOW        (cms)=       .95            .21         1.020 (iii)
      TIME TO PEAK     (hrs)=      1.21           1.71         1.250
      RUNOFF VOLUME     (mm)=     30.29          13.34        21.814
      TOTAL RAINFALL    (mm)=     31.86          31.86        31.860
      RUNOFF COEFFICIENT   =        .95            .42          .685

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0015-------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 ---------------------              (ha)      (cms)    (hrs)    (mm)    (cms)
                 ID1 10:POND        8.56       .056     3.00   28.75    .000
                +ID2 01:HIP01      19.90      1.020     1.25   21.81    .000
                 ==========================================================
                 SUM 02:HIP02      28.46      1.039     1.25   23.90    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0016-------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=    17.00
 | 03:HIP03   DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                             IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=    12.07           4.93
      Dep. Storage      (mm)=     1.57           4.67
      Average Slope      (%)=      .65           1.50
      Length             (m)=   450.00         100.00
      Mannings n            =     .030           .250

      Max.eff.Inten.(mm/hr)=     59.23          25.04
                 over (min)     15.00          37.50
      Storage Coeff.   (min)=    14.60 (ii)     37.80 (ii)
      Unit Hyd. Tpeak (min)=     15.00          37.50
      Unit Hyd. peak  (cms)=       .08            .03
                                                              *TOTALS*
      PEAK FLOW        (cms)=       .91            .19          .978 (iii)
      TIME TO PEAK     (hrs)=      1.17           1.63         1.167
      RUNOFF VOLUME     (mm)=     30.29          13.34        21.814
      TOTAL RAINFALL    (mm)=     31.86          31.86        31.860
      RUNOFF COEFFICIENT   =        .95            .42          .685

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0017-------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=    15.60
 | 04:HIP04   DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                             IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=    11.08           4.52
      Dep. Storage      (mm)=     1.57           4.67
      Average Slope      (%)=      .50           1.50
      Length             (m)=   600.00         100.00
      Mannings n            =     .030           .250

      Max.eff.Inten.(mm/hr)=     50.44          22.17
                 over (min)     20.00          45.00
      Storage Coeff.   (min)=    20.01 (ii)     44.37 (ii)
      Unit Hyd. Tpeak (min)=     20.00          45.00
      Unit Hyd. peak  (cms)=       .06            .03
                                                              *TOTALS*
      PEAK FLOW        (cms)=       .69            .16          .753 (iii)
      TIME TO PEAK     (hrs)=      1.25           1.79         1.292
      RUNOFF VOLUME     (mm)=     30.29          13.34        21.814
      TOTAL RAINFALL    (mm)=     31.86          31.86        31.860
      RUNOFF COEFFICIENT   =        .95            .42          .685

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0018-------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 ---------------------              (ha)      (cms)    (hrs)    (mm)    (cms)
                 ID1 03:HIP03      17.00       .978     1.17   21.81    .000
                +ID2 04:HIP04      15.60       .753     1.29   21.81    .000
                 ==========================================================
                 SUM 05:HIP05      32.60      1.698     1.21   21.81    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0019-------------------------------------------------------------------
 ---------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.     DWF
 ---------------------              (ha)      (cms)    (hrs)    (mm)    (cms)
                 ID1 05:HIP05      32.60      1.698     1.21   21.81    .000
                +ID2 02:HIP02      28.46      1.039     1.25   23.90    .000
                 ==========================================================
                 SUM 06:HIP06      61.06      2.733     1.21   22.79    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0020-------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD     |    Area     (ha)=    12.20
 | 07:HIP07   DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
 ---------------------
                             IMPERVIOUS      PERVIOUS (i)
      Surface Area      (ha)=     8.66           3.54
      Dep. Storage      (mm)=     1.57           4.67
      Average Slope      (%)=      .70           1.50
      Length             (m)=   210.00         100.00
      Mannings n            =     .030           .250

      Max.eff.Inten.(mm/hr)=     76.81          29.02
                 over (min)      7.50          30.00
      Storage Coeff.   (min)=     8.15 (ii)     30.01 (ii)
      Unit Hyd. Tpeak (min)=      7.50          30.00
      Unit Hyd. peak  (cms)=       .14            .04
                                                              *TOTALS*
      PEAK FLOW        (cms)=       .91            .16          .941 (iii)
      TIME TO PEAK     (hrs)=      1.04           1.50         1.042
      RUNOFF VOLUME     (mm)=     30.29          13.34        21.814
      TOTAL RAINFALL    (mm)=     31.86          31.86        31.860
      RUNOFF COEFFICIENT   =        .95            .42          .685

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

```
001:0021-----------------------------------------------------------------------
*
*SUB-AREA No.5
---------------------
| DESIGN NASHYD      |   Area     (ha)=    4.00   Curve Number   (CN)=85.00
| 08:Pond-B DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .170

    Unit Hyd Qpeak  (cms)=     .899

    PEAK FLOW        (cms)=     .145 (i)
    TIME TO PEAK     (hrs)=    1.167
    RUNOFF VOLUME     (mm)=   10.266
    TOTAL RAINFALL    (mm)=   31.860
    RUNOFF COEFFICIENT   =     .322

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

-------------------------------------------------------------------------------
001:0022-----------------------------------------------------------------------
--------------------
| ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 06:HIP06        61.06     2.733    1.21  22.79    .000
             +ID2 07:HIP07        12.20      .941    1.04  21.81    .000
             +ID3 08:Pond-B        4.00      .145    1.17  10.27    .000
              ==========================================================
              SUM 09:HIP08        77.26     3.542    1.21  21.98    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0023-----------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR  |     Requested routing time step =  1.0 min.
|   IN>09:(HIP08 ) |
| OUT<10:(HIP-PO)  |     =========  OUTLFOW STORAGE TABLE  ========
--------------------     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                          (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          .000   .0000E+00     |     .724   .2210E+01
                          .048   .5740E-01     |     .937   .2501E+01
                          .054   .2434E+00     |    1.262   .2798E+01
                          .059   .5834E+00     |    1.404   .3101E+01
                          .062   .8400E+00     |    1.532   .3410E+01
                          .064   .1102E+01     |    1.650   .3724E+01
                          .147   .1370E+01     |    2.409   .4044E+01
                          .280   .1644E+01     |    3.689   .4370E+01
                          .472   .1924E+01     |     .000   .0000E+00

    ROUTING RESULTS             AREA      QPEAK      TPEAK        R.V.
    -------------------         (ha)      (cms)      (hrs)        (mm)
    INFLOW >09: (HIP08 )       77.26      3.542      1.208      21.985
    OUTFLOW<10: (HIP-PO)       77.26       .148      4.014      21.985

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.179
                 TIME SHIFT OF PEAK FLOW          (min)=   168.33
                 MAXIMUM  STORAGE   USED        (ha.m.)=.1373E+01

-------------------------------------------------------------------------------
001:0024-----------------------------------------------------------------------
*
*SUB-AREA No. 6
---------------------
| DESIGN NASHYD      |   Area     (ha)=    2.70   Curve Number   (CN)=76.00
| 01:A3     DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .800

    Unit Hyd Qpeak  (cms)=     .129

    PEAK FLOW        (cms)=     .024 (i)
    TIME TO PEAK     (hrs)=    2.083
    RUNOFF VOLUME     (mm)=    6.883
    TOTAL RAINFALL    (mm)=   31.860
    RUNOFF COEFFICIENT   =     .216

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

-------------------------------------------------------------------------------
001:0025-----------------------------------------------------------------------
--------------------
| ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 10:HIP-PO       77.26      .148    4.01  21.98    .000
             +ID2 01:A3            2.70      .024    2.08   6.88    .000
              ==========================================================
              SUM 02:Ultima       79.96      .156    3.65  21.47    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0026-----------------------------------------------------------------------
***********************************************************************
*         CALCULATION OF 3HR - 1:5 YEAR STORM EVENT                   *
***********************************************************************
--------------------
| START            |   Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------   Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
   TZERO =   .00 hrs on        0
   METOUT=    2 (output = METRIC)
   NRUN  = 001
   NSTORM=    0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 998.071
| Ptotal= 42.51 mm |                           B=   6.053
--------------------                           C=    .814
                      used in:   INTENSITY =  A / (t + B)^C

                      Duration of storm  =  3.00 hrs
                      Storm time step    = 10.00 min
                      Time to peak ratio =   .33

            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .17   3.682 |   1.00 104.193 |   1.83   6.689 |   2.67   3.510
             .33   4.582 |   1.17  32.037 |   2.00   5.628 |   2.83   3.220
             .50   6.151 |   1.33  16.337 |   2.17   4.872 |   3.00   2.978
             .67   9.614 |   1.50  10.965 |   2.33   4.305 |
             .83  24.170 |   1.67   8.287 |   2.50   3.864 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
---------------------
| DEFAULT VALUES    |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
---------------------   ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
```

```
      [Ia=   4.67 mm] [N= 3.00]
-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
***********************************
*          ORGAWORLD FILE         *
***********************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD    |   Area     (ha)=     2.07
| 01:010    DT= 2.50 |  Total Imp(%)=    84.00   Dir. Conn.(%)=   84.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       1.74          .33
    Dep. Storage      (mm)=       1.57         4.67
    Average Slope      (%)=        .52         1.00
    Length             (m)=     204.72        20.00
    Mannings n            =       .030         .250

    Max.eff.Inten.(mm/hr)=      104.19        24.26
               over (min)         7.50        17.50
    Storage Coeff.  (min)=        7.76 (ii)   17.86 (ii)
    Unit Hyd. Tpeak (min)=        7.50        17.50
    Unit Hyd. peak  (cms)=         .15          .06
                                                          *TOTALS*
    PEAK FLOW        (cms)=        .36          .01         .362 (iii)
    TIME TO PEAK     (hrs)=       1.04         1.25        1.042
    RUNOFF VOLUME     (mm)=      40.94        14.70       36.745
    TOTAL RAINFALL    (mm)=      42.51        42.51       42.514
    RUNOFF COEFFICIENT   =         .96          .35         .864

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD    |   Area     (ha)=     1.54
| 02:020    DT= 2.50 |  Total Imp(%)=    92.00   Dir. Conn.(%)=   92.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       1.42          .12
    Dep. Storage      (mm)=       1.57         4.67
    Average Slope      (%)=        .50         1.00
    Length             (m)=     244.34         5.00
    Mannings n            =       .030         .030

    Max.eff.Inten.(mm/hr)=      104.19        31.02
               over (min)         7.50        10.00
    Storage Coeff.  (min)=        8.73 (ii)    9.85 (ii)
    Unit Hyd. Tpeak (min)=        7.50        10.00
    Unit Hyd. peak  (cms)=         .14          .11
                                                          *TOTALS*
    PEAK FLOW        (cms)=        .28          .01         .283 (iii)
    TIME TO PEAK     (hrs)=       1.04         1.13        1.042
    RUNOFF VOLUME     (mm)=      40.94        14.70       38.845
    TOTAL RAINFALL    (mm)=      42.51        42.51       42.514
    RUNOFF COEFFICIENT   =         .96          .35         .914

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD    |   Area     (ha)=     1.40
| 03:030    DT= 2.50 |  Total Imp(%)=    97.00   Dir. Conn.(%)=   97.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       1.36          .04
    Dep. Storage      (mm)=       1.57         4.67
    Average Slope      (%)=        .51         1.00
    Length             (m)=     225.63         5.00
    Mannings n            =       .030         .030

    Max.eff.Inten.(mm/hr)=      104.19        31.02
               over (min)         7.50        10.00
    Storage Coeff.  (min)=        8.28 (ii)    9.39 (ii)
    Unit Hyd. Tpeak (min)=        7.50        10.00
    Unit Hyd. peak  (cms)=         .14          .12
                                                          *TOTALS*
    PEAK FLOW        (cms)=        .27          .00         .274 (iii)
    TIME TO PEAK     (hrs)=       1.04         1.13        1.042
    RUNOFF VOLUME     (mm)=      40.94        14.70       40.157
    TOTAL RAINFALL    (mm)=      42.51        42.51       42.514
    RUNOFF COEFFICIENT   =         .96          .35         .945

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  81.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 01:010           2.07      .362    1.04  36.75    .000
             +ID2 02:020           1.54      .283    1.04  38.84    .000
              ==========================================================
              SUM 04:040           3.61      .645    1.04  37.64    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
              ID1 03:030           1.40      .274    1.04  40.16    .000
             +ID2 04:040           3.61      .645    1.04  37.64    .000
              ==========================================================
              SUM 05:050           5.01      .918    1.04  38.34    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD    |   Area     (ha)=      .89
| 06:060    DT= 2.50 |  Total Imp(%)=    97.00   Dir. Conn.(%)=   97.00
---------------------
```

```
                                      IMPERVIOUS     PERVIOUS (i)
         Surface Area      (ha)=          .86           .03
         Dep. Storage      (mm)=         1.57          4.67
         Average Slope      (%)=          .93           .70
         Length             (m)=       164.82         40.00
         Mannings n            =         .030          .250

         Max.eff.Inten.(mm/hr)=        104.19         20.32
                     over (min)          5.00         25.00
         Storage Coeff.   (min)=         5.72 (ii)    24.02 (ii)
         Unit Hyd. Tpeak  (min)=         5.00         25.00
         Unit Hyd. peak   (cms)=          .20           .05
                                                                  *TOTALS*
         PEAK FLOW        (cms)=          .20           .00          .205 (iii)
         TIME TO PEAK     (hrs)=         1.00          1.38         1.000
         RUNOFF VOLUME     (mm)=        40.94         14.70        40.157
         TOTAL RAINFALL    (mm)=        42.51         42.51        42.514
         RUNOFF COEFFICIENT   =          .96           .35          .945

           (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN* =  81.0    Ia = Dep. Storage  (Above)
          (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
               THAN THE STORAGE COEFFICIENT.
         (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0010----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=    2.66
 | 07:070    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                      IMPERVIOUS     PERVIOUS (i)
         Surface Area      (ha)=         2.58           .08
         Dep. Storage      (mm)=         1.57          4.67
         Average Slope      (%)=          .61          1.50
         Length             (m)=       207.25         20.00
         Mannings n            =         .030          .250

         Max.eff.Inten.(mm/hr)=        104.19         24.26
                     over (min)          7.50         17.50
         Storage Coeff.   (min)=         7.45 (ii)    16.40 (ii)
         Unit Hyd. Tpeak  (min)=         7.50         17.50
         Unit Hyd. peak   (cms)=          .15           .07
                                                                  *TOTALS*
         PEAK FLOW        (cms)=          .54           .00          .538 (iii)
         TIME TO PEAK     (hrs)=         1.04          1.25         1.042
         RUNOFF VOLUME     (mm)=        40.94         14.70        40.157
         TOTAL RAINFALL    (mm)=        42.51         42.51        42.514
         RUNOFF COEFFICIENT   =          .96           .35          .945

           (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN* =  81.0    Ia = Dep. Storage  (Above)
          (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
               THAN THE STORAGE COEFFICIENT.
         (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0011----------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                      ID1 06:060       .89    .205    1.00  40.16    .000
                     +ID2 07:070      2.66    .538    1.04  40.16    .000
                      ==================================================
                      SUM 08:080      3.55    .733    1.04  40.16    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0012----------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                      ID1 05:050      5.01    .918    1.04  38.34    .000
                     +ID2 08:080      3.55    .733    1.04  40.16    .000
                      ==================================================
                      SUM 09:090      8.56   1.651    1.04  39.10    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0013----------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
 |  IN>09:(090   )   |
 | OUT<10:(POND  )   |     =========  OUTFLOW STORAGE TABLE  =========
 --------------------       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .593  .6251E+00
                              .008  .6560E-01    |     .654  .6631E+00
                              .017  .1311E+00    |     .797  .7391E+00
                              .093  .2831E+00    |     .950  .8274E+00
                              .233  .3971E+00    |    1.304  .9157E+00
                              .337  .4731E+00    |    1.880  .1004E+01
                              .465  .5491E+00    |    2.577  .1092E+01
                              .531  .5871E+00    |     .000  .0000E+00

        ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
        ---------------            (ha)     (cms)     (hrs)       (mm)
        INFLOW >09: (090   )       8.56     1.651     1.042     39.096
        OUTFLOW<10: (POND  )       8.56      .089     2.625     39.093

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=     5.413
                     TIME SHIFT OF PEAK FLOW        (min)=     95.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.2758E+00

 ------------------------------------------------------------------------------
 001:0014----------------------------------------------------------------------
 ************************************************
 *      Remaining Hawthorne Industrial Park      *
 ************************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                      IMPERVIOUS     PERVIOUS (i)
         Surface Area      (ha)=        14.13          5.77
         Dep. Storage      (mm)=         1.57          4.67
         Average Slope      (%)=          .60          1.50
         Length             (m)=       580.00        100.00
         Mannings n            =         .030          .250

         Max.eff.Inten.(mm/hr)=         80.14         42.65
                     over (min)         15.00         35.00
         Storage Coeff.   (min)=        15.43 (ii)    34.18 (ii)
         Unit Hyd. Tpeak  (min)=        15.00         35.00
         Unit Hyd. peak   (cms)=          .07           .03
                                                                  *TOTALS*
         PEAK FLOW        (cms)=         1.41           .40         1.572 (iii)
         TIME TO PEAK     (hrs)=         1.17          1.54         1.208
         RUNOFF VOLUME     (mm)=        40.94         21.31        31.126
         TOTAL RAINFALL    (mm)=        42.51         42.51        42.514
         RUNOFF COEFFICIENT   =          .96           .50          .732

           (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN* =  81.0    Ia = Dep. Storage  (Above)
          (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
               THAN THE STORAGE COEFFICIENT.
         (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0015----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                      ID1 10:POND     8.56    .089    2.63  39.09    .000
                     +ID2 01:HIP01   19.90   1.572    1.21  31.13    .000
                      ==================================================
                      SUM 02:HIP02   28.46   1.615    1.21  33.52    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0016----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                      IMPERVIOUS     PERVIOUS (i)
         Surface Area      (ha)=        12.07          4.93
         Dep. Storage      (mm)=         1.57          4.67
         Average Slope      (%)=          .65          1.50
         Length             (m)=       450.00        100.00
         Mannings n            =         .030          .250

         Max.eff.Inten.(mm/hr)=         89.76         47.48
                     over (min)         12.50         30.00
         Storage Coeff.   (min)=        12.36 (ii)    30.32 (ii)
         Unit Hyd. Tpeak  (min)=        12.50         30.00
         Unit Hyd. peak   (cms)=          .09           .04
                                                                  *TOTALS*
         PEAK FLOW        (cms)=         1.36           .37         1.504 (iii)
         TIME TO PEAK     (hrs)=         1.13          1.46         1.167
         RUNOFF VOLUME     (mm)=        40.94         21.31        31.126
         TOTAL RAINFALL    (mm)=        42.51         42.51        42.514
         RUNOFF COEFFICIENT   =          .96           .50          .732

           (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN* =  81.0    Ia = Dep. Storage  (Above)
          (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
               THAN THE STORAGE COEFFICIENT.
         (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0017----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   15.60
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                      IMPERVIOUS     PERVIOUS (i)
         Surface Area      (ha)=        11.08          4.52
         Dep. Storage      (mm)=         1.57          4.67
         Average Slope      (%)=          .50          1.50
         Length             (m)=       600.00        100.00
         Mannings n            =         .030          .250

         Max.eff.Inten.(mm/hr)=         73.27         42.65
                     over (min)         17.50         35.00
         Storage Coeff.   (min)=        17.24 (ii)    35.98 (ii)
         Unit Hyd. Tpeak  (min)=        17.50         35.00
         Unit Hyd. peak   (cms)=          .07           .03
                                                                  *TOTALS*
         PEAK FLOW        (cms)=         1.03           .30         1.176 (iii)
         TIME TO PEAK     (hrs)=         1.21          1.54         1.250
         RUNOFF VOLUME     (mm)=        40.94         21.31        31.126
         TOTAL RAINFALL    (mm)=        42.51         42.51        42.514
         RUNOFF COEFFICIENT   =          .96           .50          .732

           (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN* =  81.0    Ia = Dep. Storage  (Above)
          (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
               THAN THE STORAGE COEFFICIENT.
         (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0018----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                      ID1 03:HIP03   17.00   1.504    1.17  31.13    .000
                     +ID2 04:HIP04   15.60   1.176    1.25  31.13    .000
                      ==================================================
                      SUM 05:HIP05   32.60   2.621    1.17  31.13    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0019----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                      ID1 05:HIP05   32.60   2.621    1.17  31.13    .000
                     +ID2 02:HIP02   28.46   1.615    1.21  33.52    .000
                      ==================================================
                      SUM 06:HIP06   61.06   4.222    1.17  32.24    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0020----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   12.20
 | 07:HIP07  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                      IMPERVIOUS     PERVIOUS (i)
         Surface Area      (ha)=         8.66          3.54
         Dep. Storage      (mm)=         1.57          4.67
         Average Slope      (%)=          .70          1.50
         Length             (m)=       210.00        100.00
         Mannings n            =         .030          .250

         Max.eff.Inten.(mm/hr)=        104.19         52.96
                     over (min)          7.50         25.00
         Storage Coeff.   (min)=         7.21 (ii)    24.40 (ii)
         Unit Hyd. Tpeak  (min)=         7.50         25.00
         Unit Hyd. peak   (cms)=          .15           .05
                                                                  *TOTALS*
         PEAK FLOW        (cms)=         1.28           .31         1.375 (iii)
         TIME TO PEAK     (hrs)=         1.04          1.38         1.042
         RUNOFF VOLUME     (mm)=        40.94         21.31        31.126
```

```
     TOTAL RAINFALL   (mm)=      42.51          42.51          42.514
     RUNOFF COEFFICIENT   =        .96            .50            .732

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0021----------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=     4.00   Curve Number    (CN)=85.00
 | 08:Pond-B DT= 2.50 |   Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=      .170

     Unit Hyd Qpeak   (cms)=       .899

     PEAK FLOW        (cms)=      .260 (i)
     TIME TO PEAK     (hrs)=     1.167
     RUNOFF VOLUME     (mm)=    17.325
     TOTAL RAINFALL    (mm)=    42.514
     RUNOFF COEFFICIENT   =       .408

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

 ------------------------------------------------------------------------------
 001:0022----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 06:HIP06     61.06     4.222     1.17   32.24    .000
                 +ID2 07:HIP07     12.20     1.375     1.04   31.13    .000
                 +ID3 08:Pond-B     4.00      .260     1.17   17.32    .000
                  ================================================
                  SUM 09:HIP08     77.26     5.545     1.17   31.29    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0023----------------------------------------------------------------------
 ---------------------
 | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
 |  IN>09:(HIP08 )    |
 | OUT<10:(HIP-PO)    |    =========  OUTFLOW STORAGE TABLE  =========
 ---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .724  .2210E+01
                              .048  .5740E-01    |     .937  .2501E+01
                              .054  .2434E+00    |    1.262  .2798E+01
                              .059  .5834E+00    |    1.404  .3101E+01
                              .062  .8400E+00    |    1.532  .3410E+01
                              .064  .1102E+01    |    1.650  .3724E+01
                              .147  .1370E+01    |    2.409  .4044E+01
                              .280  .1644E+01    |    3.689  .4370E+01
                              .472  .1924E+01    |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK       TPEAK          R.V.
     --------------------         (ha)      (cms)       (hrs)          (mm)
     INFLOW >09: (HIP08 )        77.26      5.545       1.167        31.292
     OUTFLOW<10: (HIP-PO)        77.26       .435       3.389        31.292

                      PEAK    FLOW    REDUCTION [Qout/Qin](%)=     7.850
                      TIME SHIFT OF PEAK FLOW          (min)=   133.33
                      MAXIMUM   STORAGE    USED       (ha.m.)=.1871E+01

 ------------------------------------------------------------------------------
 001:0024----------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 ----------------------
 | DESIGN NASHYD      |   Area     (ha)=     2.70   Curve Number    (CN)=76.00
 | 01:A3      DT= 2.50 |  Ia       (mm)=    4.670   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=      .800

     Unit Hyd Qpeak   (cms)=       .129

     PEAK FLOW        (cms)=      .044 (i)
     TIME TO PEAK     (hrs)=     2.042
     RUNOFF VOLUME     (mm)=    12.131
     TOTAL RAINFALL    (mm)=    42.514
     RUNOFF COEFFICIENT   =       .285

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

 ------------------------------------------------------------------------------
 001:0025----------------------------------------------------------------------
 --------------------
 | ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 10:HIP-PO    77.26      .435     3.39   31.29    .000
                 +ID2 01:A3         2.70      .044     2.04   12.13    .000
                  ================================================
                  SUM 02:Ultima    79.96      .457     3.29   30.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0026----------------------------------------------------------------------
 ****************************************************************
 *        CALCULATION OF 3HR - 1:10 YEAR STORM EVENT             *
 ****************************************************************
 --------------------
 | START            |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
 --------------------  Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=    0
 ------------------------------------------------------------------------------
 001:0002----------------------------------------------------------------------
 --------------------
 | CHICAGO STORM    |     IDF curve parameters: A=1174.184
 | Ptotal= 49.50 mm |                           B=   6.014
 --------------------                           C=    .816
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .33

                TIME     RAIN |  TIME     RAIN |   TIME     RAIN |   TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
                 .17    4.248 |  1.00  122.142 |   1.83    7.733 |   2.67    4.049
                 .33    5.290 |  1.17   37.285 |   2.00    6.502 |   2.83    3.714
                 .50    7.108 |  1.33   18.954 |   2.17    5.625 |   3.00    3.434
                 .67   11.130 |  1.50   12.700 |   2.33    4.969 |
                 .83   28.100 |  1.67    9.588 |   2.50    4.458 |

 ------------------------------------------------------------------------------
 001:0003----------------------------------------------------------------------
 --------------------
 | DEFAULT VALUES     |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
 ----------------------   ICASEdv = 1 (read and print data)
        FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                   ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
        Horton's infiltration equation parameters:
        [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
        Parameters for PERVIOUS surfaces in STANDHYD:
        [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
        Parameters for IMPERVIOUS surfaces in STANDHYD:
        [IAimp=   1.57 mm] [CLI= 1.50]    [MNI= .035]
        Parameters used in NASHYD:
        [Ia=    4.67 mm] [N= 3.00]
 ------------------------------------------------------------------------------
 001:0004----------------------------------------------------------------------
 ************************************
 *            ORGAWORLD FILE        *
 ************************************
 *
 * SUB-AREA No.1
 ----------------------
 | CALIB STANDHYD     |   Area      (ha)=     2.07
 | 01:010     DT= 2.50 |  Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
 ----------------------
                            IMPERVIOUS      PERVIOUS (i)
     Surface Area       (ha)=     1.74           .33
     Dep. Storage       (mm)=     1.57          4.67
     Average Slope       (%)=      .52          1.00
     Length              (m)=   204.72         20.00
     Mannings n             =     .030          .250

     Max.eff.Inten.(mm/hr)=     122.14         34.69
                over (min)        7.50         15.00
     Storage Coeff.   (min)=      7.28 (ii)    16.04 (ii)
     Unit Hyd. Tpeak  (min)=      7.50         15.00
     Unit Hyd. peak   (cms)=       .15           .07
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .43           .02          .437 (iii)
     TIME TO PEAK     (hrs)=      1.04          1.21         1.042
     RUNOFF VOLUME     (mm)=     47.93         19.25        43.345
     TOTAL RAINFALL    (mm)=     49.50         49.50        49.505
     RUNOFF COEFFICIENT   =        .97           .39          .876

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =   81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0005----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ----------------------
 | CALIB STANDHYD     |   Area      (ha)=     1.54
 | 02:020     DT= 2.50 |  Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
 ----------------------
                            IMPERVIOUS      PERVIOUS (i)
     Surface Area       (ha)=     1.42           .12
     Dep. Storage       (mm)=     1.57          4.67
     Average Slope       (%)=      .50          1.00
     Length              (m)=   244.34          5.00
     Mannings n             =     .030          .030

     Max.eff.Inten.(mm/hr)=     122.14         42.32
                over (min)        7.50         10.00
     Storage Coeff.   (min)=      8.20 (ii)     9.18 (ii)
     Unit Hyd. Tpeak  (min)=      7.50         10.00
     Unit Hyd. peak   (cms)=       .14           .12
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .33           .01          .341 (iii)
     TIME TO PEAK     (hrs)=      1.04          1.13         1.042
     RUNOFF VOLUME     (mm)=     47.93         19.25        45.640
     TOTAL RAINFALL    (mm)=     49.50         49.50        49.505
     RUNOFF COEFFICIENT   =        .97           .39          .922

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =   81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0006----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ----------------------
 | CALIB STANDHYD     |   Area      (ha)=     1.40
 | 03:030     DT= 2.50 |  Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
 ----------------------
                            IMPERVIOUS      PERVIOUS (i)
     Surface Area       (ha)=     1.36           .04
     Dep. Storage       (mm)=     1.57          4.67
     Average Slope       (%)=      .51          1.00
     Length              (m)=   225.63          5.00
     Mannings n             =     .030          .030

     Max.eff.Inten.(mm/hr)=     122.14         48.18
                over (min)        7.50          7.50
     Storage Coeff.   (min)=      7.77 (ii)     8.70 (ii)
     Unit Hyd. Tpeak  (min)=      7.50          7.50
     Unit Hyd. peak   (cms)=       .15           .14
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .33           .00          .329 (iii)
     TIME TO PEAK     (hrs)=      1.04          1.08         1.042
     RUNOFF VOLUME     (mm)=     47.93         19.25        47.074
     TOTAL RAINFALL    (mm)=     49.50         49.50        49.505
     RUNOFF COEFFICIENT   =        .97           .39          .951

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =   81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0007----------------------------------------------------------------------
 --------------------
 | ADD HYD (040   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 01:010        2.07      .437     1.04   43.35    .000
                 +ID2 02:020        1.54      .341     1.04   45.64    .000
                  ================================================
                  SUM 04:040        3.61      .778     1.04   44.32    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0008----------------------------------------------------------------------
 --------------------
 | ADD HYD (050   ) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 03:030        1.40      .329     1.04   47.07    .000
                 +ID2 04:040        3.61      .778     1.04   44.32    .000
                  ================================================
                  SUM 05:050        5.01     1.107     1.04   45.09    .000
```

```

     Max.eff.Inten.(mm/hr)=     122.14         72.53
                over (min)        7.50         22.50
     Storage Coeff.  (min)=       6.77 (ii)    21.93 (ii)
     Unit Hyd. Tpeak (min)=       7.50         22.50
     Unit Hyd. peak  (cms)=        .16           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.54           .42        1.687 (iii)
     TIME TO PEAK    (hrs)=       1.04          1.33        1.042
     RUNOFF VOLUME    (mm)=      47.93         26.92       37.426
     TOTAL RAINFALL   (mm)=      49.50         49.50       49.505
     RUNOFF COEFFICIENT   =        .97           .54         .756

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 001:0021------------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ---------------------
 | DESIGN NASHYD       |   Area     (ha)=    4.00   Curve Number   (CN)=85.00
 | 08:Pond-B DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=     .170

     Unit Hyd Qpeak  (cms)=      .899

     PEAK FLOW       (cms)=      .345 (i)
     TIME TO PEAK    (hrs)=     1.167
     RUNOFF VOLUME    (mm)=    22.420
     TOTAL RAINFALL   (mm)=    49.505
     RUNOFF COEFFICIENT   =      .453

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

 --------------------------------------------------------------------------------
 001:0022------------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 06:HIP06    61.06      5.358     1.17  38.61    .000
                   +ID2 07:HIP07    12.20      1.687     1.04  37.43    .000
                   +ID3 08:Pond-B    4.00       .345     1.17  22.42    .000
                    ==================================================
                    SUM 09:HIP08    77.26      7.016     1.17  37.59    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 --------------------------------------------------------------------------------
 001:0023------------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
 |   IN>09:(HIP08 )   |
 | OUT<10:(HIP-PO)    |     =========  OUTLFOW STORAGE TABLE  =========
 --------------------       OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                             (cms)      (ha.m.)    |   (cms)     (ha.m.)
                              .000  .0000E+00     |     .724  .2210E+01
                              .048  .5740E-01     |     .937  .2501E+01
                              .054  .2434E+00     |    1.262  .2798E+01
                              .059  .5834E+00     |    1.404  .3101E+01
                              .062  .8400E+00     |    1.532  .3410E+01
                              .064  .1102E+01     |    1.650  .3724E+01
                              .147  .1370E+01     |    2.409  .4044E+01
                              .280  .1644E+01     |    3.689  .4370E+01
                              .472  .1924E+01     |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK         R.V.
     -------------------          (ha)      (cms)      (hrs)         (mm)
     INFLOW >09: (HIP08 )        77.26      7.016      1.167       37.588
     OUTFLOW<10: (HIP-PO)        77.26       .696      3.208       37.588

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=     9.919
                   TIME SHIFT OF PEAK FLOW          (min)=   122.50
                   MAXIMUM  STORAGE   USED        (ha.m.)=.2178E+01

 --------------------------------------------------------------------------------
 001:0024------------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 ---------------------
 | DESIGN NASHYD       |   Area     (ha)=    2.70   Curve Number   (CN)=76.00
 | 01:A3      DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=     .800

     Unit Hyd Qpeak  (cms)=      .129

     PEAK FLOW       (cms)=      .059 (i)
     TIME TO PEAK    (hrs)=     2.000
     RUNOFF VOLUME    (mm)=    16.075
     TOTAL RAINFALL   (mm)=    49.505
     RUNOFF COEFFICIENT   =      .325

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

 --------------------------------------------------------------------------------
 001:0025------------------------------------------------------------------------
 --------------------
 | ADD HYD (Ultima) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 10:HIP-PO   77.26       .696     3.21  37.59    .000
                   +ID2 01:A3        2.70       .059     2.00  16.08    .000
                    ==================================================
                    SUM 02:Ultima   79.96       .729     3.15  36.86    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 --------------------------------------------------------------------------------
 001:0026------------------------------------------------------------------------
 *****************************************************************
 *        CALCULATION OF 3HR - 1:25 YEAR STORM EVENT             *
 *****************************************************************
 --------------------
 | START              |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
 --------------------   Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN   = 001
    NSTORM=    0
 --------------------------------------------------------------------------------
 001:0002------------------------------------------------------------------------
 --------------------
 | CHICAGO STORM    |     IDF curve parameters: A=1402.884
 | Ptotal= 58.23 mm |                           B=    6.018
 --------------------                           C=     .819
                          used in:    INTENSITY =  A / (t + B)^C

                          Duration of storm   =  3.00 hrs
                          Storm time step     = 10.00 min
                          Time to peak ratio =    .33

                TIME    RAIN |   TIME     RAIN |   TIME    RAIN |   TIME     RAIN
                 hrs   mm/hr |    hrs    mm/hr |    hrs   mm/hr |    hrs    mm/hr
                 .17   4.934 |   1.00 144.693 |   1.83    9.014 |   2.67    4.701
                 .33   6.152 |   1.17  43.904 |   2.00    7.571 |   2.83    4.310
                 .50   8.282 |   1.33  22.224 |   2.17    6.544 |   3.00    3.983
                 .67  13.006 |   1.50  14.852 |   2.33    5.776 |
                 .83  33.041 |   1.67  11.192 |   2.50    5.179 |

 --------------------------------------------------------------------------------
 001:0003------------------------------------------------------------------------
 ---------------------
 | DEFAULT VALUES       |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
 ---------------------   ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 --------------------------------------------------------------------------------
 001:0004------------------------------------------------------------------------
 **********************************
 *         ORGAWORLD FILE         *
 **********************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=    2.07
 | 01:010     DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.74          .33
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .52         1.00
     Length             (m)=       204.72        20.00
     Mannings n            =         .030         .250

     Max.eff.Inten.(mm/hr)=        144.69        47.07
                over (min)           7.50        15.00
     Storage Coeff.  (min)=          6.81 (ii)   14.56 (ii)
     Unit Hyd. Tpeak (min)=          7.50        15.00
     Unit Hyd. peak  (cms)=           .16          .08
                                                             *TOTALS*
     PEAK FLOW       (cms)=           .52          .03          .532 (iii)
     TIME TO PEAK    (hrs)=          1.04         1.21         1.042
     RUNOFF VOLUME    (mm)=         56.66        25.35        51.647
     TOTAL RAINFALL   (mm)=         58.23        58.23        58.226
     RUNOFF COEFFICIENT   =           .97          .44          .887

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 001:0005------------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=    1.54
 | 02:020     DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.42          .12
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .50         1.00
     Length             (m)=       244.34         5.00
     Mannings n            =         .030         .030

     Max.eff.Inten.(mm/hr)=        144.69        65.19
                over (min)           7.50         7.50
     Storage Coeff.  (min)=          7.66 (ii)    8.49 (ii)
     Unit Hyd. Tpeak (min)=          7.50         7.50
     Unit Hyd. peak  (cms)=           .15          .14
                                                             *TOTALS*
     PEAK FLOW       (cms)=           .40          .01          .418 (iii)
     TIME TO PEAK    (hrs)=          1.04         1.08         1.042
     RUNOFF VOLUME    (mm)=         56.66        25.35        54.152
     TOTAL RAINFALL   (mm)=         58.23        58.23        58.226
     RUNOFF COEFFICIENT   =           .97          .44          .930

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 001:0006------------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=    1.40
 | 03:030     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.36          .04
     Dep. Storage      (mm)=         1.57         4.67
     Average Slope      (%)=          .51         1.00
     Length             (m)=       225.63         5.00
     Mannings n            =         .030         .030

     Max.eff.Inten.(mm/hr)=        144.69        65.19
                over (min)           7.50         7.50
     Storage Coeff.  (min)=          7.26 (ii)    8.09 (ii)
     Unit Hyd. Tpeak (min)=          7.50         7.50
     Unit Hyd. peak  (cms)=           .15          .14
                                                             *TOTALS*
     PEAK FLOW       (cms)=           .40          .00          .400 (iii)
     TIME TO PEAK    (hrs)=          1.04         1.08         1.042
     RUNOFF VOLUME    (mm)=         56.66        25.35        55.717
     TOTAL RAINFALL   (mm)=         58.23        58.23        58.226
     RUNOFF COEFFICIENT   =           .97          .44          .957

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 001:0007------------------------------------------------------------------------
 --------------------
 | ADD HYD (040   ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:010       2.07       .532     1.04  51.65    .000
                   +ID2 02:020       1.54       .418     1.04  54.15    .000
                    ==================================================
                    SUM 04:040       3.61       .950     1.04  52.72    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -----------------------------------------------------------------------------
 001:0008--------------------------------------------------------------------
 --------------------
 | ADD HYD (050  ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                       ID1 03:030    1.40      .400     1.04  55.72    .000
                      +ID2 04:040    3.61      .950     1.04  52.72    .000
                      ==================================================
                       SUM 05:050    5.01     1.350     1.04  53.55    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0009--------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=     .89
 | 06:060     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .86          .03
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .93          .70
     Length            (m)=   164.82        40.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   144.69        44.12
                over (min)      5.00        17.50
     Storage Coeff.  (min)=     5.02 (ii)   18.44 (ii)
     Unit Hyd. Tpeak (min)=     5.00        17.50
     Unit Hyd. peak  (cms)=      .22          .06
                                                      *TOTALS*
     PEAK FLOW        (cms)=      .30          .00         .296 (iii)
     TIME TO PEAK     (hrs)=     1.00         1.25        1.000
     RUNOFF VOLUME     (mm)=    56.66        25.35       55.717
     TOTAL RAINFALL    (mm)=    58.23        58.23       58.226
     RUNOFF COEFFICIENT    =      .97          .44         .957

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0010--------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    2.66
 | 07:070     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.58          .08
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .61         1.50
     Length            (m)=   207.25        20.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   144.69        51.33
                over (min)      7.50        12.50
     Storage Coeff.  (min)=     6.54 (ii)   13.16 (ii)
     Unit Hyd. Tpeak (min)=     7.50        12.50
     Unit Hyd. peak  (cms)=      .16          .09
                                                      *TOTALS*
     PEAK FLOW        (cms)=      .78          .01         .783 (iii)
     TIME TO PEAK     (hrs)=     1.04         1.17        1.042
     RUNOFF VOLUME     (mm)=    56.66        25.35       55.717
     TOTAL RAINFALL    (mm)=    58.23        58.23       58.226
     RUNOFF COEFFICIENT    =      .97          .44         .957

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0011--------------------------------------------------------------------
 --------------------
 | ADD HYD (080  ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                       ID1 06:060     .89      .296     1.00  55.72    .000
                      +ID2 07:070    2.66      .783     1.04  55.72    .000
                      ==================================================
                       SUM 08:080    3.55     1.060     1.04  55.72    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0012--------------------------------------------------------------------
 --------------------
 | ADD HYD (090  ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                       ID1 05:050    5.01     1.350     1.04  53.55    .000
                      +ID2 08:080    3.55     1.060     1.04  55.72    .000
                      ==================================================
                       SUM 09:090    8.56     2.410     1.04  54.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0013--------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
 |  IN>09:(090    )  |
 | OUT<10:(POND   )  |    =========  OUTLFOW STORAGE TABLE  =========
 --------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00   |     .593  .6251E+00
                              .008  .6560E-01   |     .654  .6631E+00
                              .017  .1311E+00   |     .797  .7391E+00
                              .093  .2831E+00   |     .950  .8274E+00
                              .233  .3971E+00   |    1.304  .9157E+00
                              .337  .4731E+00   |    1.880  .1004E+01
                              .465  .5491E+00   |    2.577  .1092E+01
                              .531  .5871E+00   |     .000  .0000E+00

     ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
     --------------------         (ha)     (cms)     (hrs)        (mm)
     INFLOW >09: (090    )        8.56     2.410     1.042      54.451
     OUTFLOW<10: (POND   )        8.56      .189     2.056      54.449

                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=      7.838
                      TIME SHIFT OF PEAK FLOW          (min)=     60.83
                      MAXIMUM  STORAGE  USED        (ha.m.)=.3612E+00

 -----------------------------------------------------------------------------
 001:0014--------------------------------------------------------------------
 ******************************************
 *     Remaining Hawthorne Industrial Park     *
 ******************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   19.90
 | 01:HIP01  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    14.13         5.77
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .60         1.50
     Length            (m)=   580.00       100.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   124.54        81.98
                over (min)     12.50        27.50
     Storage Coeff.  (min)=    12.93 (ii)   27.37 (ii)
     Unit Hyd. Tpeak (min)=    12.50        27.50
     Unit Hyd. peak  (cms)=      .09          .04
                                                      *TOTALS*
     PEAK FLOW        (cms)=     2.16          .77        2.548 (iii)
     TIME TO PEAK     (hrs)=     1.13         1.42        1.167
     RUNOFF VOLUME     (mm)=    56.66        34.22       45.437
     TOTAL RAINFALL    (mm)=    58.23        58.23       58.226
     RUNOFF COEFFICIENT    =      .97          .59         .780

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0015--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                       ID1 10:POND    8.56      .189     2.06  54.45    .000
                      +ID2 01:HIP01  19.90     2.548     1.17  45.44    .000
                      ==================================================
                       SUM 02:HIP02  28.46     2.622     1.17  48.15    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0016--------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   17.00
 | 03:HIP03  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    12.07         4.93
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .65         1.50
     Length            (m)=   450.00       100.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   144.69        87.13
                over (min)     10.00        25.00
     Storage Coeff.  (min)=    10.21 (ii)   24.30 (ii)
     Unit Hyd. Tpeak (min)=    10.00        25.00
     Unit Hyd. peak  (cms)=      .11          .05
                                                      *TOTALS*
     PEAK FLOW        (cms)=     2.10          .71        2.398 (iii)
     TIME TO PEAK     (hrs)=     1.08         1.38        1.125
     RUNOFF VOLUME     (mm)=    56.66        34.22       45.437
     TOTAL RAINFALL    (mm)=    58.23        58.23       58.226
     RUNOFF COEFFICIENT    =      .97          .59         .780

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0017--------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=   15.60
 | 04:HIP04  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    11.08         4.52
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .50         1.50
     Length            (m)=   600.00       100.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   111.10        77.71
                over (min)     15.00        30.00
     Storage Coeff.  (min)=    14.59 (ii)   29.34 (ii)
     Unit Hyd. Tpeak (min)=    15.00        30.00
     Unit Hyd. peak  (cms)=      .08          .04
                                                      *TOTALS*
     PEAK FLOW        (cms)=     1.57          .57        1.879 (iii)
     TIME TO PEAK     (hrs)=     1.17         1.46        1.208
     RUNOFF VOLUME     (mm)=    56.66        34.22       45.437
     TOTAL RAINFALL    (mm)=    58.23        58.23       58.226
     RUNOFF COEFFICIENT    =      .97          .59         .780

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0018--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                       ID1 03:HIP03  17.00     2.398     1.13  45.44    .000
                      +ID2 04:HIP04  15.60     1.879     1.21  45.44    .000
                      ==================================================
                       SUM 05:HIP05  32.60     4.157     1.13  45.44    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0019--------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                       ID1 05:HIP05  32.60     4.157     1.13  45.44    .000
                      +ID2 02:HIP02  28.46     2.622     1.17  48.15    .000
                      ==================================================
                       SUM 06:HIP06  61.06     6.741     1.17  46.70    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0020--------------------------------------------------------------------
 *
 * SUB-AREA No.4
```

```
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=   12.20
 | 07:HIP07  DT= 2.50 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.66          3.54
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .70          1.50
     Length            (m)=     210.00        100.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=     144.69        101.36
               over (min)        7.50         20.00
     Storage Coeff.  (min)=       6.32 (ii)    19.58 (ii)
     Unit Hyd. Tpeak (min)=       7.50         20.00
     Unit Hyd. peak  (cms)=        .17           .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.86           .59         2.109 (iii)
     TIME TO PEAK    (hrs)=       1.04          1.29         1.042
     RUNOFF VOLUME    (mm)=      56.66         34.22        45.437
     TOTAL RAINFALL   (mm)=      58.23         58.23        58.226
     RUNOFF COEFFICIENT   =        .97           .59          .780

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0021---------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=    4.00   Curve Number   (CN)=85.00
 | 08:Pond-B DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .170

     Unit Hyd Qpeak  (cms)=      .899

     PEAK FLOW       (cms)=      .459 (i)
     TIME TO PEAK    (hrs)=     1.167
     RUNOFF VOLUME    (mm)=    29.155
     TOTAL RAINFALL   (mm)=    58.226
     RUNOFF COEFFICIENT   =      .501

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

 -----------------------------------------------------------------------------
 001:0022---------------------------------------------------------------------
 -------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 -------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 06:HIP06     61.06    6.741    1.17  46.70    .000
                  +ID2 07:HIP07     12.20    2.109    1.04  45.44    .000
                  +ID3 08:Pond-B     4.00     .459    1.17  29.15    .000
                  ==================================================
                   SUM 09:HIP08     77.26    8.998    1.13  45.59    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0023---------------------------------------------------------------------
 -------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
 |   IN>09:(HIP08 )   |
 | OUT<10:(HIP-PO)    |     =========  OUTLFOW STORAGE TABLE  =========
 -------------------       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)  |   (cms)     (ha.m.)
                              .000  .0000E+00   |     .724  .2210E+01
                              .048  .5740E-01   |     .937  .2501E+01
                              .054  .2434E+00   |    1.262  .2798E+01
                              .059  .5834E+00   |    1.404  .3101E+01
                              .062  .8400E+00   |    1.532  .3410E+01
                              .064  .1102E+01   |    1.650  .3724E+01
                              .147  .1370E+01   |    2.409  .4044E+01
                              .280  .1644E+01   |    3.689  .4370E+01
                              .472  .1924E+01   |     .000  .0000E+00

     ROUTING RESULTS                AREA     QPEAK     TPEAK        R.V.
     -------------------            (ha)     (cms)     (hrs)        (mm)
     INFLOW >09: (HIP08 )          77.26     8.998     1.125      45.591
     OUTFLOW<10: (HIP-PO)          77.26     1.004     3.083      45.591

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.160
                 TIME SHIFT OF PEAK FLOW          (min)=   117.50
                 MAXIMUM  STORAGE   USED       (ha.m.)=.2562E+01

 -----------------------------------------------------------------------------
 001:0024---------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 ---------------------
 | DESIGN NASHYD      |   Area     (ha)=    2.70   Curve Number   (CN)=76.00
 | 01:A3      DT= 2.50 |   Ia       (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .800

     Unit Hyd Qpeak  (cms)=      .129

     PEAK FLOW       (cms)=      .079 (i)
     TIME TO PEAK    (hrs)=     2.000
     RUNOFF VOLUME    (mm)=    21.442
     TOTAL RAINFALL   (mm)=    58.226
     RUNOFF COEFFICIENT   =      .368

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

 -----------------------------------------------------------------------------
 001:0025---------------------------------------------------------------------
 -------------------
 | ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 -------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 10:HIP-PO    77.26    1.004    3.08  45.59    .000
                  +ID2 01:A3         2.70     .079    2.00  21.44    .000
                  ==================================================
                   SUM 02:Ultima    79.96    1.051    3.01  44.78    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 001:0026---------------------------------------------------------------------
 ****************************************************************
 *        CALCULATION OF 3HR - 1:50 YEAR STORM EVENT            *
 ****************************************************************
 -------------------
 | START              |  Project dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
 -------------------     Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
     TZERO =   .00 hrs on        0
     METOUT=    2 (output = METRIC)
     NRUN  = 001
     NSTORM=    0
 -----------------------------------------------------------------------------
 001:0002---------------------------------------------------------------------
 -------------------
 | CHICAGO STORM    |     IDF curve parameters: A=1569.580
 | Ptotal= 64.81 mm |                           B=   6.014
 -------------------                            C=    .820
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =   .33

             TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
              hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
              .17    5.467 |   1.00  161.471 |   1.83   10.000 |   2.67    5.209
              .33    6.820 |   1.17   48.876 |   2.00    8.397 |   2.83    4.774
              .50    9.187 |   1.33   24.704 |   2.17    7.256 |   3.00    4.412
              .67   14.441 |   1.50   16.495 |   2.33    6.403 |
              .83   36.764 |   1.67   12.422 |   2.50    5.740 |

 -----------------------------------------------------------------------------
 001:0003---------------------------------------------------------------------
 ---------------------
 | DEFAULT VALUES       |  Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
 ---------------------    ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 -----------------------------------------------------------------------------
 001:0004---------------------------------------------------------------------
 ***********************************
 *         ORGAWORLD FILE          *
 ***********************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    2.07
 | 01:010     DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.74           .33
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .52          1.00
     Length            (m)=     204.72         20.00
     Mannings n           =       .030          .250

     Max.eff.Inten.(mm/hr)=     161.47         62.27
               over (min)        7.50         12.50
     Storage Coeff.  (min)=       6.51 (ii)    13.44 (ii)
     Unit Hyd. Tpeak (min)=       7.50         12.50
     Unit Hyd. peak  (cms)=        .16           .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .59           .03          .609 (iii)
     TIME TO PEAK    (hrs)=       1.04          1.17         1.042
     RUNOFF VOLUME    (mm)=      63.24         30.21        57.952
     TOTAL RAINFALL   (mm)=      64.81         64.81        64.806
     RUNOFF COEFFICIENT   =        .98           .47          .894

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0005---------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    1.54
 | 02:020     DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.42           .12
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .50          1.00
     Length            (m)=     244.34          5.00
     Mannings n           =       .030          .030

     Max.eff.Inten.(mm/hr)=     161.47         78.73
               over (min)        7.50          7.50
     Storage Coeff.  (min)=       7.33 (ii)     8.10 (ii)
     Unit Hyd. Tpeak (min)=       7.50          7.50
     Unit Hyd. peak  (cms)=        .15           .14
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .46           .02          .475 (iii)
     TIME TO PEAK    (hrs)=       1.04          1.08         1.042
     RUNOFF VOLUME    (mm)=      63.24         30.21        60.594
     TOTAL RAINFALL   (mm)=      64.81         64.81        64.806
     RUNOFF COEFFICIENT   =        .98           .47          .935

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0006---------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD      |   Area     (ha)=    1.40
 | 03:030     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.36           .04
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=        .51          1.00
     Length            (m)=     225.63          5.00
     Mannings n           =       .030          .030

     Max.eff.Inten.(mm/hr)=     161.47         78.73
               over (min)        7.50          7.50
     Storage Coeff.  (min)=       6.95 (ii)     7.72 (ii)
     Unit Hyd. Tpeak (min)=       7.50          7.50
     Unit Hyd. peak  (cms)=        .16           .15
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .45           .01          .454 (iii)
     TIME TO PEAK    (hrs)=       1.04          1.08         1.042
     RUNOFF VOLUME    (mm)=      63.24         30.21        62.245
     TOTAL RAINFALL   (mm)=      64.81         64.81        64.806
     RUNOFF COEFFICIENT   =        .98           .47          .960

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 001:0007---------------------------------------------------------------------
```

```
 --------------------
 | ADD HYD (040    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 01:010         2.07      .609     1.04  57.95    .000
                  +ID2 02:020         1.54      .475     1.04  60.59    .000
                   ================================================
                   SUM 04:040         3.61     1.084     1.04  59.08    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0008------------------------------------------------------------------
 --------------------
 | ADD HYD (050    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 03:030         1.40      .454     1.04  62.25    .000
                  +ID2 04:040         3.61     1.084     1.04  59.08    .000
                   ================================================
                   SUM 05:050         5.01     1.538     1.04  59.96    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0009------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ----------------------
 | CALIB STANDHYD      |   Area    (ha)=      .89
 | 06:060     DT= 2.50 |   Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       .86          .03
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .93          .70
     Length             (m)=    164.82        40.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=    161.47        53.28
                over (min)        5.00        17.50
     Storage Coeff.   (min)=      4.80 (ii)   17.24 (ii)
     Unit Hyd. Tpeak  (min)=      5.00        17.50
     Unit Hyd. peak   (cms)=       .23          .07
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .33          .00          .335 (iii)
     TIME TO PEAK     (hrs)=      1.00         1.25         1.000
     RUNOFF VOLUME     (mm)=     63.24        30.21        62.245
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT    =       .98          .47          .960

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0010------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ----------------------
 | CALIB STANDHYD      |   Area    (ha)=     2.66
 | 07:070     DT= 2.50 |   Total Imp(%)=    97.00    Dir. Conn.(%)=    97.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      2.58          .08
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .61         1.50
     Length             (m)=    207.25        20.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=    161.47        62.27
                over (min)        7.50        12.50
     Storage Coeff.   (min)=      6.26 (ii)   12.39 (ii)
     Unit Hyd. Tpeak  (min)=      7.50        12.50
     Unit Hyd. peak   (cms)=       .17          .09
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .88          .01          .886 (iii)
     TIME TO PEAK     (hrs)=      1.04         1.17         1.042
     RUNOFF VOLUME     (mm)=     63.24        30.21        62.245
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT    =       .98          .47          .960

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0011------------------------------------------------------------------
 --------------------
 | ADD HYD (080    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 06:060          .89      .335     1.00  62.25    .000
                  +ID2 07:070         2.66      .886     1.04  62.25    .000
                   ================================================
                   SUM 08:080         3.55     1.197     1.04  62.25    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0012------------------------------------------------------------------
 --------------------
 | ADD HYD (090    ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                 (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 05:050         5.01     1.538     1.04  59.96    .000
                  +ID2 08:080         3.55     1.197     1.04  62.25    .000
                   ================================================
                   SUM 09:090         8.56     2.735     1.04  60.91    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0013------------------------------------------------------------------
 ----------------------
 | ROUTE RESERVOIR     |    Requested routing time step =  1.0 min.
 | IN>09:(090   )      |
 | OUT<10:(POND  )     |    ========  OUTFLOW STORAGE TABLE  ========
 ----------------------      OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                              (cms)      (ha.m.)   |   (cms)     (ha.m.)
                               .000   .0000E+00    |    .593  .6251E+00
                               .008   .6560E-01    |    .654  .6631E+00
                               .017   .1311E+00    |    .797  .7391E+00
                               .093   .2831E+00    |    .950  .8274E+00
                               .233   .3971E+00    |   1.304  .9157E+00
                               .337   .4731E+00    |   1.880  .1004E+01
                               .465   .5491E+00    |   2.577  .1092E+01
                               .531   .5871E+00    |    .000  .0000E+00

     ROUTING RESULTS          AREA      QPEAK      TPEAK        R.V.
     -------------------      (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (090   )     8.56      2.735      1.042       60.910
     OUTFLOW<10: (POND  )     8.56       .233      1.944       60.908

                 PEAK   FLOW    REDUCTION [Qout/Qin](%)=    8.503
                 TIME SHIFT OF PEAK FLOW          (min)=    54.17
                 MAXIMUM  STORAGE   USED       (ha.m.)=.3967E+00

 ---------------------------------------------------------------------------
 001:0014------------------------------------------------------------------
 *********************************************
 *     Remaining Hawthorne Industrial Park     *
 *********************************************
 *
 * SUB-AREA No.1
 ----------------------
 | CALIB STANDHYD      |   Area    (ha)=    19.90
 | 01:HIP01   DT= 2.50 |   Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     14.13         5.77
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .60         1.50
     Length             (m)=    580.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=    138.95       102.13
                over (min)       12.50        25.00
     Storage Coeff.   (min)=     12.38 (ii)   25.60 (ii)
     Unit Hyd. Tpeak  (min)=     12.50        25.00
     Unit Hyd. peak   (cms)=       .09          .04
                                                          *TOTALS*
     PEAK FLOW        (cms)=      2.46          .95         3.001 (iii)
     TIME TO PEAK     (hrs)=      1.13         1.38         1.167
     RUNOFF VOLUME     (mm)=     63.24        39.90        51.566
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT    =       .98          .62          .796

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0015------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 10:POND        8.56      .233     1.94  60.91    .000
                  +ID2 01:HIP01      19.90     3.001     1.17  51.57    .000
                   ================================================
                   SUM 02:HIP02      28.46     3.092     1.17  54.37    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0016------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ----------------------
 | CALIB STANDHYD      |   Area    (ha)=    17.00
 | 03:HIP03   DT= 2.50 |   Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     12.07         4.93
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .65         1.50
     Length             (m)=    450.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=    161.47       109.61
                over (min)       10.00        22.50
     Storage Coeff.   (min)=      9.77 (ii)   22.63 (ii)
     Unit Hyd. Tpeak  (min)=     10.00        22.50
     Unit Hyd. peak   (cms)=       .11          .05
                                                          *TOTALS*
     PEAK FLOW        (cms)=      2.38          .88         2.819 (iii)
     TIME TO PEAK     (hrs)=      1.08         1.33         1.125
     RUNOFF VOLUME     (mm)=     63.24        39.90        51.566
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT    =       .98          .62          .796

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0017------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ----------------------
 | CALIB STANDHYD      |   Area    (ha)=    15.60
 | 04:HIP04   DT= 2.50 |   Total Imp(%)=    71.00    Dir. Conn.(%)=    50.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     11.08         4.52
     Dep. Storage      (mm)=      1.57         4.67
     Average Slope      (%)=       .50         1.50
     Length             (m)=    600.00       100.00
     Mannings n            =      .030         .250

     Max.eff.Inten.(mm/hr)=    138.95        96.02
                over (min)       12.50        27.50
     Storage Coeff.   (min)=     13.34 (ii)   26.90 (ii)
     Unit Hyd. Tpeak  (min)=     12.50        27.50
     Unit Hyd. peak   (cms)=       .09          .04
                                                          *TOTALS*
     PEAK FLOW        (cms)=      1.86          .72         2.237 (iii)
     TIME TO PEAK     (hrs)=      1.13         1.42         1.167
     RUNOFF VOLUME     (mm)=     63.24        39.90        51.566
     TOTAL RAINFALL    (mm)=     64.81        64.81        64.806
     RUNOFF COEFFICIENT    =       .98          .62          .796

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0018------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 03:HIP03      17.00     2.819     1.13  51.57    .000
                  +ID2 04:HIP04      15.60     2.237     1.17  51.57    .000
                   ================================================
                   SUM 05:HIP05      32.60     5.019     1.13  51.57    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0019------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 05:HIP05      32.60     5.019     1.13  51.57    .000
```

```
               +ID2 02:HIP02      28.46     3.092     1.17  54.37     .000
               =======================================================
                SUM 06:HIP06      61.06     8.054     1.13  52.87     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0020-------------------------------------------------------------------
*
* SUB-AREA No.4
----------------------
| CALIB STANDHYD      |    Area     (ha)=    12.20
| 07:HIP07  DT= 2.50 |    Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        8.66          3.54
    Dep. Storage     (mm)=        1.57          4.67
    Average Slope     (%)=         .70          1.50
    Length            (m)=      210.00        100.00
    Mannings n          =        .030          .250

    Max.eff.Inten.(mm/hr)=      161.47        126.32
               over (min)        5.00         17.50
    Storage Coeff.   (min)=       6.05 (ii)    18.19 (ii)
    Unit Hyd. Tpeak (min)=       5.00         17.50
    Unit Hyd. peak   (cms)=        .20           .06
                                                           *TOTALS*
    PEAK FLOW        (cms)=       2.19           .73         2.470 (iii)
    TIME TO PEAK     (hrs)=       1.00          1.25         1.042
    RUNOFF VOLUME     (mm)=      63.24         39.90        51.566
    TOTAL RAINFALL    (mm)=      64.81         64.81        64.806
    RUNOFF COEFFICIENT   =        .98           .62          .796

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =   81.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0021-------------------------------------------------------------------
*
*SUB-AREA No.5
----------------------
| DESIGN NASHYD       |   Area      (ha)=     4.00    Curve Number    (CN)=85.00
| 08:Pond-B DT= 2.50 |   Ia         (mm)=    4.670    # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .170

    Unit Hyd Qpeak  (cms)=      .899

    PEAK FLOW       (cms)=      .551 (i)
    TIME TO PEAK    (hrs)=     1.125
    RUNOFF VOLUME    (mm)=    34.455
    TOTAL RAINFALL   (mm)=    64.806
    RUNOFF COEFFICIENT   =      .532

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

---------------------------------------------------------------------------
001:0022-------------------------------------------------------------------
---------------------
| ADD HYD (HIP08 ) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.     DWF
---------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                  ID1 06:HIP06      61.06     8.054     1.13  52.87     .000
                 +ID2 07:HIP07      12.20     2.470     1.04  51.57     .000
                 +ID3 08:Pond-B      4.00      .551     1.13  34.45     .000
                 ======================================================
                  SUM 09:HIP08      77.26    10.570     1.13  51.71     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0023-------------------------------------------------------------------
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>09:(HIP08 )    |
| OUT<10:(HIP-PO)    |    =========  OUTFLOW STORAGE TABLE  =========
---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000   .0000E+00   |     .724   .2210E+01
                             .048   .5740E-01   |     .937   .2501E+01
                             .054   .2434E+00   |    1.262   .2798E+01
                             .059   .5834E+00   |    1.404   .3101E+01
                             .062   .8400E+00   |    1.532   .3410E+01
                             .064   .1102E+01   |    1.650   .3724E+01
                             .147   .1370E+01   |    2.409   .4044E+01
                             .280   .1644E+01   |    3.689   .4370E+01
                             .472   .1924E+01   |     .000   .0000E+00

   ROUTING RESULTS            AREA      QPEAK     TPEAK        R.V.
   ---------------            (ha)      (cms)     (hrs)        (mm)
   INFLOW >09: (HIP08 )      77.26     10.570     1.125      51.714
   OUTFLOW<10: (HIP-PO)      77.26      1.280     2.917      51.714

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.106
                   TIME SHIFT OF PEAK FLOW         (min)=   107.50
                   MAXIMUM  STORAGE   USED        (ha.m.)=.2836E+01

---------------------------------------------------------------------------
001:0024-------------------------------------------------------------------
*
*SUB-AREA No. 6
----------------------
| DESIGN NASHYD       |   Area      (ha)=     2.70    Curve Number    (CN)=76.00
| 01:A3      DT= 2.50 |   Ia         (mm)=    4.670    # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .800

    Unit Hyd Qpeak  (cms)=      .129

    PEAK FLOW       (cms)=      .096 (i)
    TIME TO PEAK    (hrs)=     1.958
    RUNOFF VOLUME    (mm)=    25.767
    TOTAL RAINFALL   (mm)=    64.806
    RUNOFF COEFFICIENT   =      .398

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

---------------------------------------------------------------------------
001:0025-------------------------------------------------------------------
---------------------
| ADD HYD (Ultima) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.     DWF
---------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                  ID1 10:HIP-PO     77.26     1.280     2.92  51.71     .000
                 +ID2 01:A3          2.70      .096     1.96  25.77     .000
                 ======================================================
                  SUM 02:Ultima     79.96     1.348     2.63  50.84     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0026-------------------------------------------------------------------
*******************************************************************
*       CALCULATION OF 3HR - 1:100 YEAR STORM EVENT               *
*******************************************************************
--------------------
| START              |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------    Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
   TZERO =    .00 hrs on        0
   METOUT=    2 (output = METRIC)
   NRUN  = 001
   NSTORM=   0
---------------------------------------------------------------------------
001:0002-------------------------------------------------------------------
--------------------
| CHICAGO STORM      |    IDF curve parameters: A=1735.688
| Ptotal= 71.66 mm |                             B=   6.014
--------------------                              C=    .820
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =   .33

          TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
           hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
           .17    6.046 |  1.00  178.559 |  1.83   11.059 |  2.67    5.760
           .33    7.542 |  1.17   54.049 |  2.00    9.285 |  2.83    5.280
           .50   10.159 |  1.33   27.319 |  2.17    8.024 |  3.00    4.879
           .67   15.969 |  1.50   18.240 |  2.33    7.080 |
           .83   40.655 |  1.67   13.737 |  2.50    6.347 |

---------------------------------------------------------------------------
001:0003-------------------------------------------------------------------
--------------------
| DEFAULT VALUES      |  Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
---------------------   ICASEdv = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
---------------------------------------------------------------------------
001:0004-------------------------------------------------------------------
************************************
*          ORGAWORLD FILE          *
************************************
*
* SUB-AREA No.1
----------------------
| CALIB STANDHYD      |    Area     (ha)=     2.07
| 01:010     DT= 2.50 |    Total Imp(%)=    84.00   Dir. Conn.(%)=    84.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        1.74           .33
    Dep. Storage     (mm)=        1.57          4.67
    Average Slope     (%)=         .52          1.00
    Length            (m)=      204.72         20.00
    Mannings n          =        .030          .250

    Max.eff.Inten.(mm/hr)=      178.56         74.05
               over (min)        7.50         12.50
    Storage Coeff.   (min)=       6.26 (ii)    12.72 (ii)
    Unit Hyd. Tpeak (min)=       7.50         12.50
    Unit Hyd. peak   (cms)=        .17           .09
                                                           *TOTALS*
    PEAK FLOW        (cms)=        .66           .04          .685 (iii)
    TIME TO PEAK     (hrs)=       1.04          1.17         1.042
    RUNOFF VOLUME     (mm)=      70.09         35.46        64.553
    TOTAL RAINFALL    (mm)=      71.66         71.66        71.665
    RUNOFF COEFFICIENT   =        .98           .49          .901

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =   81.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0005-------------------------------------------------------------------
*
* SUB-AREA No.2
----------------------
| CALIB STANDHYD      |    Area     (ha)=     1.54
| 02:020     DT= 2.50 |    Total Imp(%)=    92.00   Dir. Conn.(%)=    92.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        1.42           .12
    Dep. Storage     (mm)=        1.57          4.67
    Average Slope     (%)=         .50          1.00
    Length            (m)=      244.34          5.00
    Mannings n          =        .030          .030

    Max.eff.Inten.(mm/hr)=      178.56         93.23
               over (min)        7.50          7.50
    Storage Coeff.   (min)=       7.04 (ii)     7.76 (ii)
    Unit Hyd. Tpeak (min)=       7.50          7.50
    Unit Hyd. peak   (cms)=        .16           .15
                                                           *TOTALS*
    PEAK FLOW        (cms)=        .51           .02          .534 (iii)
    TIME TO PEAK     (hrs)=       1.04          1.08         1.042
    RUNOFF VOLUME     (mm)=      70.09         35.46        67.324
    TOTAL RAINFALL    (mm)=      71.66         71.66        71.665
    RUNOFF COEFFICIENT   =        .98           .49          .939

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =   81.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0006-------------------------------------------------------------------
*
* SUB-AREA No.3
----------------------
| CALIB STANDHYD      |    Area     (ha)=     1.40
| 03:030     DT= 2.50 |    Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        1.36           .04
    Dep. Storage     (mm)=        1.57          4.67
    Average Slope     (%)=         .51          1.00
    Length            (m)=      225.63          5.00
    Mannings n          =        .030          .030

    Max.eff.Inten.(mm/hr)=      178.56         93.23
               over (min)        7.50          7.50
    Storage Coeff.   (min)=       6.67 (ii)     7.39 (ii)
    Unit Hyd. Tpeak (min)=       7.50          7.50
    Unit Hyd. peak   (cms)=        .16           .15
                                                           *TOTALS*
    PEAK FLOW        (cms)=        .50           .01          .509 (iii)
    TIME TO PEAK     (hrs)=       1.04          1.08         1.042
    RUNOFF VOLUME     (mm)=      70.09         35.46        69.056
    TOTAL RAINFALL    (mm)=      71.66         71.66        71.665
```

```
     RUNOFF COEFFICIENT   =         .98           .49          .964

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:010       2.07      .685    1.04  64.55    .000
                 +ID2 02:020       1.54      .534    1.04  67.32    .000
                  =====================================================
                  SUM 04:040       3.61     1.220    1.04  65.74    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 03:030       1.40      .509    1.04  69.06    .000
                 +ID2 04:040       3.61     1.220    1.04  65.74    .000
                  =====================================================
                  SUM 05:050       5.01     1.729    1.04  66.66    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
*
* SUB-AREA No.4
----------------------
| CALIB STANDHYD     |    Area     (ha)=      .89
| 06:060     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .86          .03
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .93          .70
     Length            (m)=   164.82        40.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   178.56        67.61
                over (min)      5.00        15.00
     Storage Coeff.   (min)=    4.62 (ii)   15.92 (ii)
     Unit Hyd. Tpeak  (min)=    5.00        15.00
     Unit Hyd. peak   (cms)=     .24          .07
                                                           *TOTALS*
     PEAK FLOW        (cms)=     .37          .00            .374 (iii)
     TIME TO PEAK     (hrs)=    1.00         1.21           1.000
     RUNOFF VOLUME     (mm)=   70.09        35.46          69.056
     TOTAL RAINFALL    (mm)=   71.66        71.66          71.665
     RUNOFF COEFFICIENT   =      .98          .49            .964

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
*
* SUB-AREA No.5
----------------------
| CALIB STANDHYD     |    Area     (ha)=     2.66
| 07:070     DT= 2.50 |   Total Imp(%)=    97.00   Dir. Conn.(%)=    97.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.58          .08
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .61         1.50
     Length            (m)=   207.25        20.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   178.56        74.05
                over (min)      5.00        12.50
     Storage Coeff.   (min)=    6.01 (ii)   11.73 (ii)
     Unit Hyd. Tpeak  (min)=    5.00        12.50
     Unit Hyd. peak   (cms)=     .20          .09
                                                           *TOTALS*
     PEAK FLOW        (cms)=    1.03          .01           1.034 (iii)
     TIME TO PEAK     (hrs)=    1.00         1.17           1.000
     RUNOFF VOLUME     (mm)=   70.09        35.46          69.056
     TOTAL RAINFALL    (mm)=   71.66        71.66          71.665
     RUNOFF COEFFICIENT   =      .98          .49            .964

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
--------------------
| ADD HYD (080   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 06:060        .89      .374    1.00  69.06    .000
                 +ID2 07:070       2.66     1.034    1.00  69.06    .000
                  =====================================================
                  SUM 08:080       3.55     1.408    1.00  69.06    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0012-----------------------------------------------------------------------
--------------------
| ADD HYD (090   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 05:050       5.01     1.729    1.04  66.66    .000
                 +ID2 08:080       3.55     1.408    1.00  69.06    .000
                  =====================================================
                  SUM 09:090       8.56     3.067    1.04  67.66    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0013-----------------------------------------------------------------------
----------------------
| ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
|  IN>09:(090    )   |
| OUT<10:(POND   )   |     ========  OUTFLOW STORAGE TABLE  ========
----------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00    |     .593  .6251E+00
                             .008  .6560E-01    |     .654  .6631E+00
                             .017  .1311E+00    |     .797  .7391E+00
                             .093  .2831E+00    |     .950  .8274E+00
                             .233  .3971E+00    |    1.304  .9157E+00
                             .337  .4731E+00    |    1.880  .1004E+01
                             .465  .5491E+00    |    2.577  .1092E+01
                             .531  .5871E+00    |     .000  .0000E+00

     ROUTING RESULTS          AREA     QPEAK     TPEAK       R.V.
     --------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW >09: (090   )     8.56     3.067     1.042     67.655
     OUTFLOW<10: (POND  )     8.56      .283     1.861     67.653

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.214
                  TIME SHIFT OF PEAK FLOW         (min)=    49.17
                  MAXIMUM  STORAGE   USED     (ha.m.)=.4333E+00

-------------------------------------------------------------------------------
001:0014-----------------------------------------------------------------------
***********************************************
*    Remaining Hawthorne Industrial Park       *
***********************************************
*
* SUB-AREA No.1
----------------------
| CALIB STANDHYD     |    Area     (ha)=    19.90
| 01:HIP01   DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    14.13         5.77
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .60         1.50
     Length            (m)=   580.00       100.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   153.66       117.89
                over (min)     12.50        25.00
     Storage Coeff.   (min)=   11.89 (ii)   24.37 (ii)
     Unit Hyd. Tpeak  (min)=   12.50        25.00
     Unit Hyd. peak   (cms)=     .09          .05
                                                           *TOTALS*
     PEAK FLOW        (cms)=    2.77         1.13           3.419 (iii)
     TIME TO PEAK     (hrs)=    1.13         1.38           1.167
     RUNOFF VOLUME     (mm)=   70.09        45.94          58.015
     TOTAL RAINFALL    (mm)=   71.66        71.66          71.665
     RUNOFF COEFFICIENT   =      .98          .64            .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0015-----------------------------------------------------------------------
--------------------
| ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 10:POND      8.56      .283    1.86  67.65    .000
                 +ID2 01:HIP01    19.90     3.419    1.17  58.02    .000
                  =====================================================
                  SUM 02:HIP02    28.46     3.554    1.17  60.91    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0016-----------------------------------------------------------------------
*
* SUB-AREA No.2
----------------------
| CALIB STANDHYD     |    Area     (ha)=    17.00
| 03:HIP03   DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    12.07         4.93
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .65         1.50
     Length            (m)=   450.00       100.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   178.56       126.60
                over (min)     10.00        22.50
     Storage Coeff.   (min)=    9.39 (ii)   21.52 (ii)
     Unit Hyd. Tpeak  (min)=   10.00        22.50
     Unit Hyd. peak   (cms)=     .12          .05
                                                           *TOTALS*
     PEAK FLOW        (cms)=    2.68         1.05           3.203 (iii)
     TIME TO PEAK     (hrs)=    1.08         1.33           1.125
     RUNOFF VOLUME     (mm)=   70.09        45.94          58.015
     TOTAL RAINFALL    (mm)=   71.66        71.66          71.665
     RUNOFF COEFFICIENT   =      .98          .64            .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0017-----------------------------------------------------------------------
*
* SUB-AREA No.3
----------------------
| CALIB STANDHYD     |    Area     (ha)=    15.60
| 04:HIP04   DT= 2.50 |   Total Imp(%)=    71.00   Dir. Conn.(%)=    50.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    11.08         4.52
     Dep. Storage     (mm)=     1.57         4.67
     Average Slope     (%)=      .50         1.50
     Length            (m)=   600.00       100.00
     Mannings n           =     .030         .250

     Max.eff.Inten.(mm/hr)=   153.66       117.89
                over (min)     12.50        25.00
     Storage Coeff.   (min)=   12.82 (ii)   25.30 (ii)
     Unit Hyd. Tpeak  (min)=   12.50        25.00
     Unit Hyd. peak   (cms)=     .09          .04
                                                           *TOTALS*
     PEAK FLOW        (cms)=    2.10          .87           2.612 (iii)
     TIME TO PEAK     (hrs)=    1.13         1.38           1.167
     RUNOFF VOLUME     (mm)=   70.09        45.94          58.015
     TOTAL RAINFALL    (mm)=   71.66        71.66          71.665
     RUNOFF COEFFICIENT   =      .98          .64            .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0018-----------------------------------------------------------------------
--------------------
| ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 03:HIP03    17.00     3.203    1.13  58.02    .000
                 +ID2 04:HIP04    15.60     2.612    1.17  58.02    .000
                  =====================================================
```

```
                  SUM 05:HIP05     32.60    5.767    1.13  58.02    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0019--------------------------------------------------------------------
-------------------
| ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
-------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 05:HIP05     32.60    5.767    1.13  58.02    .000
                 +ID2 02:HIP02     28.46    3.554    1.17  60.91    .000
                 ==================================================
                  SUM 06:HIP06     61.06    9.239    1.13  59.36    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0020--------------------------------------------------------------------
*
* SUB-AREA No.4
----------------------
| CALIB STANDHYD      |   Area    (ha)=   12.20
| 07:HIP07  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=    8.66         3.54
    Dep. Storage     (mm)=    1.57         4.67
    Average Slope     (%)=     .70         1.50
    Length            (m)=  210.00       100.00
    Mannings n           =    .030         .250

    Max.eff.Inten.(mm/hr)=  178.56       146.17
               over (min)     5.00        17.50
    Storage Coeff.  (min)=    5.81 (ii)   17.27 (ii)
    Unit Hyd. Tpeak (min)=    5.00        17.50
    Unit Hyd. peak  (cms)=     .20          .07
                                                       *TOTALS*
    PEAK FLOW       (cms)=    2.46          .87          2.793 (iii)
    TIME TO PEAK    (hrs)=    1.00         1.25          1.042
    RUNOFF VOLUME    (mm)=   70.09        45.94         58.015
    TOTAL RAINFALL   (mm)=   71.66        71.66         71.665
    RUNOFF COEFFICIENT   =     .98          .64           .810

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
001:0021--------------------------------------------------------------------
*
*SUB-AREA No.5
----------------------
| DESIGN NASHYD       |   Area    (ha)=    4.00   Curve Number   (CN)=85.00
| 08:Pond-B DT= 2.50  |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=    .170

    Unit Hyd Qpeak  (cms)=     .899

    PEAK FLOW       (cms)=     .649 (i)
    TIME TO PEAK    (hrs)=    1.125
    RUNOFF VOLUME    (mm)=   40.139
    TOTAL RAINFALL   (mm)=   71.665
    RUNOFF COEFFICIENT   =     .560

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

----------------------------------------------------------------------------
001:0022--------------------------------------------------------------------
-------------------
| ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
-------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 06:HIP06     61.06    9.239    1.13  59.36    .000
                 +ID2 07:HIP07     12.20    2.793    1.04  58.02    .000
                 +ID3 08:Pond-B     4.00     .649    1.13  40.14    .000
                 ==================================================
                  SUM 09:HIP08     77.26   12.109    1.13  58.16    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0023--------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>09:(HIP08 )    |
| OUT<10:(HIP-PO)    |    ========= OUTFLOW STORAGE TABLE =========
--------------------      OUTFLOW    STORAGE  |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)  |   (cms)     (ha.m.)
                            .000  .0000E+00   |     .724  .2210E+01
                            .048  .5740E-01   |     .937  .2501E+01
                            .054  .2434E+00   |    1.262  .2798E+01
                            .059  .5834E+00   |    1.404  .3101E+01
                            .062  .8400E+00   |    1.532  .3410E+01
                            .064  .1102E+01   |    1.650  .3724E+01
                            .147  .1370E+01   |    2.409  .4044E+01
                            .280  .1644E+01   |    3.689  .4370E+01
                            .472  .1924E+01   |     .000  .0000E+00

    ROUTING RESULTS            AREA     QPEAK     TPEAK        R.V.
    --------------------       (ha)     (cms)     (hrs)        (mm)
    INFLOW >09: (HIP08 )      77.26    12.109     1.125      58.156
    OUTFLOW<10: (HIP-PO)      77.26     1.432     2.889      58.156

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.826
                   TIME SHIFT OF PEAK FLOW        (min)=   105.83
                   MAXIMUM  STORAGE  USED       (ha.m.)=.3168E+01

----------------------------------------------------------------------------
001:0024--------------------------------------------------------------------
*
*SUB-AREA No. 6
----------------------
| DESIGN NASHYD       |   Area    (ha)=    2.70   Curve Number   (CN)=76.00
| 01:A3      DT= 2.50 |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=    .800

    Unit Hyd Qpeak  (cms)=     .129

    PEAK FLOW       (cms)=     .114 (i)
    TIME TO PEAK    (hrs)=    1.958
    RUNOFF VOLUME    (mm)=   30.490
    TOTAL RAINFALL   (mm)=   71.665
    RUNOFF COEFFICIENT   =     .425

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

----------------------------------------------------------------------------
001:0025--------------------------------------------------------------------
--------------------
| ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 10:HIP-PO    77.26    1.432    2.89  58.16    .000
                 +ID2 01:A3         2.70     .114    1.96  30.49    .000
                 ==================================================
                  SUM 02:Ultima    79.96    1.515    2.57  57.22    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0026--------------------------------------------------------------------
        FINISH
----------------------------------------------------------------------------
****************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2009-05-15     at 08:45:24
============================================================================
```

APPENDIX 'I'

MINISTRY OF THE ENVIRONMENT
CERTIFICATE OF APPROVAL
EXISTING SETTLING PONDS

NK

Ministry of the Environment

Ministère de l'Environnement

Ontario

GOLDER ASSOCIATES
MAY 2 5 2004
RECEIVED — OTTAWA

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 6924-5YWQ3U

R. W. Tomlinson Limited
5597 Power Road, R.R. No. 6
Gloucester, Ontario
K1G 3N4

Site Location: Tomlinson Property, east side of Hawthorne Road
Lot 26 & 27, Concession VI
Ottawa City

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of sewage works for the collection, transmission, treatment and disposal of excess wash plant wash water, consisting of the following:

- 410 millimeter pipeline extending from the wash plant, located on the Rideau Road Quarry #1 site, to the settling ponds;

- three (3) settling ponds, in series, Cell #1 having an effective volume of 3,275 cubic metres (and an operating freeboard of 0.6 metres), Cell #2 having an effective volume of 2,347 cubic metres (and an operating freeboard of 0.6 metres) and Cell #3 having an effective volume of 1,154 cubic metres (and an operating freeboard of 0.6 metres), including temporary floating pumping station in Cell #1, floating recycle pumping station in Cell #2, baffle in Cell #2 and mixing manhole between Cell #2 and Cell #3 (if required), with an overflow discharge from Cell #3 to the roadside ditch along Hawthorne Road;

- all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works;

all in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Ronald Tomlinson of R. W. Tomlinson Limited dated March 8, 2004;

2. Report on Application for Industrial Sewage Works Approval under Section 53 of the Ontario Water Resources Act, R.W. Tomlinson Limited, Aggregate Wash Water Management Associated with Rideau Road Quarry No. 1, Geographic City of Gloucester, City of Ottawa, Ontario prepared by Golder Associates, dated March 2004; and

3. Letter and attachments dated May 11, 2004 from Nural Kuyucak and K. Marentette of Golder Associates to Randy Chin of the Ministry of the Environment.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means R. W. Tomlinson Limited and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

(1) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

(2) Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner or operating authority, or both;

(b) change of address of Owner or operating authority or address of new owner or operating authority;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Partnerships Registration Act*; and

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the *Corporations Informations Act* shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this certificate, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition will refer to this certificate's number.

3. <u>OPERATIONS MANUAL</u>

(1) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the works;

(b) inspection programs, including frequency of inspection, for the works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the works;

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager; and

(e) complaint procedures for receiving and responding to public complaints.

(2) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

4. <u>CLOSED LOOP OPERATION</u>

(1) The Owner shall ensure that the works are normally operated as a closed loop system with treated water being recycled back to the wash plant.

(2) In the event that excess accumulation of water occurs and a discharge is necessary, the Owner shall undertake the monitoring outlined in Condition 6 and shall adhere to the effluent limits in Condition 5.

5. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the works such that the concentration of Total Suspended Solids does not exceed 25 milligrams per litre in the effluent from the works.

(2) For the purposes of determining compliance with and enforcing subsection (1), non-compliance with respect to the Total Suspended Solids concentration limit is deemed to have occurred when any single sample (along with a follow-up confirmation sample collected within 7 days of the receipt of the original sample result that indicated that an exceedance had occurred) analyzed for Total Suspended Solids is greater than the corresponding maximum concentration set out in subsection (1).

6. EFFLUENT MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the sewage works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this certificate are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Samples shall be collected of the discharge from Cell #3 to the Hawthorne Road ditch and analyzed, at the sampling frequencies and using the sample type specified for each parameter listed:

Table 1 - Effluent Monitoring	
Frequency	Once each Month During Periods of Effluent Discharge
Sample Type	Grab
Parameters	Total Suspended Solids

(3) The methods and protocols for sampling, analysis, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions; and

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (17th edition) as amended from time to time by more recently published editions.

(4) The Owner shall measure, record and calculate the flowrate from Cell #3 to the Hawthorne Road ditch daily (during periods of discharge), within an accuracy of plus or minus 15 per cent of the actual flowrate.

(5) The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this certificate.

7. REPORTING

(1) The Owner shall report to the District Manager or designate, of any exceedence of any parameter specified in Conditions 5 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedence.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

3. Condition 3 is included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the work.

4. Condition 4 is included to ensure that the works are operated as designed.

5. Condition 5 is imposed to ensure that the effluent discharged from the works meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.

6. Conditions 6 and 7 are included to require the owner to demonstrate on a continual basis that the quality of the effluent from the approved works is consistent with the effluent limits specified in the certificate and that the approved works does not cause any impairment to the receiving watercourse.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, S.O. 1993, Chapter 28, the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., 12th Floor P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Environmental Commissioner 1075 Bay Street, 6th Floor Suite 605 Toronto, Ontario M5S 2B1	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

This instrument is subject to Section 38 of the Environmental Bill of Rights, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ene.gov.on.ca, you can determine when the leave to appeal period ends.

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 19th day of May, 2004

THIS CERTIFICATE WAS MAILED
ON May 20, 2004
RC
(Signed)

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

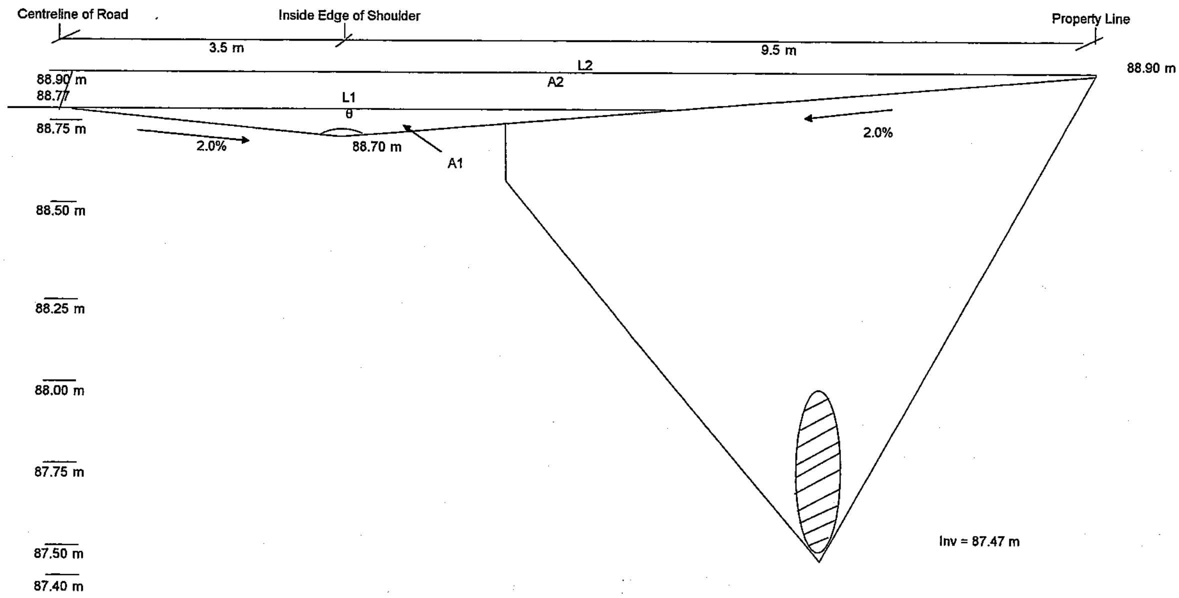
RC/
c: District Manager, MOE Ottawa
Nural Kuyucak, Golder Associates Ltd. ✓

APPENDIX 'J'

ASSESSMENT OF CULVERT CROSSING DURING AN EXTREME STORM EVENT

ENTRANCE TO POND ACCESS ROAD - OPEN DITCH/CULVERT CONFIGURATION

Typical open ditch/culvert configuration: 1390x970mm CSPA culvert, invert approx. 1.43 m below elevation at property line.
Proposed Terrace Elevation is approx. 0.13 m above road centreline.



A1:	0.24 m2	L1:	7.000 m
A2:	1.30 m2	L2:	13.000 m
θ:	178 Degrees		

FLOW ABOVE CULVERT THRU A1:	FLOW ABOVE CULVERT THRU A2:
Since θ is equal to approx. 180 degrees Use the Rectangular Weir Equation to Estimate the Flow Thru A1:	Using the Rectangular Weir Equation to Estimate the Flow Thru A2:
Q = C x L x H ^ 1.5 C = 1.84 L' = L1 - (0.1 x n x h) , where n= no. of end contractions	Q = C x L x H ^ 1.5 C = 1.84 L' = L3 - (0.1 x n x h) , where n= no. of end contractions
use h = 88.77 - 88.7 = 0.07 m h = 0.07 m L' = 6.99 m	use h = 88.9 - 88.77 = 0.13 m h = 0.13 m L3 = (L1 + L2) / 2 = 10m (Avg. Length) L '= 9.97 m
Q_{A1} = 0.24 m3/s	Q_{A2} = 0.86 m3/s

1:100 year Peak Flow Rate of 3.0 m^3/s (From Storm Design Sheet : 100 Year Flow 27B-27C)

Flow through the 1390 x 970 mm CSPA Culvert under Inlet Control Conditions = 1.9 m^3/s (From Culvert Sizing Nomograph 27B-27C)
Total flow above culvert = $Q_{A1} + Q_{A2} = 0.24\ m^3/s + 0.86\ m^3/s = 1.10\ m^3/s$

Therefore, Total Flow = 1.9 m^3/s + 1.1 m^3/s
= 3.0 m^3/s
=1:100 year Peak Flow Rate

APPENDIX 'K'

SWMHYMO INPUT AND OUTPUT FILES
(July 1, 1979 Historical Storm Event)

```
2     Metric units
*#*****************************************************************************
*#  Project Name : Hawthorne Industrial Park        Project Number:    [20983] *
*#  Date         : January, 2009                                               *
*#  Revised      : N/A                                                         *
*#  Developed by : Mark Buchanan, E.I.T.                                       *
*#  Reviewed by  : Guy Forget, P.Eng.                                          *
*#  Company      : J.L. Richards & Associates Limited                          *
*#  License #    : 4418403                                                     *
*#*****************************************************************************
*
*
*#***************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT              *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE    *
*#***************************************************************
*
****************************************************************************
*         SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE         *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
****************************************************************************

*******************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*******************************************************
**************************************************************
*           CALCULATION OF JULY 1st 1979 STORM EVENT         *
**************************************************************

START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [  ] <--storm filename, one per line for NSTORM time
READ STORM            STORM_FILENAME=["JUL_1_79.STM"]
*%-----------------|--------------------------------------------------------|
DEFAULT VALUES        ICASEdef=[1],  read and print values
                      DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\"ORGA.VAL"]
*%-----------------|--------------------------------------------------------|

***********************************
*            ORGAWORLD FILE       *
***********************************
*
* SUB-AREA No.1

CALIB STANDHYD        ID=[ 1  ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
                      XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[20](m), MNP=[ 0.25 ], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.52](%),
                                           LGI=[204.72](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD        ID=[ 2  ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
                      XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.50](%),
                                           LGI=[244.34](m), MNI=[0.03 ], SCI=[0.0]
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD        ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.0](%),
                                           LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[ 0.51 ](%),
                                           LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
*%-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD        ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.7](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.93](%),
                                           LGI=[164.82](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.5

CALIB STANDHYD        ID=[ 7  ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
                      XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[20.0](m), MNP=[0.25], SCP=[0.0](mi
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.61](%),
                                           LGI=[207.25](m), MNI=[0.03], SCI=[0.0](
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
*%-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
*%-----------------|--------------------------------------------------------|

ROUTE RESERVOIR       IDout=[10],   NHYD=["POND"],  IDin=[9],
                      RDT=[1.0](min),
                             TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                    [   0.000,  0.0000]
                                    [   0.008,  0.0656]
                                    [   0.017,  0.1311]
                                    [   0.093,  0.2831]
                                    [   0.233,  0.3971]
                                    [   0.337,  0.4731]
                                    [   0.465,  0.5491]
                                    [   0.531,  0.5871]
                                    [   0.593,  0.6251]
                                    [   0.654,  0.6631]
                                    [   0.797,  0.7391]
                                    [   0.950,  0.8274]
                                    [   1.304,  0.9157]
                                    [   1.880,  1.0040]
                                    [   2.577,  1.0923]
                                    [   -1   ,  -1    ]  (max twenty pts)

**********************************************
*     Remaining Hawthorne Industrial Park    *
**********************************************
*
* SUB-AREA No.1

CALIB STANDHYD        ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.6](%),
                                           LGI=[580](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.2

CALIB STANDHYD        ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.65](%),
                                           LGI=[450](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.3

CALIB STANDHYD        ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.5](%),
                                           LGI=[600](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
*%-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
*%-----------------|--------------------------------------------------------|
*
* SUB-AREA No.4

CALIB STANDHYD        ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
                      XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
                      SCS curve number CN=[81],
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[1.5](%),
                                           LGP=[100.0](m), MNP=[0.25], SCP=[0.0](m
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.7](%),
                                           LGI=[210](m), MNI=[0.03], SCI=[0.0](min
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1

*%-----------------|--------------------------------------------------------|
*
*SUB-AREA No.5

DESIGN NASHYD         ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
                      DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------|

ADD HYD               IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
*%-----------------|--------------------------------------------------------|

ROUTE RESERVOIR       IDout=[ 10 ],   NHYD=["HIP-POND"],  IDin=[ 9 ],
                      RDT=[1.0](min),
                             TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                    [   0.0  , 0.0    ]
                                    [   0.048, 0.0574 ]
                                    [   0.054, 0.2434 ]
                                    [   0.059, 0.5834 ]
                                    [   0.062, 0.8400 ]
                                    [   0.064, 1.1024 ]
                                    [   0.147, 1.3705 ]
                                    [   0.280, 1.6444 ]
                                    [   0.472, 1.9242 ]
                                    [   0.724, 2.2097 ]
                                    [   0.937, 2.5010 ]
                                    [   1.262, 2.7981 ]
                                    [   1.404, 3.1009 ]
                                    [   1.532, 3.4096 ]
                                    [   1.650, 3.7240 ]
                                    [   2.409, 4.0442 ]
                                    [   3.689, 4.3702 ]
                                    [   -1  ,  -1     ]  (max twenty pts)

*%-----------------|--------------------------------------------------------|
*
*SUB-AREA No. 6

DESIGN NASHYD         ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
                      DWF=[0](cms), CNC=[76], TP=[0.80]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|--------------------------------------------------------|

ADD HYD               IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
*%-----------------|--------------------------------------------------------|

FINISH
```

```
==========================================================================
 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999   999  ========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9 9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O ##  9   9 9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999  9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9     9 ========
                                                     9   9 9   9 # 4418403
       StormWater Management HYdrologic Model         999   999  ========
 ***************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 ****************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                OTTHYMO-83 and OTTHYMO-89.                   *******
 ***************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                  Ottawa,  Ontario: (613) 727-5199           *******
 *******                  Gatineau, Quebec: (819) 243-6858           *******
 *******                  E-Mail: swmhymo@jfsa.Com                   *******
 ***************************************************************************
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: J. L. Richards & Associates Limited          +++++++
 +++++++                Ottawa                 SERIAL#:4418403       +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 ***************************************************************************
 *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *******
 *******            Maximum value for ID numbers  :    10            *******
 *******            Max. number of rainfall points:  15000           *******
 *******            Max. number of flow points    :  15000           *******
 ***************************************************************************
 ********************   D E T A I L E D   O U T P U T   ********************
 ***************************************************************************
 *      DATE: 2009-05-15     TIME: 09:03:53     RUN COUNTER: 000200        *
 ***************************************************************************
 * Input   filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\July1979.dat        *
 * Output  filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\July1979.out        *
 * Summary filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\July1979.sum        *
 * User comments:                                                          *
 * 1:______________________________________________________________________*
 * 2:______________________________________________________________________*
 * 3:______________________________________________________________________*
 ***************************************************************************
-----------------------------------------------------------------------------
001:0001---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name : Hawthorne Industrial Park        Project Number:  [20983] *
*#  Date         : January, 2009                                             *
*#  Revised      : N/A                                                       *
*#  Developed by : Mark Buchanan, E.I.T.                                     *
*#  Reviewed by  : Guy Forget, P.Eng.                                        *
*#  Company      : J.L. Richards & Associates Limited                        *
*#  License #    : 4418403                                                   *
*#****************************************************************************
*
*
*#****************************************************************
*#  FILENAME:  V:\20983.DU\ENG\SWMHYMO\20983PST.DAT               *
*#  FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
*#   OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE    *
*#****************************************************************
*
*****************************************************************************
*          SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE         *
*   PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS  *
*****************************************************************************
*****************************************************
* HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND  *
* FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
*****************************************************
**********************************************************
*           CALCULATION OF JULY 1st 1979 STORM EVENT      *
**********************************************************
--------------------
| START             |  Project  dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
--------------------   Rainfall dir.: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\
     TZERO =   .00 hrs on       0
     METOUT=   2 (output = METRIC)
     NRUN  = 001
     NSTORM=   0
-----------------------------------------------------------------------------
001:0002---------------------------------------------------------------------
--------------------
| READ STORM        |    Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\JUL_1_
| Ptotal=  88.86 mm|     Comments: HISTORICAL STORM - JULY 1, 1979
--------------------
                  TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                   hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                   .08   2.300 |    .83  38.100 |   1.58  71.100 |   2.33   3.800
                   .17   2.300 |    .92  38.100 |   1.67  71.100 |   2.42   3.800
                   .25   8.890 |   1.00  38.100 |   1.75  30.500 |   2.50   3.800
                   .33   8.890 |   1.08  38.100 |   1.83  30.500 |   2.58   3.800
                   .42  38.100 |   1.17  50.800 |   1.92  30.500 |   2.67   3.800
                   .50  38.100 |   1.25  50.800 |   2.00  30.500 |   2.75   3.800
                   .58  38.100 |   1.33  76.200 |   2.08   3.800 |   2.83   3.800
                   .67  38.100 |   1.42 106.700 |   2.17   3.800 |   2.92   3.800
                   .75  38.100 |   1.50 106.700 |   2.25   3.800 |   3.00   3.800
-----------------------------------------------------------------------------
001:0003---------------------------------------------------------------------
---------------------
| DEFAULT VALUES     |   Filename: V:\20983.DU\ENG\FINALS~1\SWMHYM~1\ORGA.VAL
---------------------    ICASEdv = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .035]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
-----------------------------------------------------------------------------
001:0004---------------------------------------------------------------------
************************************
*          ORGAWORLD FILE           *
************************************
*
* SUB-AREA No.1
---------------------
| CALIB STANDHYD     |   Area    (ha)=    2.07
| 01:010    DT= 2.50 |   Total Imp(%)=   84.00   Dir. Conn.(%)=   84.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.74           .33
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .52          1.00
     Length             (m)=      204.72         20.00
     Mannings n           =         .030          .250
```

```
     Max.eff.Inten.(mm/hr)=      106.70         67.70
                over (min)         7.50         15.00
     Storage Coeff.  (min)=        7.69 (ii)    14.39 (ii)
     Unit Hyd. Tpeak (min)=        7.50         15.00
     Unit Hyd. peak  (cms)=         .15           .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .44           .05         .476 (iii)
     TIME TO PEAK    (hrs)=        1.54          1.71        1.542
     RUNOFF VOLUME    (mm)=       87.29         49.30       81.209
     TOTAL RAINFALL   (mm)=       88.86         88.86       88.857
     RUNOFF COEFFICIENT   =         .98           .55         .914

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0005---------------------------------------------------------------------
*
* SUB-AREA No.2
---------------------
| CALIB STANDHYD     |   Area    (ha)=    1.54
| 02:020    DT= 2.50 |   Total Imp(%)=   92.00   Dir. Conn.(%)=   92.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.42           .12
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .50          1.00
     Length             (m)=      244.34          5.00
     Mannings n           =         .030          .030

     Max.eff.Inten.(mm/hr)=      106.70         74.64
                over (min)         7.50         10.00
     Storage Coeff.  (min)=        8.65 (ii)     9.44 (ii)
     Unit Hyd. Tpeak (min)=        7.50         10.00
     Unit Hyd. peak  (cms)=         .14           .12
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .35           .02         .367 (iii)
     TIME TO PEAK    (hrs)=        1.54          1.63        1.542
     RUNOFF VOLUME    (mm)=       87.29         49.30       84.248
     TOTAL RAINFALL   (mm)=       88.86         88.86       88.857
     RUNOFF COEFFICIENT   =         .98           .55         .948

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0006---------------------------------------------------------------------
*
* SUB-AREA No.3
---------------------
| CALIB STANDHYD     |   Area    (ha)=    1.40
| 03:030    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.36           .04
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .51          1.00
     Length             (m)=      225.63          5.00
     Mannings n           =         .030          .030

     Max.eff.Inten.(mm/hr)=      106.70         74.64
                over (min)         7.50         10.00
     Storage Coeff.  (min)=        8.20 (ii)     8.98 (ii)
     Unit Hyd. Tpeak (min)=        7.50         10.00
     Unit Hyd. peak  (cms)=         .14           .12
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .34           .01         .344 (iii)
     TIME TO PEAK    (hrs)=        1.54          1.63        1.542
     RUNOFF VOLUME    (mm)=       87.29         49.30       86.147
     TOTAL RAINFALL   (mm)=       88.86         88.86       88.857
     RUNOFF COEFFICIENT   =         .98           .55         .970

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  81.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
-----------------------------------------------------------------------------
001:0007---------------------------------------------------------------------
--------------------
| ADD HYD (040   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)    (cms)   (hrs)   (mm)    (cms)
               ID1 01:010          2.07     .476    1.54  81.21     .000
              +ID2 02:020          1.54     .367    1.54  84.25     .000
               ==================================================
               SUM 04:040          3.61     .844    1.54  82.50     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
001:0008---------------------------------------------------------------------
--------------------
| ADD HYD (050   ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)    (cms)   (hrs)   (mm)    (cms)
               ID1 03:030          1.40     .344    1.54  86.15     .000
              +ID2 04:040          3.61     .844    1.54  82.50     .000
               ==================================================
               SUM 05:050          5.01    1.188    1.54  83.52     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
001:0009---------------------------------------------------------------------
*
* SUB-AREA No.4
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .89
| 06:060    DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .86           .03
     Dep. Storage      (mm)=        1.57          4.67
     Average Slope      (%)=         .93           .70
     Length             (m)=      164.82         40.00
     Mannings n           =         .030          .250

     Max.eff.Inten.(mm/hr)=      106.70         65.89
                over (min)         5.00         17.50
     Storage Coeff.  (min)=        5.67 (ii)    17.10 (ii)
     Unit Hyd. Tpeak (min)=        5.00         17.50
     Unit Hyd. peak  (cms)=         .21           .07
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .23           .00         .235 (iii)
     TIME TO PEAK    (hrs)=        1.50          1.75        1.500
     RUNOFF VOLUME    (mm)=       87.29         49.30       86.147
     TOTAL RAINFALL   (mm)=       88.86         88.86       88.857
     RUNOFF COEFFICIENT   =         .98           .55         .970
```

```

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0010----------------------------------------------------------------------
 *
 * SUB-AREA No.5
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=    2.66
 | 07:070     DT= 2.50 |   Total Imp(%)=   97.00   Dir. Conn.(%)=   97.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=        2.58          .08
      Dep. Storage      (mm)=        1.57         4.67
      Average Slope      (%)=         .61         1.50
      Length             (m)=      207.25        20.00
      Mannings n            =        .030         .250

      Max.eff.Inten.(mm/hr)=       106.70        70.39
                 over (min)          7.50        12.50
      Storage Coeff.  (min)=         7.38 (ii)   13.23 (ii)
      Unit Hyd. Tpeak (min)=         7.50        12.50
      Unit Hyd. peak  (cms)=          .15          .09
                                                             *TOTALS*
      PEAK FLOW       (cms)=          .65          .01          .665 (iii)
      TIME TO PEAK    (hrs)=         1.54         1.67         1.542
      RUNOFF VOLUME    (mm)=        87.29        49.30        86.147
      TOTAL RAINFALL   (mm)=        88.86        88.86        88.857
      RUNOFF COEFFICIENT   =          .98          .55          .970

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0011----------------------------------------------------------------------
 --------------------
 | ADD HYD (080   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 06:060        .89      .235     1.50  86.15     .000
                  +ID2 07:070       2.66      .665     1.54  86.15     .000
                   ================================================
                   SUM 08:080       3.55      .896     1.54  86.15     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0012----------------------------------------------------------------------
 --------------------
 | ADD HYD (090   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 05:050       5.01     1.188     1.54  83.52     .000
                  +ID2 08:080       3.55      .896     1.54  86.15     .000
                   ================================================
                   SUM 09:090       8.56     2.084     1.54  84.61     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0013----------------------------------------------------------------------
 ---------------------
 | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
 |  IN>09:(090    )   |
 | OUT<10:(POND   )   |    =========  OUTFLOW STORAGE TABLE  =========
 ---------------------     OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00    |     .593  .6251E+00
                             .008  .6560E-01    |     .654  .6631E+00
                             .017  .1311E+00    |     .797  .7391E+00
                             .093  .2831E+00    |     .950  .8274E+00
                             .233  .3971E+00    |    1.304  .9157E+00
                             .337  .4731E+00    |    1.880  .1004E+01
                             .465  .5491E+00    |    2.577  .1092E+01
                             .531  .5871E+00    |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     -------------------          (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (090    )        8.56      2.084      1.542      84.611
     OUTFLOW<10: (POND   )        8.56       .496      2.125      84.607

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   23.815
                    TIME SHIFT OF PEAK FLOW         (min)=    35.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=.5671E+00

 ------------------------------------------------------------------------------
 001:0014----------------------------------------------------------------------
 ********************************************
 *     Remaining Hawthorne Industrial Park     *
 ********************************************
 *
 * SUB-AREA No.1
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   19.90
 | 01:HIP01  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       14.13         5.77
      Dep. Storage      (mm)=        1.57         4.67
      Average Slope      (%)=         .60         1.50
      Length             (m)=      580.00       100.00
      Mannings n            =        .030         .250

      Max.eff.Inten.(mm/hr)=        96.53       119.96
                 over (min)         15.00        27.50
      Storage Coeff.  (min)=        14.32 (ii)   26.72 (ii)
      Unit Hyd. Tpeak (min)=        15.00        27.50
      Unit Hyd. peak  (cms)=          .08          .04
                                                             *TOTALS*
      PEAK FLOW       (cms)=         2.14         1.33         3.264 (iii)
      TIME TO PEAK    (hrs)=         1.67         1.92         1.708
      RUNOFF VOLUME    (mm)=        87.29        61.48        74.386
      TOTAL RAINFALL   (mm)=        88.86        88.86        88.857
      RUNOFF COEFFICIENT   =          .98          .69          .837

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0015----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP02 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 10:POND       8.56      .496     2.13  84.61     .000
                  +ID2 01:HIP01     19.90     3.264     1.71  74.39     .000
                   ================================================
                   SUM 02:HIP02     28.46     3.642     1.75  77.46     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0016----------------------------------------------------------------------
 *
 * SUB-AREA No.2
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   17.00
 | 03:HIP03  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       12.07         4.93
      Dep. Storage      (mm)=        1.57         4.67
      Average Slope      (%)=         .65         1.50
      Length             (m)=      450.00       100.00
      Mannings n            =        .030         .250

      Max.eff.Inten.(mm/hr)=       100.60       125.35
                 over (min)         12.50        25.00
      Storage Coeff.  (min)=        11.81 (ii)   23.99 (ii)
      Unit Hyd. Tpeak (min)=        12.50        25.00
      Unit Hyd. peak  (cms)=          .09          .05
                                                             *TOTALS*
      PEAK FLOW       (cms)=         1.92         1.20         2.923 (iii)
      TIME TO PEAK    (hrs)=         1.63         1.88         1.667
      RUNOFF VOLUME    (mm)=        87.29        61.48        74.386
      TOTAL RAINFALL   (mm)=        88.86        88.86        88.857
      RUNOFF COEFFICIENT   =          .98          .69          .837

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0017----------------------------------------------------------------------
 *
 * SUB-AREA No.3
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   15.60
 | 04:HIP04  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       11.08         4.52
      Dep. Storage      (mm)=        1.57         4.67
      Average Slope      (%)=         .50         1.50
      Length             (m)=      600.00       100.00
      Mannings n            =        .030         .250

      Max.eff.Inten.(mm/hr)=        96.53       119.96
                 over (min)         15.00        27.50
      Storage Coeff.  (min)=        15.44 (ii)   27.83 (ii)
      Unit Hyd. Tpeak (min)=        15.00        27.50
      Unit Hyd. peak  (cms)=          .07          .04
                                                             *TOTALS*
      PEAK FLOW       (cms)=         1.64         1.03         2.519 (iii)
      TIME TO PEAK    (hrs)=         1.67         1.92         1.750
      RUNOFF VOLUME    (mm)=        87.29        61.48        74.386
      TOTAL RAINFALL   (mm)=        88.86        88.86        88.857
      RUNOFF COEFFICIENT   =          .98          .69          .837

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0018----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP05 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 03:HIP03     17.00     2.923     1.67  74.39     .000
                  +ID2 04:HIP04     15.60     2.519     1.75  74.39     .000
                   ================================================
                   SUM 05:HIP05     32.60     5.435     1.71  74.39     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0019----------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP06 ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                   ID1 05:HIP05     32.60     5.435     1.71  74.39     .000
                  +ID2 02:HIP02     28.46     3.642     1.75  77.46     .000
                   ================================================
                   SUM 06:HIP06     61.06     9.050     1.74  75.82     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0020----------------------------------------------------------------------
 *
 * SUB-AREA No.4
 ---------------------
 | CALIB STANDHYD      |   Area    (ha)=   12.20
 | 07:HIP07  DT= 2.50  |   Total Imp(%)=   71.00   Dir. Conn.(%)=   50.00
 ---------------------
                                  IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=        8.66         3.54
      Dep. Storage      (mm)=        1.57         4.67
      Average Slope      (%)=         .70         1.50
      Length             (m)=      210.00       100.00
      Mannings n            =        .030         .250

      Max.eff.Inten.(mm/hr)=       106.70       131.04
                 over (min)          7.50        20.00
      Storage Coeff.  (min)=         7.14 (ii)   19.11 (ii)
      Unit Hyd. Tpeak (min)=         7.50        20.00
      Unit Hyd. peak  (cms)=          .15          .06
                                                             *TOTALS*
      PEAK FLOW       (cms)=         1.56          .95         2.287 (iii)
      TIME TO PEAK    (hrs)=         1.54         1.79         1.583
      RUNOFF VOLUME    (mm)=        87.29        61.48        74.386
      TOTAL RAINFALL   (mm)=        88.86        88.86        88.857
      RUNOFF COEFFICIENT   =          .98          .69          .837

          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  81.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
              THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0021----------------------------------------------------------------------
 *
 *SUB-AREA No.5
 ---------------------
 | DESIGN NASHYD       |   Area    (ha)=    4.00   Curve Number   (CN)=85.00
 | 08:Pond-B DT= 2.50  |   Ia      (mm)=   4.670   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=    .170

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```
     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .721 (i)
     TIME TO PEAK    (hrs)=    1.667
     RUNOFF VOLUME    (mm)=   54.937
     TOTAL RAINFALL   (mm)=   88.857
     RUNOFF COEFFICIENT  =     .618

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

 ------------------------------------------------------------------------------
 001:0022---------------------------------------------------------------------
 --------------------
 | ADD HYD (HIP08 ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 06:HIP06       61.06    9.050    1.74  75.82    .000
                +ID2 07:HIP07       12.20    2.287    1.58  74.39    .000
                +ID3 08:Pond-B       4.00     .721    1.67  54.94    .000
                 ===================================================
                 SUM 09:HIP08       77.26   11.944    1.71  74.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0023---------------------------------------------------------------------
 --------------------
 | ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
 |   IN>09:(HIP08 )  |
 | OUT<10:(HIP-PO)   |     =========  OUTLFOW STORAGE TABLE  =========
 --------------------       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .724  .2210E+01
                              .048  .5740E-01    |     .937  .2501E+01
                              .054  .2434E+00    |    1.262  .2798E+01
                              .059  .5834E+00    |    1.404  .3101E+01
                              .062  .8400E+00    |    1.532  .3410E+01
                              .064  .1102E+01    |    1.650  .3724E+01
                              .147  .1370E+01    |    2.409  .4044E+01
                              .280  .1644E+01    |    3.689  .4370E+01
                              .472  .1924E+01    |     .000  .0000E+00

     ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
     --------------------         (ha)     (cms)     (hrs)        (mm)
     INFLOW >09: (HIP08 )        77.26    11.944     1.708      74.508
     OUTFLOW<10: (HIP-PO)        77.26     2.666     2.625      74.508

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   22.321
                     TIME SHIFT OF PEAK FLOW         (min)=    55.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.4110E+01

 ------------------------------------------------------------------------------
 001:0024---------------------------------------------------------------------
 *
 *SUB-AREA No. 6
 ---------------------
 | DESIGN NASHYD      |   Area    (ha)=     2.70   Curve Number   (CN)=76.00
 | 01:A3      DT= 2.50 |  Ia      (mm)=    4.670   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .800

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW       (cms)=     .180 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   43.111
     TOTAL RAINFALL   (mm)=   88.857
     RUNOFF COEFFICIENT  =     .485

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

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 001:0025---------------------------------------------------------------------
 --------------------
 | ADD HYD (Ultima) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 10:HIP-PO      77.26    2.666    2.63  74.51    .000
                +ID2 01:A3           2.70     .180    2.33  43.11    .000
                 ===================================================
                 SUM 02:Ultima      79.96    2.830    2.61  73.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0026---------------------------------------------------------------------
      FINISH
 ------------------------------------------------------------------------------
 ******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2009-05-15     at 09:03:53
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Ontario

Ministry of the Environment
Ministère de l'Environnement

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 4660-7UNPRJ
Issue Date: November 9, 2009

Tomlinson Development Corporation
5597 Power Rd
Ottawa, Ontario K1G 3N4

Site Location: Hawthorne Industrial Park (HIP) - Phase 1
Lot 26 and 27, Concession 6 (R.F.)
City of Ottawa, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of sewage works for the collection, transmission, treatment and disposal of stormwater runoff from a catchment area of approximately 70 hectares, servicing the Hawthorne Industrial Park, located immediately southeast of the Hawthorne Road/Rideau Road intersection in the City of Ottawa, to provide partial water quality protection (Normal Protection Level) and to attenuate post-development peak flows to pre-development levels, discharging to Findlay Creek, which is a tributary to the North Castor River, for all storm events up to and including the 100 year return storm, consisting of the following stormwater works:

Stormwater Management System

Outlet No. 1, HIP to a dry pond facility (Service area of 69.81 ha):

- A dry pond facility to provide quantity control by attenuating post development peak flows to pre-development levels for all storm events up to and including the 100 year return storm, having a design minimum liquid retention volume of approximately 37,240 m^3 at elevation 86.15 m (0.23 m above 100-year surface pond elevation), with side slopes of 4:1, and servicing approximately 69.81 hectares, which includes Orgaworld Canada Ltd's stormwater treated effluent (10.14 ha). The SWM pond is designed to provide a controlled maximum discharge flow rate of 1,531 L/s for the 100-year storm event, discharging to Findlay Creek; and equipped with:
    - An outlet structure consisting of a 150 mm diameter orifice within a 200 mm diameter polyvinyl chloride (PVC) pipe at an invert elevation of 82.90 m, which serves as outlet to the facility;
    - Two (2) 600 mm diameter corrugated steel pipe (CSP) culvert placed at an invert elevation of 84.80 m, which also serves as an outlet to the facility; and
    - An emergency spillway of 0.35 m deep with a 6.0 m wide base to convey surface flow toward the

receiving channel during extreme storm events.

- The simulated modelling estimate and drainage pattern draining to Outlet No.1 is as follows:

Storm Events (catchment for Outlet #1 – 70 ha)	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (m^3/s.)	0.467	0.826	1.468	2.093
Post-development flows (m^3/s)	3.077	4.812	7.772	10.662
Post-development attenuated flows (m^3/s)	0.194	0.359	0.939	1.531

- A new roadside ditch system draining to the dry pond facility, equipped with CSP culverts and approximately 1,755 m of 200 mm diameter HDPE perforated pipe sub-drains and clear stone bedding wrapped in geotextile located at the base of the ditches to meet a Normal water quality Protection Level (70% Total Suspended Solids removal) for the contributing catchment area of 1.58 ha which includes the paved portion of the industrial park road network located within the subdivision right-of-way as per the SWM Report (J.L.Richards, 2009).

- The requirement for quality protection for the remaining 68.23 ha is provided by the individual industrial lots within HIP as per the following Certificates of Approval (this list will be amended as future CofAs for other lots within HIP are developed, as per Condition 7 of this Certificate):

  - CofA # 9465-7NVRWT, issued on September 16, 2009, providing Normal water quality Protection Level for 10.14 ha.

Outlet No.2, to Findlay Creek (Service area of 39.16 ha):

- A new roadside ditch system draining to Findlay Creek via an existing roadside ditch located adjacent to Rideau Road, servicing a catchment area along the Hawthorne Road extension and includes the Tomlinson Quarry, as per the SWM Report (J.L.Richards, 2009). This service area is not part of the HIP site.

All including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works* ;

all in accordance with the following supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Domenic Idone, P.Eng., Planning Engineer of Tomlinson Development Corporation, dated March 12, 2009, and received on June 8 , 2009;

2. Stormwater Management Report - Hawthorne Industrial Park, dated February 2009 (revised May 2009), and prepared by J.L Richards & Associates Limited.

3. Geotechnical Study Subdivision Plan - Hawthorne Industrial Park, Lots 26 and 27, Concession 6, Southeast of Hawthorne and Rideau Roads, Ottawa, dated May 4, 2009, and prepared by

Inspec-Sol Inc.

4. Certificate of Approval 6924-5YWQ3U, issued on May 19, 2004, for R.W. Tomlinson Limited for a lagoon system to treat sewage from the Tomlinson Quarry.

5. s.53 OWRA Certificate of Approval, Orgaworld Canada Ltd. (9465-7NVRWT, issued on September 16, 2009).

6. Revised Fish Habitat Ehnacement Strategy - Hawthorne Industrial Park Stormwater Management Pond, prepared by Stantec (Jacques Whitford Stantec Limited), dated May 13, 2009.

7. Clearance Letter from the South Nation Conservation dated May 26, 2009, issued to the City of Ottawa for the Tomlinson / Hawthorne Industrial Park Subdivision.

8. Emails from Derrick P. Upton, P.Eng., of J.L. Richards & Associates Limited to Edgardo Tovilla, P.Eng., of the MOE, dated August 7 & 11, 2009, with additional information requested.

9. Letter from Derrick P. Upton, P.Eng., of J.L. Richards & Associates Limited to Edgardo Tovilla, P.Eng., of the MOE, dated August 31, 2009, with additional information requested.

10. Email from Tim Chadder of J.L. Richards & Associates Limited to Edgardo Tovilla, P.Eng., of the MOE, dated October 9, 2009, with final comments to the CofA.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Certificate* " means this entire certificate of approval document, issued in accordance with Section 53 of the Ontario Water Resources Act, and includes any schedules;

"*Director* " means any *Ministry* employee appointed by the Minister pursuant to section 5 of the Ontario Water Resources Act;

"*District Manager* " means the District Manager of the Ottawa District Office of the *Ministry* ;

"*Ministry* " means the Ontario Ministry of the Environment;

"*Owner* " means Tomlinson Development Corporation and includes its successors and assignees; and

"*Works* " means the sewage works described in the *Owner* 's application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* .

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* , the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate* .

(2) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate* , the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(3) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate* .

3. CHANGE OF OWNER

The *Owner* shall notify the *District Manager* and the *Director* , in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of *Owner* ;

(b) change of address of the *Owner* ;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager* ; and

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager* .

4. OPERATION AND MAINTENANCE.

(1) The *Owner* shall ensure that the design minimum liquid retention volume(s) is maintained at all times.

(2) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the

Works to prevent the excessive build-up of sediments and/or vegetation.

(3) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's office for inspection by the *Ministry* . The logbook shall include the following:

(a) the name of the *Works* ;

(b) the date and results of each inspection, maintenance, monitoring reports and cleaning, including an estimate of the quantity of any materials removed; and

(c) the date of each spill within the catchment area, including follow-up actions / remedial measures undertaken.

(4) The *Owner* shall operate the *Works* with an objective of achieving Normal water quality Protection Level (70% long-term Total Suspended Solids removal) for the portion of the land being treated with the proposed Works.

5. MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works* , carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this *Certificate* are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) For the purposes of this condition, Semi-annually means once twice per year;

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 1 - Surface Water Monitoring Sample location: at the inlet of the dry pond facility	
Frequency	Semi-annually; at least once being for the snowmelt freshets and another being 72 hours after the fall of precipitation of more than 25 mm.
Sample Type	Grab
Parameters	*CBOD5* , Total Suspended Solids, Total Phosphorus, *E. Coli* , pH, Temperature, Acute Lethality.

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions;

(d) the Environment Canada publications "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" (July 1990) and "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna" (July 1990), as amended from time to time by more recently published editions; and,

(6) The measurement frequencies and the overall monitoring program specified in subsection (3) are minimum requirements which may, after three (3) years of monitoring in accordance with this Condition or after a minimum 75% build-up of the site, whichever occurs first, be modified by the *District Manager* in writing from time to time.

(7) The *Owner* shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate* .

(8) The *Owner* shall enter into an agreement with the owner of the composting facility located within HIP, located at Part of Lot 27, Concession 6, 5123 Hawthorne Road, for the long-term acess to private wells for its operation, maintenance and testing to ensure that the provisions of a groundwater monitoring program can be administered. A copy of such Agreement shall be provided to the *District Manager* prior to the commencement of operation of the *Works* .

6. RECORD KEEPING

The *Owner* shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance and activities required by this *Certificate* .

7. SPECIAL CONDITION

(1) The *Owner* shall ensure through the Site Plan Approval process that individual lots developed within the industrial park will obtain a approval, in accordance with section 53 of the OWRA, before discharging into the roadside ditches and ultimately to the dry pond facility.

(2) The *Owner* shall not approve any additional flow from storm sewers, catchbasin leads, and storm service drains to the individual industrial plots to connect with the dry pond unless this Certificate of Approval is amended with adequate quality treatment proposed via provision of additional sewage treatment works, best management practices and hydraulic capacity servicing them has been designed and reviewed by the Ministry concluding that the additional quality of stormwater will not overload the

downstream collection system, pond and/or alter the stormwater quality of effluent discharged to the receiver of this *Certificate.*

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the *Works* are constructed in a timely manner so that standards applicable at the time of Approval of the *Works* are still applicable at the time of construction, to ensure the ongoing protection of the environment

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

4. Condition 4 is included to require that the *Works* be properly operated and maintained such that the environment is protected .

5. Conditions 5 and 7 are included to enable the *Owner* to evaluate and demonstrate the performance of the *Works* , on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

6. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the *Works* .

In accordance with Section 100 of the <u>*Ontario Water Resources Act*</u>*, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the* <u>*Ontario Water Resources Act*</u> *, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:*

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to <u>each</u>portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, 15th Floor Toronto, Ontario M5G 1E5	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 9th day of November, 2009

THIS CERTIFICATE WAS MAILED
ON NOV. 19, 2009
9c
(Signed)

Mansoor Mahmood

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

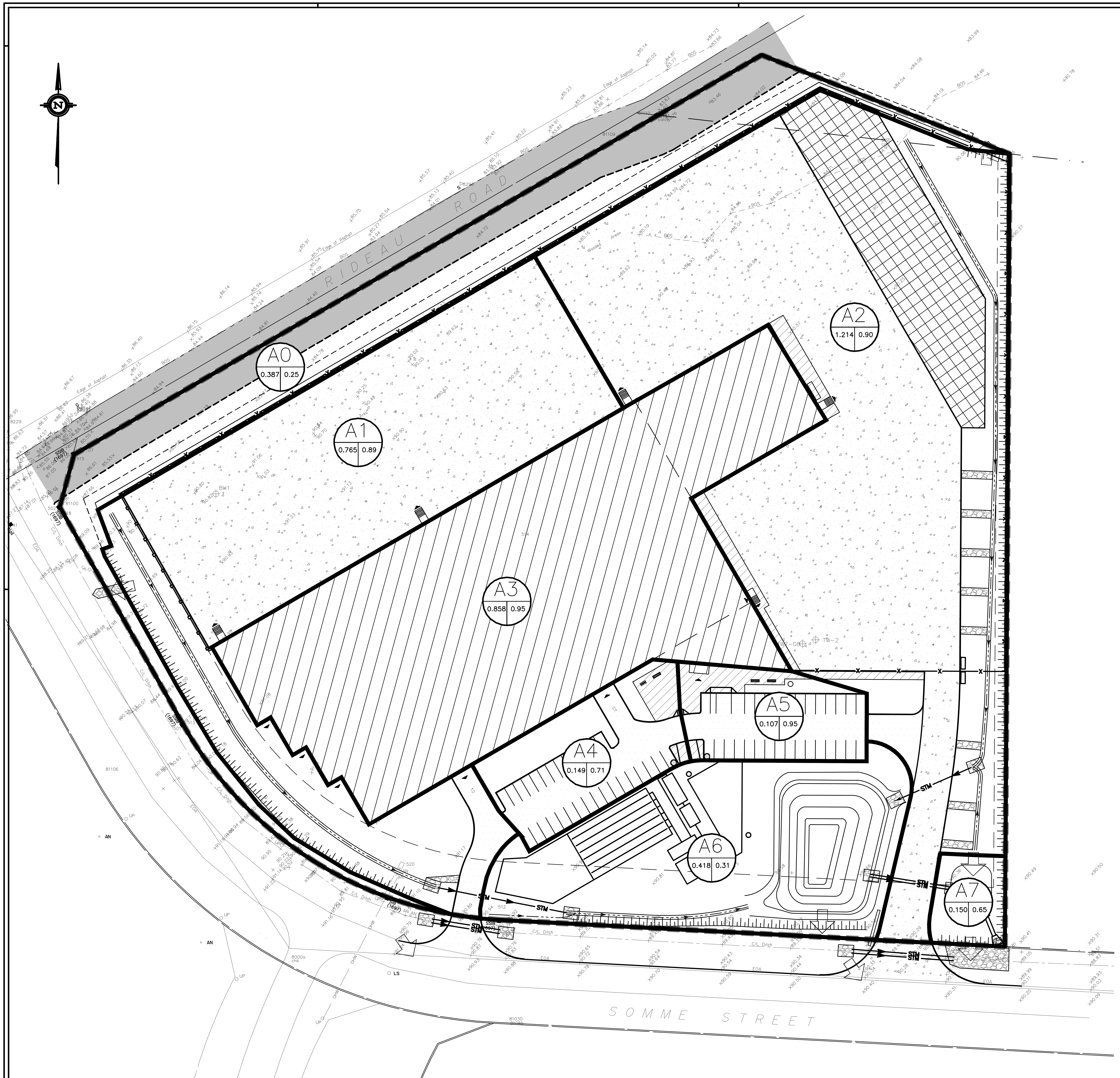
ET/

c: District Manager, MOE Ottawa District Office
Derrick Upton, P.Eng., J.L. Richards & Associates Limited √

RECEIVED
NOV 23 2009
J.L. Richards & Associates Limited
OTTAWA OFFICE

B

Appendix B - Stormwater Management Plan



LEGEND | PROPOSED

STORM DRAINAGE BOUNDARY

AREA ID

AREA IN HECTARES

RUNOFF COEFFICIENT

OVERLAND FLOW

A1.1

0.102 0.20

0 5 10 20 30 40 50

NOTE OF CAUTION

THE GEODETIC COORDINATES OF EVERY ITEM INCLUDED AS PART OF THIS DOCUMENT HAVE NO LEGAL VALUE. THE SITE LAYOUT MUST BE COMPLETED USING THE OFFICIAL BENCHMARKS OF AN ACCREDITED LAND SURVEYOR.

THE UNDERGROUND FEATURES AND INFORMATION THAT APPEAR ON THE DRAWINGS WERE OBTAINED FROM THE PUBLIC UTILITY COMPANIES AND/OR FROM THE CITY EACH RESPECTIVELY.

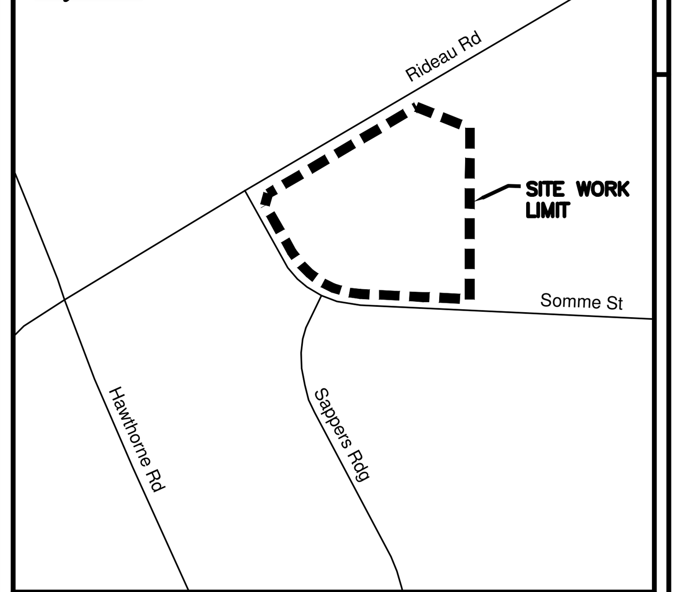
ALL INFORMATION UNDER THE LEGEND 'EXISTING' IS FOR INFORMATION ONLY. COMPLETE OR EXACT LOCATION AND ELEVATION OF UNDERGROUND SERVICES ARE NOT GUARANTEED.

CERTAIN UNDERGROUND FEATURES ON PRIVATE PROPERTY ARE NOT SHOWN ON THE CURRENT DRAWING.

ANYONE WHO PROCEEDS WITH EXCAVATION WORK SHALL VERIFY THE EXACT LOCATION OF ALL UNDERGROUND FEATURES, BY EXPLORATORY EXCAVATIONS, AND SHALL ASSUME FULL RESPONSIBILITY IF THERE IS ANY DAMAGE THAT OCCURS DURING WORK.

THE CONTRACTOR WILL HAVE THE RESPONSIBILITY AND THE OBLIGATION TO VALIDATE, BY EXPLORATORY EXCAVATION, THE SIZE OF THE PUBLIC UTILITIES UNDERGROUND SERVICES AND TO WARN THE ENGINEER OF ANY CONFLICT WITH THE PROJECTED WORK.

Key Plan



no.	date	revision/issue	by
1	JULY 26, 2021	ISSUED FOR REVIEW	

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

consultant

CIMA+

northpoint

N
W E
S

professional stamp

project title

SOMME STREET, OTTAWA, ONTARIO FASTFRATE FACILITY

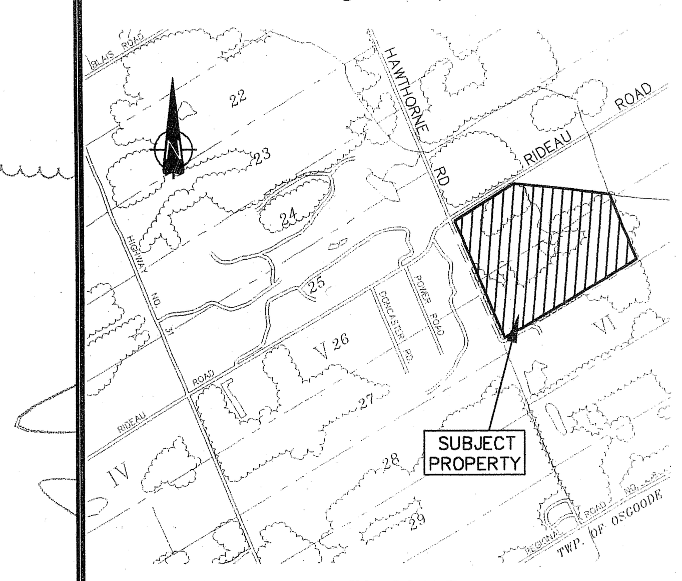
drawing title

STORMWATER MANAGEMENT PLAN

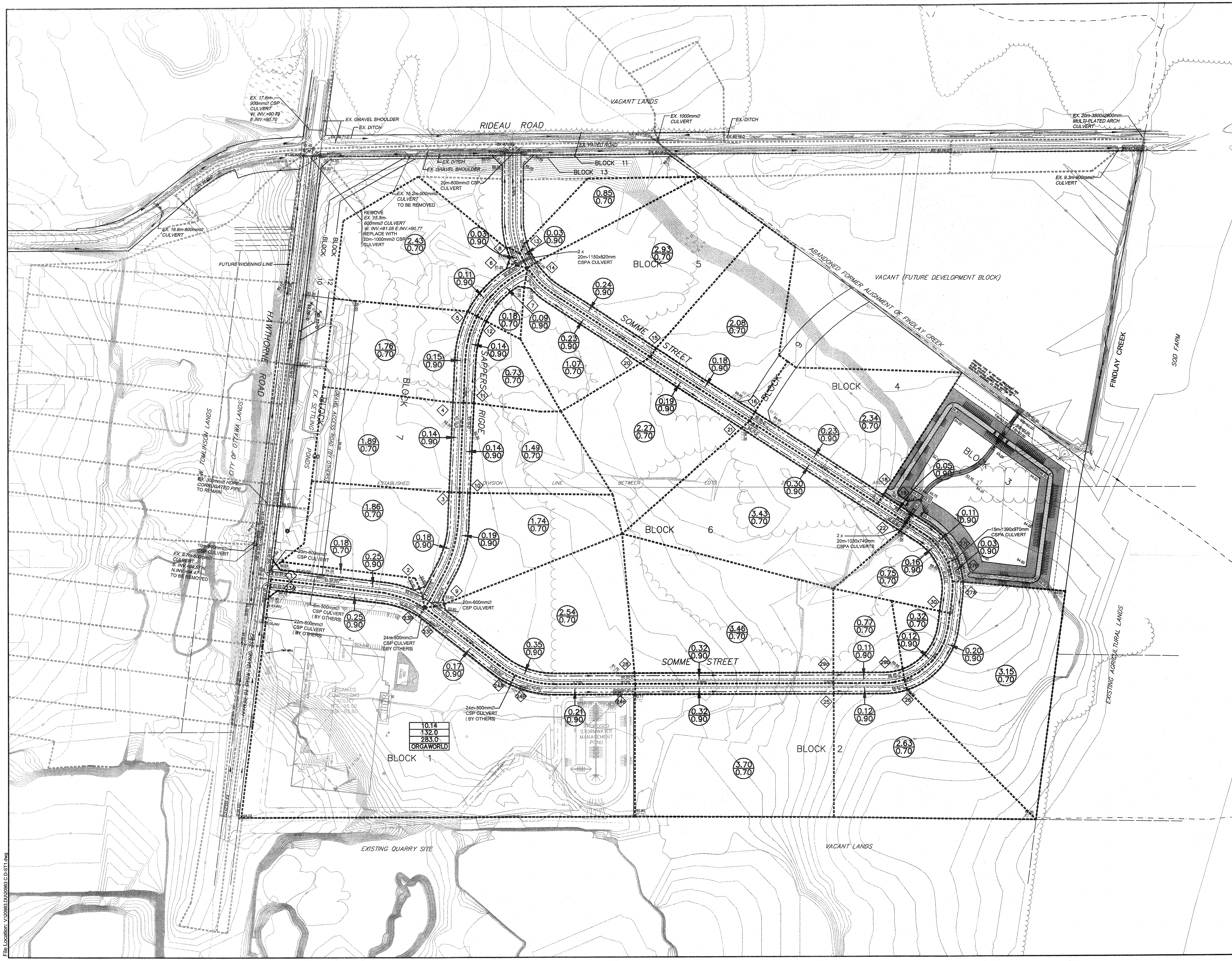
date	MARCH 08, 2021	job. no.	A001083
scale	1 : 500		
drawn	D.CANN	drawing no.	SWM
approved	J.SAUVÉ		
plot date	1/13/2021 3:31:05 PM		

1. DO NOT SCALE FROM THIS DRAWING
2. CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BEFORE WORK COMMENCES
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE FOLLOWING DRAWINGS: STRUCTURAL, MECHANICAL, ELECTRICAL

Key Map



NOT TO SCALE



LEGEND

- - - - -	DRAINAGE BOUNDARY
2.91 / 0.70	AREA IN HECTARES * RUNOFF COEFFICIENT (C)
10.14 / 132.0 / 283.0 / ORGAWORLD	DRAINAGE AREA (ha) 10 YEAR PEAK FLOW (l/s) 100 YEAR PEAK FLOW (l/s) ORGAWORLD SITE
28	NODE LOCATION NUMBER
← - - -	PROPOSED DITCH AND FLOW DIRECTION

* NOTE: RUNOFF COEFFICIENT (C) FOR DEVELOPMENT AREA IS BASED ON A WEIGHTED AVERAGE OF 0.70, WHILE ROADWAYS ARE 0.90.

NO.	ISSUE	DATE
03	ISSUED FOR M.O.E. APPROVAL	28/05/09
02	REVISED PER CITY COMMENTS	30/04/09
01	ISSUED FOR CITY APPROVAL	12/02/09

SCALE: 1:2000

0 25 50 100 150

J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS

J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER D. P. UPTON PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:

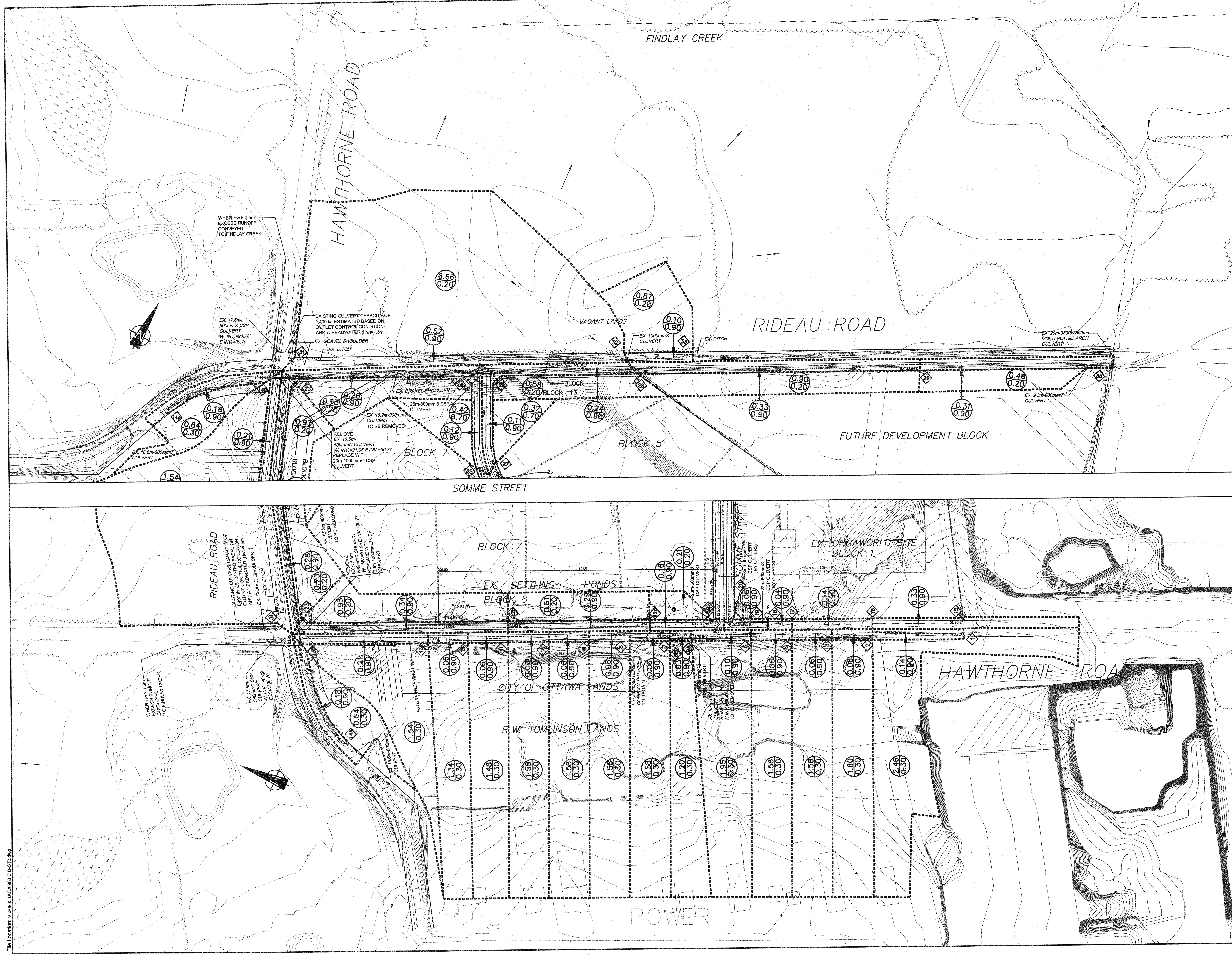
HAWTHORNE INDUSTRIAL PARK

DRAWING:

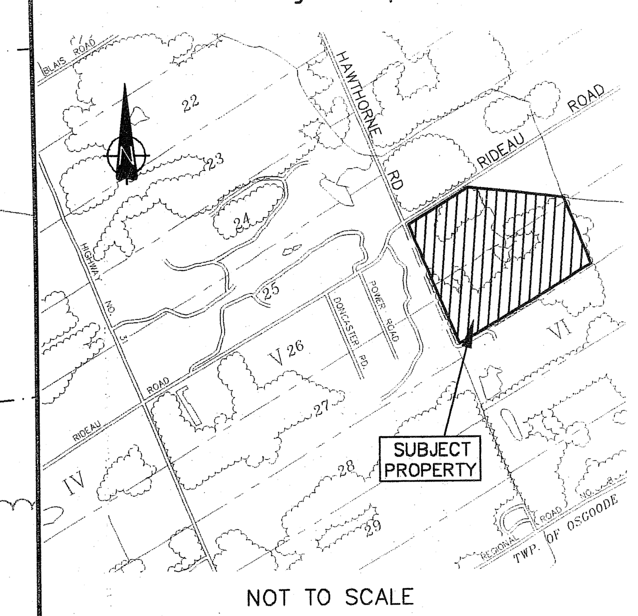
STORM DRAINAGE AREA PLAN

DESIGN:	M.B.	DRAWING NO.:	D-ST1
DRAWN:	T.S.		
CHECKED:	D.U.	JLR NO:	20983
PLOTTED:	May 28, 2009		

File Location: V:\20983.D\J20983 C D-ST1.dwg



Key Map



LEGEND

- DRAINAGE BOUNDARY
- 2.91 / 0.70 — AREA IN HECTARES / * RUNOFF COEFFICIENT (C)
- 28 — NODE LOCATION NUMBER
- PROPOSED DITCH AND FLOW DIRECTION
- EXISTING SURFACE FLOW DIRECTION

* NOTE: RUNOFF COEFFICIENT (C) FOR DEVELOPMENT AREA IS BASED ON A WEIGHTED AVERAGE OF 0.70, WHILE ROADWAYS ARE 0.90.

NO.	ISSUE	DATE
03	ISSUED FOR M.O.E. APPROVAL	28/05/09
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SCALE: 1:2000

0 25 50 100 150

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Tel: 613 544 1424
Fax: 613 544 5679

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER — D. P. UPTON — PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:

HAWTHORNE INDUSTRIAL PARK

DRAWING:

STORM DRAINAGE AREA PLAN

DESIGN:	M.B.	DRAWING NO.:	D-ST2
DRAWN:	T.S.		
CHECKED:	D.U.	JLR NO:	20983
PLOTTED:	May 28, 2009		

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009 (Revised April 2009)

1:10 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA									CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT						FLOW TIME	U/S Inv	D/S Inv
	FROM	TO	Area at C of 0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)	(min)	(m)	(m)
NORTHERN CATCHMENT AREA																														
WEST SIDE SAPPERS RIDGE	2	3	1.86	0.18	2.04	1.46	1.46	4.07	4.07	15.00	97.85	398.2	0.00	0.42	1.20	3.00	0.50	424.2	6973.0	0.80	136.80							2.84	92.50	91.82
WEST SIDE SAPPERS RIDGE	3	4	1.89	0.14	2.03	1.45	2.92	4.04	8.11	17.84	88.22	715.4	0.00	0.51	1.20	3.00	0.80	904.2	8856.1	1.16	111.00							1.60	91.82	90.93
WEST SIDE SAPPERS RIDGE	4	5	1.76	0.15	1.91	1.36	4.28	3.79	11.90	19.44	83.68	995.9	0.00	0.58	1.20	3.00	0.51	1011.3	7029.1	1.00	112.85							1.88	90.93	90.36
WEST SIDE SAPPERS RIDGE	5	6	2.43	0.11	2.54	1.80	6.08	5.00	16.90	21.32	78.96	1334.4	0.00	0.65	1.20	3.00	0.62	1513.4	7762.6	1.19	82.79							1.16	90.36	89.85
										22.47																				
NORTH ENTRANCE TO SOMME STREET	8	6		0.03	0.03	0.03	0.03	0.08	0.08	15.00	97.85	7.3	0.00	0.20	1.20	3.00	1.30	94.9	11276.7	0.79	10.00							0.21	89.98	89.85
										15.21																				
CULVERT CROSSING	6	14		0.00	0.00	0.00	6.11	0.00	16.97	22.47	76.34	1295.8					0.50				20.00	2	-----	1.15 x 0.82	NO	YES	0.75	0.38	89.85	89.75
										22.85																				
NORTH PORTION SOMME STREET	13	14	0.85	0.03	0.88	0.62	0.62	1.73	1.73	15.00	97.85	169.2	0.00	0.30	1.20	3.00	2.30	372.0	14999.4	1.38	10.00							0.12	89.98	89.75
										15.12																				
NORTH PORTION SOMME STREET	14	15	2.93	0.24	3.17	2.27	8.99	6.30	25.00	22.85	75.52	1888.2	0.00	0.74	1.20	3.00	0.50	1926.6	6992.8	1.17	184.04							2.62	89.75	88.83
NORTH PORTION SOMME STREET	15	16	2.08	0.18	2.26	1.62	10.61	4.50	29.50	25.47	70.36	2075.4	0.00	0.77	1.20	3.00	0.57	2291.4	7480.8	1.29	145.08							1.88	88.83	88.00
NORTH PORTION SOMME STREET	16	18	2.34	0.23	2.57	1.85	12.46	5.13	34.63	27.35	67.11	2323.9	0.00	0.80	1.20	3.00	0.51	2399.6	7074.8	1.25	185.66							2.48	88.00	87.05
NORTH PORTION SOMME STREET	18	19	0.00	0.05	0.05	0.05	12.50	0.13	34.75	29.82	63.30	2199.9	0.00	0.76	1.20	3.00	0.72	2476.8	8372.8	1.43	41.86							0.49	87.05	86.75
										30.31																				
EAST SIDE SAPPERS RIDGE	9	10	1.74	0.19	1.93	1.39	1.39	3.86	3.86	15.00	97.85	378.0	0.00	0.41	1.20	3.00	0.50	399.2	6996.6	0.79	147.87							3.11	92.40	91.66
EAST SIDE SAPPERS RIDGE	10	11	1.49	0.14	1.63	1.17	2.56	3.25	7.11	18.11	87.42	622.0	0.00	0.49	1.20	3.00	0.66	735.9	8019.2	1.02	111.04							1.81	91.66	90.93
EAST SIDE SAPPERS RIDGE	11	12	0.73	0.14	0.87	0.64	3.20	1.77	8.88	19.92	82.40	732.0	0.00	0.52	1.20	3.00	0.55	785.5	7304.8	0.97	104.49							1.80	90.93	90.36
EAST SIDE SAPPERS RIDGE	12	7	0.18	0.09	0.27	0.21	3.40	0.58	9.46	21.72	78.02	738.2	0.00	0.49	1.20	3.00	0.81	818.5	8919.0	1.14	72.55							1.06	90.36	89.77
NORTH PORTION SOMME STREET	7	20	1.07	0.23	1.30	0.96	4.36	2.66	12.12	22.79	75.66	916.9	0.00	0.57	1.20	3.00	0.50	956.8	6966.1	0.98	177.39							3.01	89.77	88.89
NORTH PORTION SOMME STREET	20	21	2.27	0.19	2.46	1.76	6.12	4.89	17.01	25.80	69.76	1186.8	0.00	0.62	1.20	3.00	0.50	1200.1	6981.9	1.04	147.49							2.36	88.89	88.16
NORTH PORTION SOMME STREET	21	22	3.43	0.30	3.73	2.67	8.79	7.43	24.44	28.16	65.80	1608.1	0.00	0.70	1.20	3.00	0.56	1759.0	7404.4	1.20	232.84							3.24	88.16	86.85
										31.40																				
SOUTHERN CATCHMENT AREA																														
SOUTH PORTION SOMME STREET	23A	23B	0.00	0.25	0.25	0.23	0.23	0.63	0.63	15.00	97.85	61.2	0.00	0.20	1.20	3.00	0.64	66.3	7883.5	0.55	181.00							5.46	93.65	92.50
CULVERT CROSSING	23B	23C		0.00	0.00	0.00	0.23	0.00	0.63	20.46	81.05	50.7					0.42				24.00	1	500	-----	NO	YES	0.33	1.55	92.50	92.40
SOUTH PORTION SOMME STREET	23C	24A	0.00	0.17	0.17	0.15	0.38	0.43	1.05	22.00	77.38	81.3	0.00	0.22	1.20	3.00	0.82	97.0	8946.1	0.67	110.00							2.74	92.40	91.50
CULVERT CROSSING	24A	24B		0.00	0.00	0.00	0.38	0.00	1.05	24.75	71.70	75.3					0.42				24.00	1	500	-----	NO	YES	0.34	1.04	91.50	91.40
SOUTH PORTION SOMME STREET	24B	24C	0.00	0.21	0.21	0.19	0.57	0.53	1.58	25.79	69.78	110.0	0.00	0.25	1.20	3.00	0.70	126.0	8258.2	0.67	142.00							3.52	91.40	90.41
ORGAWORLD - SITE	U/S	24C	1:10 year peak flow = 132 L/s, see Table 4 of Orgaworld Stormwater Site Management Plan, Sept. 2008									132.0																		
SOUTH PORTION SOMME STREET	24C	25	3.70	0.32	4.02	2.88	3.44	8.00	9.58	29.31	64.05	745.3	0.00	0.52	1.20	3.00	0.54	783.8	7289.5	0.97	244.84							4.22	90.41	89.08
SOUTH PORTION SOMME STREET	25	26	2.63	0.12	2.75	1.95	5.39	5.42	14.99	33.53	58.41	1007.7	0.00	0.58	1.20	3.00	0.51	1013.1	7041.5	1.00	90.75							1.51	89.08	88.62
SOUTH PORTION SOMME STREET	26	27A	3.15	0.20	3.35	2.39	7.78	6.63	21.63	35.04	56.65	1357.2	0.00	0.62	1.20	3.00	0.65	1370.0	7970.4	1.19	157.06							2.20	88.62	87.60
SOUTH PORTION SOMME STREET	27A	27B	0.00	0.03	0.03	0.03	7.81	0.08	21.70	37.24	54.29	1310.1	0.00	0.61	1.20	3.00	0.65	1312.4	7973.8	1.18	20.00							0.28	87.60	87.47
CULVERT CROSSING	27B	27C		0.00	0.00	0.00	7.81	0.00	21.70	37.53	54.00	1303.8					0.73				15.00	1	-----	1.39 X 0.97	YES	NO	0.87	0.20	87.47	87.36
CORNER OF POND	27C	19	0.00	0.11	0.11	0.10	7.88	0.28	21.98	37.73	53.79	1314.2	0.00	0.65	1.20	3.00	0.71	1622.9	8324.0	1.28	72.00							0.94	87.36	86.85
										38.67																				

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009 (Revised April 2009)

1:10 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION				
	FROM	TO	Area at C of 0.70 (ha)	Area at C of 0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s
SW ENTRANCE TO SOMME STREET	1	2	0.18	0.25	0.43	0.35	0.35	0.97	0.97	15.00	97.85	94.6
CULVERT CROSSING	2	9		0.00	0.00	0.00	0.35	0.00	0.97	19.28	84.12	81.3
SOUTH PORTION SOMME STREET	9	28	2.54	0.35	2.89	2.10	2.44	5.83	6.80	20.44	81.10	551.2
SOUTH PORTION SOMME STREET	28	29A	3.46	0.32	3.78	2.71	5.15	7.53	14.33	24.77	71.65	1026.7
SOUTH PORTION SOMME STREET	29A	29B	0.77	0.11	0.88	0.64	5.79	1.78	16.11	28.58	65.15	1049.5
SOUTH PORTION SOMME STREET	29B	30	0.32	0.12	0.44	0.33	6.13	0.92	17.03	29.92	63.16	1075.8
SOUTH PORTION SOMME STREET	30	22	0.75	0.16	0.91	0.67	6.80	1.86	18.89	31.25	61.31	1158.5
										32.74		
CULVERT CROSSING	22	19		0.00	0.00	0.00	15.59	0.00	43.33	32.74	59.38	2573.1
										32.82		
POND INLET	19	POND		0.00	0.00	0.00	35.97	0.00	100.06	38.67	52.87	5422.6
POND OUTLET DITCH	POND	DITCH	**1:10 year controlled post development peak flow = 696 l/s, see SWMHYMO output of this Report**									696.0

DETAILS	OPEN DITCH/SWALE DATA									CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT						FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
	BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)			
SW ENTRANCE TO SOMME STREET	0.00	0.32	1.20	3.00	0.61	226.9	7702.7	0.74	189.60							4.28	93.65	92.50
CULVERT CROSSING					0.50				20.00	1	600	-----	NO	**YES**	**0.52**	1.16	92.50	92.40
SOUTH PORTION SOMME STREET	0.00	0.47	1.20	3.00	0.73	694.0	8450.7	1.05	272.58							4.34	92.40	90.41
SOUTH PORTION SOMME STREET	0.00	0.61	1.20	3.00	0.54	1198.8	7283.5	1.07	245.24							3.81	90.41	89.08
SOUTH PORTION SOMME STREET	0.00	0.62	1.20	3.00	0.53	1239.6	7212.0	1.07	86.51							1.34	89.08	88.62
SOUTH PORTION SOMME STREET	0.00	0.58	1.20	3.00	0.70	1191.6	8282.1	1.18	94.12							1.33	88.62	87.96
SOUTH PORTION SOMME STREET	0.00	0.58	1.20	3.00	0.97	1402.6	9748.4	1.39	124.55							1.49	87.96	86.75
CULVERT CROSSING					0.50				20.00	2	-----	1.03 X 0.74	**YES**	NO	**1.30**	0.08	86.85	86.75
POND INLET	3.09	0.38	1.20	3.00	5.68	5629.1	13135.2	3.50	22.00							0.10	86.75	85.50
POND OUTLET DITCH	1.00	0.27	0.38	3.00	2.08	750.9	1506.6	1.54	24.00							0.26	82.50	82.00

Note: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

J.L. RICHARDS AND ASSOCIATES LIMITED, Consulting Engineers, Architects and Planners

DATE : 5/27/2009

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009 (Revised April 2009)

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA							CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
	FROM	TO	Area at C of 0.70 (ha)	Area at C of 0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL			
NORTHERN CATCHMENT AREA																											
WEST SIDE SAPPERS RIDGE	2	3	1.86	0.18	2.04	1.81	1.81	5.02	5.02	15.00	142.89	718.0	0.00	1.20	3.00	0.50	6973.0	1.61	136.80						1.41	92.50	91.82
WEST SIDE SAPPERS RIDGE	3	4	1.89	0.14	2.03	1.80	3.61	5.00	10.02	16.41	135.47	1357.9	0.00	1.20	3.00	0.80	8856.1	2.05	111.00						0.90	91.82	90.93
WEST SIDE SAPPERS RIDGE	4	5	1.76	0.15	1.91	1.69	5.29	4.69	14.71	17.31	131.16	1929.7	0.00	1.20	3.00	0.51	7029.1	1.63	112.85						1.16	90.93	90.36
WEST SIDE SAPPERS RIDGE	5	6	2.43	0.11	2.54	2.23	7.53	6.21	20.92	18.47	126.06	2637.5	0.00	1.20	3.00	0.62	7762.6	1.80	82.79						0.77	90.36	89.85
										19.24																	
NORTH ENTRANCE TO SOMME STREET	8	6		0.03	0.03	0.03	0.03	0.08	0.08	15.00	142.89	11.9	0.00	1.20	3.00	1.30	11276.7	2.61	10.00						0.06	89.98	89.85
										15.06																	
CULVERT CROSSING	6	14		0.00	0.00	0.00	7.56	0.00	21.01	19.24	122.91	2581.8				0.50			20.00	2	-----	1.15 x 0.82	NO	YES	0.19	89.85	89.75
										19.43																	
NORTH PORTION SOMME STREET	13	14	0.85	0.03	0.88	0.77	0.77	2.15	2.15	15.00	142.89	307.4	0.00	1.20	3.00	2.30	14999.4	3.47	10.00						0.05	89.98	89.75
										15.05																	
NORTH PORTION SOMME STREET	14	15	2.93	0.24	3.17	2.80	11.13	7.79	30.95	19.43	122.15	3780.5	0.00	1.20	3.00	0.50	6992.8	1.62	184.04						1.89	89.75	88.83
NORTH PORTION SOMME STREET	15	16	2.08	0.18	2.26	2.00	13.13	5.56	36.51	21.32	115.16	4204.4	0.00	1.20	3.00	0.57	7480.8	1.73	145.08						1.40	88.83	88.00
NORTH PORTION SOMME STREET	16	18	2.34	0.23	2.57	2.28	15.41	6.33	42.84	22.72	110.55	4736.0	0.00	1.20	3.00	0.51	7074.8	1.64	185.66						1.89	88.00	87.05
NORTH PORTION SOMME STREET	18	19	0.00	0.05	0.05	0.05	15.46	0.14	42.98	24.61	104.93	4509.7	0.00	1.20	3.00	0.72	8372.8	1.94	41.86						0.36	87.05	86.75
										24.97																	
EAST SIDE SAPPERS RIDGE	9	10	1.74	0.19	1.93	1.71	1.71	4.76	4.76	15.00	142.89	680.4	0.00	1.20	3.00	0.50	6996.6	1.62	147.87						1.52	92.40	91.66
EAST SIDE SAPPERS RIDGE	10	11	1.49	0.14	1.63	1.44	3.16	4.02	8.78	16.52	134.93	1184.3	0.00	1.20	3.00	0.66	8019.2	1.86	111.04						1.00	91.66	90.93
EAST SIDE SAPPERS RIDGE	11	12	0.73	0.14	0.87	0.78	3.94	2.16	10.94	17.52	130.23	1424.7	0.00	1.20	3.00	0.55	7304.8	1.69	104.49						1.03	90.93	90.36
EAST SIDE SAPPERS RIDGE	12	7	0.18	0.09	0.27	0.25	4.18	0.69	11.63	18.55	125.73	1462.2	0.00	1.20	3.00	0.81	8919.0	2.06	72.55						0.59	90.36	89.77
NORTH PORTION SOMME STREET	7	20	1.07	0.23	1.30	1.17	5.35	3.24	14.87	19.13	123.33	1834.1	0.00	1.20	3.00	0.50	6966.1	1.61	177.39						1.83	89.77	88.89
NORTH PORTION SOMME STREET	20	21	2.27	0.19	2.46	2.18	7.53	6.05	20.92	20.97	116.41	2435.6	0.00	1.20	3.00	0.50	6981.9	1.62	147.49						1.52	88.89	88.16
NORTH PORTION SOMME STREET	21	22	3.43	0.30	3.73	3.30	10.83	9.18	30.10	22.49	111.29	3350.0	0.00	1.20	3.00	0.56	7404.4	1.71	232.84						2.26	88.16	86.85
										24.75																	
SOUTHERN CATCHMENT AREA																											
SOUTH PORTION SOMME STREET	23A	23B	0.00	0.25	0.25	0.25	0.25	0.70	0.70	15.00	142.89	99.3	0.00	1.20	3.00	0.64	7883.5	1.82	181.00						1.65	93.65	92.50
CULVERT CROSSING	23B	23C		0.00	0.00	0.00	0.25	0.00	0.70	16.65	134.29	93.3				0.42			24.00	1	500	-----	NO	YES	0.84	92.50	92.40
SOUTH PORTION SOMME STREET	23C	24A	0.00	0.17	0.17	0.17	0.42	0.47	1.17	17.49	130.34	152.2	0.00	1.20	3.00	0.82	8946.1	2.07	110.00						0.89	92.40	91.50
CULVERT CROSSING	24A	24B		0.00	0.00	0.00	0.42	0.00	1.17	18.38	126.45	147.6				0.42			24.00	1	500	-----	NO	YES	0.53	91.50	91.40
SOUTH PORTION SOMME STREET	24B	24C	0.00	0.21	0.21	0.21	0.63	0.58	1.75	18.91	124.24	217.6	0.00	1.20	3.00	0.70	8258.2	1.91	142.00						1.24	91.40	90.41
ORGAWORLD - SITE	U/S	24C	1:100 year peak flow = 283 l/s, see Table 4 of Orgaworld Stormwater Site Management Plan, Sept. 2008									283.0															
SOUTH PORTION SOMME STREET	24C	25	3.70	0.32	4.02	3.56	4.19	9.89	11.64	20.15	119.40	1672.8	0.00	1.20	3.00	0.54	7289.5	1.69	244.84						2.42	90.41	89.08
SOUTH PORTION SOMME STREET	25	26	2.63	0.12	2.75	2.42	6.61	6.73	18.37	22.57	111.05	2323.0	0.00	1.20	3.00	0.51	7041.5	1.63	90.75						0.93	89.08	88.62
SOUTH PORTION SOMME STREET	26	27A	3.15	0.20	3.35	2.96	9.57	8.22	26.59	23.49	108.17	3159.5	0.00	1.20	3.00	0.65	7970.4	1.84	157.06						1.42	88.62	87.60
SOUTH PORTION SOMME STREET	27A	27B	0.00	0.03	0.03	0.03	9.60	0.08	26.67	24.91	104.09	3059.5	0.00	1.20	3.00	0.65	7973.8	1.85	20.00						0.18	87.60	87.47
CULVERT CROSSING	27B	27C		0.00	0.00	0.00	9.60	0.00	26.67	25.09	103.59	3046.2				0.73			15.00	1	-----	1.39 X 0.97	YES	NO	0.09	87.47	87.36
CORNER OF POND	27C	19	0.00	0.11	0.11	0.11	9.71	0.31	26.98	25.18	103.36	3071.7	0.00	1.20	3.00	0.71	8324.0	1.93	72.00						0.62	87.36	86.85
										25.80																	

J.L. RICHARDS AND ASSOCIATES LIMITED, Consulting Engineers, Architects and Planners

DATE : 5/27/2009

Hawthorne Industrial Park

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009 (Revised April 2009)

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION				
	FROM	TO	Area at C of 0.70 (ha)	Area at C of 0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s
SW ENTRANCE TO SOMME STREET	1	2	0.18	0.25	0.43	0.40	0.40	1.12	1.12	15.00	142.89	160.5
CULVERT CROSSING	2	9		0.00	0.00	0.00	0.40	0.00	1.12	16.77	133.71	150.2
SOUTH PORTION SOMME STREET	9	28	2.54	0.35	2.89	2.58	2.98	7.16	8.29	17.40	130.77	1083.6
SOUTH PORTION SOMME STREET	28	29A	3.46	0.32	3.78	3.35	6.33	9.31	17.59	19.72	121.01	2128.9
SOUTH PORTION SOMME STREET	29A	29B	0.77	0.11	0.88	0.79	7.11	2.19	19.78	22.15	112.40	2223.0
SOUTH PORTION SOMME STREET	29B	30	0.32	0.12	0.44	0.40	7.51	1.11	20.89	23.01	109.65	2290.7
SOUTH PORTION SOMME STREET	30	22	0.75	0.16	0.91	0.82	8.33	2.27	23.16	23.83	107.18	2482.3
										24.75		
CULVERT CROSSING	22	19		0.00	0.00	0.00	19.16	0.00	53.26	24.75	104.53	5567.5
										24.79		
POND INLET	19	POND		0.00	0.00	0.00	44.32	0.00	123.22	25.80	101.69	12813.8
POND OUTLET DITCH	POND	DITCH	1:100 year controlled post development peak flow = 1,432 l/s, see SWMHYMO output of this Report									1432.0

DETAILS	OPEN DITCH/SWALE DATA							CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
	BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL			
SW ENTRANCE TO SOMME STREET	0.00	1.20	3.00	0.61	7702.7	1.78	189.60						1.77	93.65	92.50
CULVERT CROSSING				0.50			20.00	1	600	-----	NO	**YES**	0.63	92.50	92.40
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.73	8450.7	1.96	272.58						2.32	92.40	90.41
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.54	7283.5	1.69	245.24						2.42	90.41	89.08
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.53	7212.0	1.67	86.51						0.86	89.08	88.62
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.70	8282.1	1.92	94.12						0.82	88.62	87.96
SOUTH PORTION SOMME STREET	0.00	1.20	3.00	0.97	9748.4	2.26	124.55						0.92	87.96	86.75
CULVERT CROSSING				0.50			20.00	2	-----	1.03 X 0.74	**YES**	NO	0.04	86.85	86.75
POND INLET	3.09	0.55	5.00	5.68	13135.2	4.09	22.00						0.09	86.75	85.50
POND OUTLET DITCH	1.00	0.38	3.00	2.08	1506.6	1.85	24.00						0.22	82.50	82.00

Note: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009

10 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0% up C = 1.0

DETAILS	NODES		DRAINAGE AREA AREA (A) at C of							PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA									CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT						FLOW	U/S	D/S
	FROM	TO	0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)	TIME (min)	Inv (m)	Inv (m)
WEST CATCHMENT AREA																																
WEST SIDE HAWTHORNE ROAD	1	2		2.46		0.14	2.60	0.86	0.86	2.40	2.40	15.00	97.85	235.0	0.00	0.41	0.50	3.00	0.20	250.1	424.5	0.50	112.00							3.76	103.22	103.00
WEST SIDE HAWTHORNE ROAD	2	3		1.60		0.06	1.66	0.53	1.40	1.48	3.89	18.76	85.54	332.5	0.00	0.25	0.50	3.00	5.00	337.3	2141.9	1.80	50.00							0.46	103.00	100.50
WEST SIDE HAWTHORNE ROAD	3	4		1.58		0.06	1.64	0.53	1.93	1.47	5.35	19.23	84.26	451.1	0.00	0.27	0.50	3.00	7.00	490.1	2534.3	2.24	50.00							0.37	100.50	97.00
WEST SIDE HAWTHORNE ROAD	4	5		1.58		0.06	1.64	0.53	2.45	1.47	6.82	19.60	83.26	568.0	0.00	0.34	0.50	3.00	5.00	765.9	2141.9	2.21	50.00							0.38	97.00	94.50
WEST SIDE HAWTHORNE ROAD	5	6a		1.95		0.10	2.05	0.68	3.13	1.88	8.70	19.98	82.27	715.6	0.00	0.45	0.65	3.00	1.07	747.0	1991.5	1.23	75.00							1.02	94.50	93.70
CULVERT CROSSING	6a	6b				0.00	0.00	0.00	3.13	0.00	8.70	20.99	79.73	693.6					1.00				10.00	1	800	------	YES	NO	0.84	0.12	93.70	93.60
WEST SIDE HAWTHORNE ROAD	6b	7		1.20		0.03	1.23	0.39	3.52	1.08	9.77	21.11	79.45	776.5	0.00	0.53	1.15	3.00	0.53	817.1	6447.9	0.97	15.00							0.26	93.60	93.52
WEST SIDE HAWTHORNE ROAD	7	8		1.58		0.06	1.64	0.53	4.04	1.47	11.24	21.37	78.83	886.3	0.00	0.56	1.15	3.00	0.50	916.3	6243.2	0.97	50.00							0.86	93.52	93.27
WEST SIDE HAWTHORNE ROAD	8	9		1.58		0.06	1.64	0.53	4.57	1.47	12.71	22.23	76.88	977.2	0.00	0.58	1.15	3.00	0.50	1006.2	6243.2	1.00	50.00							0.84	93.27	93.02
WEST SIDE HAWTHORNE ROAD	9	10		1.58		0.06	1.64	0.53	5.10	1.47	14.18	23.06	75.07	1064.4	0.00	0.60	1.15	3.00	0.50	1101.4	6243.2	1.02	50.00							0.82	93.02	92.77
WEST SIDE HAWTHORNE ROAD	10	11		1.58		0.06	1.64	0.53	5.63	1.47	15.65	23.88	73.39	1148.3	0.00	0.62	1.15	3.00	0.50	1202.1	6243.2	1.04	50.00							0.80	92.77	92.52
WEST SIDE HAWTHORNE ROAD	11	12		1.48		0.06	1.54	0.50	6.13	1.38	17.03	24.68	71.83	1223.3	0.00	0.63	1.15	3.00	0.50	1254.5	6243.2	1.05	50.00							0.79	92.52	92.27
WEST SIDE HAWTHORNE ROAD	12	13		1.34		0.06	1.40	0.46	6.58	1.27	18.30	25.47	70.35	1287.3	0.00	0.64	1.15	3.00	0.50	1308.3	6243.2	1.06	50.00							0.78	92.27	92.02
WEST SIDE HAWTHORNE ROAD	13	14b		1.54		0.21	1.75	0.65	7.23	1.81	20.11	26.25	68.96	1386.6	0.00	0.64	1.15	3.00	0.61	1449.7	6918.0	1.18	158.00							2.23	92.02	91.05
												28.49																				
SW RIDEAU & HAWTHORNE	14a	14b		0.64		0.18	0.82	0.35	0.35	0.98	0.98	15.00	97.85	96.3	0.00	0.20	1.30	3.00	4.06	167.6	24661.5	1.40	140.00							1.67	96.73	91.05
												16.67																				
CULVERT CROSSING	14b	23				0.00	0.00	0.00	7.59	0.00	21.09	28.49	65.29	1377.2					1.40				20.00	1	1000	------	YES	NO	1.14	0.19	91.05	90.77
												28.68																				
EAST CATCHMENT AREA																																
EAST SIDE HAWTHORNE ROAD	15	16				0.33	0.33	0.30	0.30	0.83	0.83	15.00	97.85	80.8	0.00	0.25	0.30	3.00	0.45	101.7	165.4	0.54	110.00							3.38	103.80	103.30
EAST SIDE HAWTHORNE ROAD	16	17				0.14	0.14	0.13	0.42	0.35	1.18	18.38	86.64	101.9	0.00	0.16	0.30	3.00	6.20	114.3	610.8	1.49	100.00							1.12	103.30	97.10
EAST SIDE HAWTHORNE ROAD	17	18				0.04	0.04	0.04	0.46	0.10	1.28	19.50	83.52	106.6	0.00	0.16	1.20	3.00	6.36	115.8	24949.6	1.51	33.00							0.36	97.10	95.00
CULVERT CROSSING	18	19				0.00	0.00	0.00	0.46	0.00	1.28	19.86	82.56	105.3					1.77				22.00	1	600	------	YES	NO	0.30	0.98	95.00	94.61
EAST SIDE HAWTHORNE ROAD	19	20				0.06	0.06	0.05	0.51	0.15	1.43	20.85	80.08	114.2	0.00	0.21	0.70	3.00	2.79	158.3	3925.7	1.20	24.00							0.33	94.61	93.94
CULVERT CROSSING	20	21				0.00	0.00	0.00	0.51	0.00	1.43	21.18	79.28	113.1					0.50				20.00	1	600	------	NO	YES	0.37	0.83	93.94	93.84
EAST SIDE HAWTHORNE ROAD	21	22a	0.21			0.16	0.37	0.19	0.70	0.52	1.94	22.02	77.35	150.3	0.00	0.29	0.80	3.00	0.50	158.5	2372.0	0.63	82.00							2.18	93.84	93.43
EAST SIDE HAWTHORNE ROAD	22a	22b	0.61			0.29	0.90	0.38	1.08	1.06	3.01	24.19	72.77	218.9	0.00	0.33	1.17	3.00	0.52	228.1	6666.4	0.70	175.00							4.18	93.43	92.52
EAST SIDE HAWTHORNE ROAD	22b	23	0.93			0.34	1.27	0.49	1.57	1.37	4.38	28.37	65.47	286.5	0.00	0.35	1.17	3.00	0.70	309.6	7734.6	0.84	260.00							5.14	92.59	90.77
												33.51																				
SOUTH CATCHMENT AREA																																
SOUTH SIDE RIDEAU ROAD	23	24	0.73			0.28	1.01	0.40	9.56	1.11	26.57	33.51	58.43	1552.8	0.00	0.51	1.74	3.00	2.65	1642.9	43339.8	2.11	235.00							1.86	90.77	84.55
												35.37																				
WEST SIDE SOMME STREET	25	24			0.42	0.12	0.54	0.40	0.40	1.12	1.12	15.00	97.85	109.4	0.00	0.18	1.20	3.00	2.80	105.1	16548.0	1.08	125.74							1.94	89.98	86.46
												16.94																				
CULVERT CROSSING	24	26				0.00	0.00	0.00	9.96	0.00	27.69	35.37	56.28	1558.5					1.00				20.00	1	800	------	NO	YES	2.31	0.11	84.55	84.35
												35.48																				
EAST SIDE SOMME STREET	27	26			0.32	0.11	0.43	0.32	0.32	0.90	0.90	15.00	97.85	87.9	0.00	0.17	1.20	3.00	2.80	90.3	16548.0	1.04	125.74							2.01	89.98	86.46
												17.01																				
SOUTH SIDE RIDEAU ROAD	26	28	0.58			0.24	0.82	0.33	10.62	0.92	29.51	35.48	56.16	1657.5	0.00	0.66	2.20	3.00	0.71	1695.7	42043.4	1.30	183.76							2.36	84.35	83.04
												37.84																				

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983
February 2009

10 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 0.0% up C = 1.0

DETAILS	NODES FROM	NODES TO	DRAINAGE AREA – AREA (A) at C of 0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*C)	TOTAL A*C	PEAK FLOW GENERATION – 2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s
NORTH CATCHMENT AREA														
			Existing 900 mm dia. culvert capacity before ditch flows to Findlay Creek											1400.0
NORTH SIDE RIDEAU ROAD	31	32	6.66			0.52	7.18	1.80	1.80	5.00	5.00	20.00	97.26	[redacted]
												23.41		
	33	32	0.87			0.10	0.97	0.26	0.26	0.73	0.73	15.00	115.83	[redacted]
												18.45		
EXISTING CULVERT CROSSING	32	28				0.00	0.00	0.00	2.06	0.00	5.74	23.41	87.93	[redacted]
												23.55		
SOUTH CATCHMENT AREA														
SOUTH SIDE RIDEAU ROAD	28	29	0.90			0.33	1.23	0.48	13.16	1.33	36.58	37.84	53.68	3363.5
SOUTH SIDE RIDEAU ROAD	29	30	0.48			0.31	0.79	0.38	13.53	1.04	37.62	44.76	47.64	3192.1

DETAILS	OPEN DITCH/SWALE DATA – BW m	D_{10yr} m	D_{max} m	SS X:1	SLOPE %	Q_{10yr} l/s	Q_{100yr} l/s	VEL. m/s	LENGTH m	CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT – No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL	HW 1:10 (m)	FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
NORTH CATCHMENT AREA																		
NORTH SIDE RIDEAU ROAD	0.00	0.58	1.50	3.00	1.93	1974.3	24880.1	1.96	400.00							3.41	90.71	83.01
	0.00	0.40	1.50	3.00	0.16	213.3	7240.8	0.44	92.00							3.45	83.16	83.01
EXISTING CULVERT CROSSING					-0.15				20.00	1	1000					0.14	83.01	83.04
SOUTH CATCHMENT AREA																		
SOUTH SIDE RIDEAU ROAD	0.00	1.17	2.20	3.00	0.14	3437.1	18513.7	0.84	347.24							6.91	83.04	82.56
SOUTH SIDE RIDEAU ROAD	0.00	0.90	2.20	3.00	0.51	3287.0	35640.2	1.35	236.20							2.91	82.56	81.35

ote: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

[redacted]

J.L. RICHARDS AND ASSOCIATES LIMITED, Consulting Engineers, Architects and Planners

DATE : 4/28/2009

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983

February 2009

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0% up C = 1.0

DETAILS	NODES		DRAINAGE AREA							PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA							CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
	FROM	TO	AREA (A) at C of 0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL			
WEST CATCHMENT AREA																													
WEST SIDE HAWTHORNE ROAD	1	2		2.46		0.14	2.60	1.06	1.06	2.95	2.95	15.00	142.89	422.1	0.00	0.50	3.00	0.20	424.5	0.57	112.00						3.30	103.22	103.00
WEST SIDE HAWTHORNE ROAD	2	3		1.60		0.06	1.66	0.66	1.72	1.83	4.79	18.30	126.80	607.2	0.00	0.50	3.00	5.00	2141.9	2.86	50.00						0.29	103.00	100.50
WEST SIDE HAWTHORNE ROAD	3	4		1.58		0.06	1.64	0.65	2.38	1.81	6.60	18.59	125.56	829.0	0.00	0.50	3.00	7.00	2534.3	3.38	50.00						0.25	100.50	97.00
WEST SIDE HAWTHORNE ROAD	4	5		1.58		0.06	1.64	0.65	3.03	1.81	8.42	18.84	124.54	1048.2	0.00	0.50	3.00	5.00	2141.9	2.86	50.00						0.29	97.00	94.50
WEST SIDE HAWTHORNE ROAD	5	6A		1.95		0.10	2.05	0.83	3.86	2.31	10.73	19.13	123.35	1323.2	0.00	0.65	3.00	1.07	1991.5	1.57	75.00						0.80	94.50	93.70
CULVERT CROSSING	6A	6B				0.00	0.00	0.00	3.86	0.00	10.73	19.92	120.24	1289.9				1.00			10.00	1	800	------	YES	NO	0.06	93.70	93.60
WEST SIDE HAWTHORNE ROAD	6B	7		1.20		0.03	1.23	0.48	4.34	1.33	12.06	19.99	119.99	1447.3	0.00	1.15	3.00	0.53	6447.9	1.63	15.00						0.15	93.60	93.52
WEST SIDE HAWTHORNE ROAD	7	8		1.58		0.06	1.64	0.65	4.99	1.81	13.88	20.14	119.42	1657.0	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	93.52	93.27
WEST SIDE HAWTHORNE ROAD	8	9		1.58		0.06	1.64	0.65	5.64	1.81	15.69	20.67	117.47	1843.0	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	93.27	93.02
WEST SIDE HAWTHORNE ROAD	9	10		1.58		0.06	1.64	0.65	6.30	1.81	17.50	21.20	115.59	2023.3	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	93.02	92.77
WEST SIDE HAWTHORNE ROAD	10	11		1.58		0.06	1.64	0.65	6.95	1.81	19.32	21.73	113.78	2197.9	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	92.77	92.52
WEST SIDE HAWTHORNE ROAD	11	12		1.48		0.06	1.54	0.62	7.56	1.71	21.03	22.26	112.03	2355.6	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	92.52	92.27
WEST SIDE HAWTHORNE ROAD	12	13		1.34		0.06	1.40	0.56	8.13	1.56	22.59	22.79	110.34	2492.6	0.00	1.15	3.00	0.50	6243.2	1.57	50.00						0.53	92.27	92.02
WEST SIDE HAWTHORNE ROAD	13	14B		1.54		0.21	1.75	0.79	8.91	2.19	24.78	23.32	108.70	2693.6	0.00	1.15	3.00	0.61	6918.0	1.74	158.00						1.51	92.02	91.05
												24.83																	
SW RIDEAU & HAWTHORNE	14A	14B		0.64		0.18	0.82	0.42	0.42	1.17	1.17	15.00	142.89	166.8	0.00	1.30	3.00	4.06	24661.5	4.86	140.00						0.48	96.73	91.05
												15.48																	
CULVERT CROSSING	14B	23				0.00	0.00	0.00	9.33	0.00	25.95	24.83	104.32	2706.8				1.40			20.00	1	1000	------	YES	NO	0.10	91.05	90.77
												24.93																	
EAST CATCHMENT AREA																													
EAST SIDE HAWTHORNE ROAD	15	16				0.33	0.33	0.33	0.33	0.92	0.92	15.00	142.89	131.1	0.00	0.30	3.00	0.45	165.4	0.61	110.00						2.99	103.80	103.30
EAST SIDE HAWTHORNE ROAD	16	17				0.14	0.14	0.14	0.47	0.39	1.31	17.99	128.11	167.4	0.00	0.30	3.00	6.20	610.8	2.26	100.00						0.74	103.30	97.10
EAST SIDE HAWTHORNE ROAD	17	18				0.04	0.04	0.04	0.51	0.11	1.42	18.73	124.98	177.2	0.00	1.20	3.00	6.36	24949.6	5.78	33.00						0.10	97.10	95.00
CULVERT CROSSING	18	19				0.00	0.00	0.00	0.51	0.00	1.42	18.82	124.58	176.6				1.77			22.00	1	600	------	YES	NO	0.59	95.00	94.61
EAST SIDE HAWTHORNE ROAD	19	20				0.06	0.06	0.06	0.57	0.17	1.58	19.41	122.22	193.7	0.00	0.70	3.00	2.79	3925.7	2.67	24.00						0.15	94.61	93.94
CULVERT CROSSING	20	21				0.00	0.00	0.00	0.57	0.00	1.58	19.56	121.63	192.7				0.50			20.00	1	600	------	NO	**YES**	0.49	93.94	93.84
EAST SIDE HAWTHORNE ROAD	21	22A	0.21			0.16	0.37	0.21	0.78	0.59	2.18	20.05	119.76	260.5	0.00	0.80	3.00	0.50	2372.0	1.24	82.00						1.11	93.84	93.43
EAST SIDE HAWTHORNE ROAD	22A	22B	0.61			0.29	0.90	0.44	1.23	1.23	3.41	21.16	115.75	394.2	0.00	1.17	3.00	0.52	6666.4	1.62	175.00						1.80	93.43	92.52
EAST SIDE HAWTHORNE ROAD	22B	23	0.93			0.34	1.27	0.57	1.80	1.59	5.00	22.95	109.83	548.8	0.00	1.17	3.00	0.70	7734.6	1.88	260.00						2.30	92.59	90.77
												25.25																	
SOUTH CATCHMENT AREA																													
SOUTH SIDE RIDEAU ROAD	23	24	0.73			0.28	1.01	0.46	11.59	1.29	32.23	25.25	103.15	3324.7	0.00	1.74	3.00	2.65	43339.8	4.77	235.00						0.82	90.77	84.55
												26.08																	
WEST SIDE SOMME STREET	25	24			0.42	0.12	0.54	0.49	0.49	1.36	1.36	15.00	142.89	193.7	0.00	1.20	3.00	2.80	16548.0	3.83	125.74						0.55	89.98	86.46
												15.55																	
CULVERT CROSSING	24	26				0.00	0.00	0.00	12.08	0.00	33.59	26.08	100.99	3391.7				1.00			20.00	1	800	------	NO	**YES**	0.05	84.55	84.35
												26.12																	
EAST SIDE SOMME STREET	27	26			0.32	0.11	0.43	0.39	0.39	1.08	1.08	15.00	142.89	154.9	0.00	1.20	3.00	2.80	16548.0	3.83	125.74						0.55	89.98	86.46
												15.55																	
SOUTH SIDE RIDEAU ROAD	26	28	0.58			0.24	0.82	0.39	12.86	1.07	35.74	26.12	100.86	3604.7	0.00	2.20	3.00	0.71	42043.4	2.90	183.76						1.06	84.35	83.04
												27.18																	

Hawthorne Road & Rideau Road

OPEN DITCH/CULVERT DESIGN SHEET

City of Ottawa

Prepared by: M. Buchanan, E.I.T.

JLR 20983
February 2009

1:100 year Ottawa International Airport IDF Curve

Checked by: G. Forget, P.Eng.

Increase Runoff Coefficient by 25.0% up C = 1.0

DETAILS	NODES		DRAINAGE AREA							PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA							CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)
	FROM	TO	AREA (A) at C of 0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*1.25*C) 25% increase in C factor	TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	BW m	D m	SS X:1	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	No. of Barrels	DIA (mm)	B x D (m)	INLET CONTROL	OUTLET CONTROL			
NORTH CATCHMENT AREA																													
			Existing 900 mm dia. Culvert Capacity before ditch flows to Findlay Creek											1400.0															
NORTH SIDE RIDEAU ROAD	31	32	6.66			0.52	7.18	2.19	2.19	6.07	6.07	20.00	119.95	2128.6	0.00	1.50	3.00	1.93	24880.1	3.69	400.00						1.81	90.71	83.01
												21.81																	
NORTH SIDE RIDEAU ROAD	33	32	0.87			0.10	0.97	0.32	0.32	0.88	0.88	15.00	142.89	126.1	0.00	1.50	3.00	0.16	7240.8	1.07	92.00						1.43	83.16	83.01
												16.43																	
EXISTING CULVERT CROSSING	32	28				0.00	0.00	0.00	2.50	0.00	6.96	21.81	113.52	2189.7				-0.15			20.00	1	1000				0.12	83.01	83.04
												21.93																	
SOUTH CATCHMENT AREA																													
SOUTH SIDE RIDEAU ROAD	28	29	0.90			0.33	1.23	0.56	15.91	1.54	44.24	27.18	98.22	5745.1	0.00	2.20	3.00	0.14	18513.7	1.28	347.24						4.54	83.04	82.56
SOUTH SIDE RIDEAU ROAD	29	30	0.48			0.31	0.79	0.43	16.34	1.20	45.44	31.72	88.42	5417.3	0.00	2.20	3.00	0.51	35640.2	2.45	236.20						1.60	82.56	81.35

Note: Conveyance Capacitites for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

HAWTHORNE INDUSTRIAL PARK

1:10 YEAR ROADSIDE CULVERT DESIGN

CONVENTIONAL CULVERT DESIGN

Prepared by: Mark Buchanan, E.I.T.
Reviewed by: Guy Forget, P.Eng.
Date: February 2009

	DESIGN DATA							CULVERT DATA						INLET CONTROL			OUTLET CONTROL								GOVERNING	VEL
Station	Q (m³/s)	d (m)	d_e (m)	AHW (m)	Skew No.	L (m)	S (m/m)	Description	B (m)	D or H (m)	N	Q/N (m^3/s)	A (each) (m^2)	Q/NB ($m^3/s/m$)	HW/D	HW (m)	K_e	H (m)	d_c (m)	$(d_c + D)/2$ (m)	TW (m)	h_o (m)	LS (m)	HW (m)	HW (m)	V_o (m/s)
1	2	3	4	5	6	7	8	9	10a	10b	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
6 to 14	1.296	0.67	0.05	1.1	0	20.0	0.005	CSPA 6	1.15	0.82	2	0.648	0.74	----	0.73	0.60	0.9	0.13	0.33	0.58	0.72	0.72	0.10	0.75	0.75	
23B to 23C	0.051	0.22	0.05	1.15	0	24.0	0.004	CSP 500	N/A	0.5	1	0.051	0.20	----	0.50	0.25	0.9	0.1	0.15	0.33	0.27	0.33	0.10	0.33	0.33	
24A to 24B	0.075	0.25	0.05	1.15	0	24.0	0.004	CSP 500	N/A	0.5	1	0.075	0.20	----	0.54	0.27	0.9	0.1	0.18	0.34	0.30	0.34	0.10	0.34	0.34	
2 to 9	0.081	0.47	0.05	1.15	0	20.0	0.005	CSP 600	N/A	0.6	1	0.081	0.28	----	0.50	0.30	0.9	0.1	0.19	0.40	0.52	0.52	0.10	0.52	0.52	
27B to 27C	1.304	0.61	0.05	1.23	0	15.0	0.007	CSPA 7	1.39	0.97	1	1.304	1.06	----	0.90	0.87	0.9	0.22	0.45	0.71	0.66	0.71	0.11	0.82	0.87	
22 to 19	2.573	0.38	0.05	1.35	0	20.0	0.005	CSPA 5	1.03	0.74	2	1.287	0.61	----	1.75	1.30	0.9	0.74	0.51	0.63	0.43	0.63	0.10	1.27	1.30	

2 From Form PH-D-533, col. 12
3 Flood Depth
4 Embedment below channel invert
5 Col. 3 + col. 4 + allowable backwater
7 Allowance for skew if applicable
8 Culvert Slope
10a/b D (circular) or B x H (arch)
11 Number of Barrels
13 Area per barrel
14 For box only
15 Charts D5-1A to C and E to J
16 HW = col. 15 x D (col. 10)
17 Chart D5-8
18 Charts D5-2A to G
19 Charts D5-3A to F: (d_c > D)
21 Col. 3 + col. 4
22 H_o = larger of cols. 20 and 21
23 Col. 7 x col. 8
24 HW = col. 18 + col. 22 - col. 23
25 Larger of cols 16 and 24
26 Outlet velocity if required (Subsection 3.2.3)

C

Appendix C - Stormwater Management and Storm Sewer Design Calculations

EVALUATION OF RUNOFF COEFFICIENTS

Client: Fastfrate (Ottawa) Holdings Inc.
Project: Fastfrate Warehouse Development
Location: Ottawa, Ontario
Project #: A001083
Project Status:

Area	Grassed Area (m²)	Runoff Coefficient	Hard Surface Area (m²)	Runoff Coefficient	Total Area (m²)	Runoff Coefficient (10-year event)	Runoff Coefficient (100-year)
A0	3869	0.20	0	0.90	3869	0.20	0.25
TOTAL - Christie Creek	3869		0		3869	0.20	0.25
A1	2073	0.20	5573	0.90	7646	0.71	0.89
A2	2121	0.20	10017	0.83	12138	0.72	0.90
A3	0	0.20	8582	0.90	8582	0.90	0.95
A4	705	0.20	781	0.90	1486	0.57	0.71
A5	0	0.20	1069	0.90	1069	0.90	0.95
A6	3917	0.20	266	0.90	4183	0.24	0.31
A7	820	0.20	676	0.90	1496	0.52	0.65
TOTAL - Somme Street SWMF	9636		26964		36600	0.70	0.87

Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: 2021-07-20
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng.   Date: 2021-07-20
PEO No.: 100067842

\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Runoff Coefficients.xlsx]TABLEAU

PROJECT NAME:	Fastfrate Warehouse Development Industrial/Commercial Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate
PROJECT STATUS:	Detailed Design

STORM POST-DEVELOPMENT FLOW (UNCONTROLLED)
Proposed Stormwater Management

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

PRE-DEVELOPMENT FLOW DETERMINATION:
DESIGN CRITERIA:

Design Storm (year):	10	
IDF Regression Constants: (a)	1174.184	
(b)	6.014	
(c)	0.816	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area

ALLOWABLE RELEASE RATE - SUMMARY:

Catchment ID	Area (A) ha	Runoff Coefficient (C)	Time of Concentration (tc) min	Intensity (I) mm/hr	Allowable Release Rate (Q) L/s	Release Flow Per Unit Area (Q/ha) L/s/ha
A1	0.76	0.71	22.85	75.52	**113.92**	**149.00**
A2	1.21	0.72	22.85	75.52	**183.32**	**151.03**
A3	0.86	0.90	22.85	75.52	**162.04**	**188.81**
A4	0.15	0.57	22.85	75.52	**17.70**	**119.14**
A5	0.11	0.90	22.85	75.52	**20.18**	**188.81**
A6	0.49	0.24	22.85	75.52	**24.47**	**50.35**
A7	0.15	0.52	22.85	75.52	**16.32**	**109.09**
Total	**3.73**				**537.956**	**144.31**

NOTES:
1. Time of concentration taken from SWM report (JL Richards, 2009). It is assumed that the resulting time of concentration is identical to JL Richards SWM report.
2. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)

Prepared by: Guillaume LeBlond, M.A.Sc., EI' Date: July 20, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 20, 2021
PEO No.: 100067842

PROJECT NAME:	Fastfrate Warehouse Development Industrial/Commercial Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate
PROJECT STATUS:	Detailed Design

STORM POST-DEVELOPMENT FLOW (CONTROLLED)
Per Master Stormwater Management Report (J.L. Richards, 2009)

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

PRE-DEVELOPMENT FLOW DETERMINATION:
DESIGN CRITERIA:

Design Storm (year):	10	
IDF Regression Constants: (a)	1174.184	
(b)	6.014	
(c)	0.816	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area

ALLOWABLE RELEASE RATE - SUMMARY:

Catchment ID	Area (A) ha	Runoff Coefficient (C)	Time of Concentration (tc) min	Intensity (I) mm/hr	Allowable Release Rate (Q) L/s	Release Flow Per Unit Area (Q/ha) L/s/ha
Total Site Area Draining to SWMF per JLR 2009 SWM	3.05	0.70	22.85	75.52	**448.57**	**146.85**
Total	**3.05**				**448.567**	**146.85**
Revised Total Area	**3.73**				**448.567**	**120.33**

NOTES:
1. Time of concentration taken from SWM report (JL Richards, 2009).
2. Runoff coefficients taken from SWM report (JL Richards, 2009).
3. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)

Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 20, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 20, 2021
PEO No.: 100067842

PROJECT NAME:	Fastfrate Warehouse Development Industrial/Commercial Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate
PROJECT STATUS:	Detailed Design

STORM POST-DEVELOPMENT FLOW (UNCONTROLLED)
Proposed Stormwater Management

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

PRE-DEVELOPMENT FLOW DETERMINATION:

DESIGN CRITERIA:

Design Storm (year):	100	
IDF Regression Constants: (a)	1735.688	
(b)	6.014	
(c)	0.820	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area

ALLOWABLE RELEASE RATE - SUMMARY:

Catchment ID	Area (A) ha	Runoff Coefficient (C) (factored)	Time of Concentration (tc) min	Intensity (I) mm/hr	Allowable Release Rate (Q) L/s	Release Flow Per Unit Area (Q/ha) L/s/ha
A1	0.76	0.89	19.43	122.15	230.315	**301.22**
A2	1.21	0.90	19.43	122.15	370.618	**305.34**
A3	0.86	0.95	19.43	122.15	276.631	**322.34**
A4	0.15	0.71	19.43	122.15	35.792	**240.86**
A5	0.11	0.95	19.43	122.15	34.458	**322.34**
A6	0.42	0.31	19.43	122.15	43.999	**105.18**
A7	0.15	0.65	19.43	122.15	32.994	**220.55**
Total	**3.66**				**1024.808**	**280.00**

NOTES:

1. Time of concentration taken from SWM report (JL Richards, 2009). It is assumed that the resulting time of concentration is identical to JL Richards SWM report.
2. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)
3. Runoff coefficients are increased by 25% for the 100y storm per City of Ottawa Sewer Design Guidelines.

Prepared by: Guillaume LeBlond, M.A.Sc., EI' Date: July 20, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 20, 2021
PEO No.: 100067842

PROJECT NAME:	Fastfrate Warehouse Development Industrial/Commercial Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate
PROJECT STATUS:	Detailed Design

STORM POST-DEVELOPMENT FLOW (CONTROLLED)
Per Master Stormwater Management Report (J.L. Richards, 2009)

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

PRE-DEVELOPMENT FLOW DETERMINATION:
DESIGN CRITERIA:

Design Storm (year):	100	
IDF Regression Constants: (a)	1735.688	
(b)	6.014	
(c)	0.820	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area

ALLOWABLE RELEASE RATE - SUMMARY:

Catchment ID	Area (A) ha	Runoff Coefficient (C) (factored)	Time of Concentration (tc) min	Intensity (I) mm/hr	Allowable Release Rate (Q) L/s	Release Flow Per Unit Area (Q/ha) L/s/ha
Total Site Area Draining to SWMF per JLR 2009 SWM	3.05	0.70	19.43	122.15	**906.87**	**296.89**
Total	**3.05**				**906.867**	**296.89**
Revised Total Area	**3.66**				**906.867**	**247.78**

NOTES:
1. Time of concentration taken from SWM report (JL Richards, 2009).
2. Runoff coefficients taken from SWM report (JL Richards, 2009).
3. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)
4. Runoff coefficients are increased by 25% for the 100y storm per City of Ottawa Sewer Design Guidelines.

Prepared by: Guillaume LeBlond, M.A.Sc., EI' Date: July 20, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 20, 2021
PEO No.: 100067842

PROJECT NAME:	Fastfrate Warehouse Development Industrial/Commercial Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate
PROJECT STATUS:	Detailed Design

STORM POST-DEVELOPMENT FLOW (CONTROLLED)
Per Master Stormwater Management Report (J.L. Richards, 2009)

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

PRE-DEVELOPMENT FLOW DETERMINATION:
DESIGN CRITERIA:

Design Storm (year):	100	
IDF Regression Constants: (a)	1735.688	
(b)	6.014	
(c)	0.820	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area

ALLOWABLE RELEASE RATE - SUMMARY:

Catchment ID	Area (A) ha	Runoff Coefficient (C) (factored)	Time of Concentration (tc) min	Intensity (I) mm/hr	Allowable Release Rate (Q) L/s	Release Flow Per Unit Area (Q/ha) L/s/ha
East Side Somme Street	0.32	0.88	15.00	142.89	111.140	**347.31**
South Side Rideau Road	0.58	0.25	26.12	100.87	40.628	**70.05**
East Side Somme Street (Revised	0.00	0.88	15.00	142.89	0.000	**#DIV/0!**
South Side Rideau Road (Revised	0.26	0.25	26.12	100.87	18.072	**70.05**
Total	**0.90**				**151.768**	**168.63**
Revised Total Area	**0.26**			**Actual Release Rate:**	**18.072**	**70.05**
				Residual Release Rate:	**133.695**	

NOTES:
1. Time of concentration taken from SWM report (JL Richards, 2009).
2. Runoff coefficients taken from SWM report (JL Richards, 2009).
3. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)
4. Runoff coefficients are increased by 25% for the 100y storm per City of Ottawa Sewer Design Guidelines.

Prepared by: Guillaume LeBlond, M.A.Sc., EI
PEO No.: 100530467
Date: July 21, 2021

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PEO No.: 100067842
Date: July 21, 2021

Date: 2021-09-21

Fastfrate Warehouse Development
Industrial/Commercial Development
A001083 (360)
STORM WATER MANAGEMENT - SUMMARY - FULL RELEASE RATE

Rainfall event 100 years

Sub-Area	Total Area (m^2)	Capacity Area (m^2)	Catchbasin Elev. (m)	Max. Elev. (m)	Y_{max} (m)	V_{max} (m^3)	V_{rain} (m^3)	Difference (m^3)	V_{acc} (m^3)	Y_{rain} (m)	$Elev_{rain}$ (m)	A_{rain} (m^2)	Q_{ave} (L/s)	Drawdown Time (min)	Comments
A1	7646	2294	10.000	10.001	0.001	0.76	90.96	-90.19	0.76	0.00	10.001	2294	184.958	0	
A2	12138	3641	10.000	10.001	0.001	1.21	148.91	-147.69	1.21	0.00	10.001	3641	293.620	0	
A3 - Building	8582	8582	10.000	10.050	0.050	143.03	115.04	27.99	115.04	0.04	10.045	7697	211.136	9	
A4	1486	446	10.000	10.001	0.001	0.15	10.63	-10.48	0.15	0.00	10.001	446	35.947	0	
A5	1069	321	10.000	10.001	0.001	0.11	14.71	-14.60	0.11	0.00	10.001	321	25.859	0	
A6	4860	1458	10.000	10.001	0.001	0.49	6.50	-6.02	0.49	0.00	10.001	1458	117.564	0	
A7	1497	449	10.000	10.001	0.001	0.15	8.82	-8.67	0.15	0.00	10.001	449	36.213	0	
Total	37278	17191				145.90	395.55	-249.65	117.91						

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Legend:

NC	= Non-controlled areas (no storage available)
Capacity Area	= Area of water accumulated in sub-area at Max. Elev.
Catchbasin Elev.	= Elevation of catchbasin inlet (top of grate).
Max. Elev.	= Maximum elevation of water that may be accumulated within sub-area.
Y_{max}	= Maximum depth of water that may be accumulated within the sub-area.
V_{max}	= Maximum volume of water (capacity) that may be accumulated within the sub-area.
V_{rain}	= Volume of water generated by rainfall.
Difference	= Difference between V_{max} and V_{rain} (remaining capacity of sub-area)
V_{acc}	= Total volume of water accumulated within the sub-area in the event of a specific rainfall.
Y_{rain}	= Depth of water generated by rainfall.
$Elev_{rain}$	= Elevation of water generated by rainfall.
A_{rain}	= Area of water generated by rainfall.
Q_{ave}	= Average flow (for drawdown time calculation).
Drawdown Time	= Time required for the total volume of water accumulated within sub-area to evacuate (following rainfall event).

Design Criteria:

1) Maximum Allowable Release Rate = 247.78 L/s/ha
2) ~~Pipe size for 10 years~~
3) Rainfall event of 100 years
4) ~~Pre-development flow (5 year) = ____ L/s (or ____ L/s/ha)~~

Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 22, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 22, 2021
PEO No.: 100067842

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Industrial/Commercial Development

A001083 (360)

STORM WATER MANAGEMENT - AVERAGE FLOW CALCULATION FOR DRAWDOWN TIME

Date: **2021-09-21**

Catchment ID	Release Rate	Specified Flow rate	Calculated area
	L/s/ha	L/s	(mm^2)
A1	241.93	184.98	50482
A2	241.93	293.66	80140
A3 - Building	247.78	212.65	57299
A4	241.93	35.95	9811
A5	241.93	25.86	7058
A6	241.93	117.58	32088
A7	241.93	36.22	9884
	Total Flowrate	906.90	

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Préparé par: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

Vérifié par: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210719_Storm Water Management - Storage and Drawdown_full RR.xlsx]A1*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9332667 L/s/ha

Area : A1 0.7646 ha
Runoff Coefficient C (unfactored 0.71
C_runoff factor: 1.25
Runoff Coefficient C : 0.8875
Rainfall Event : 100 year
Discharge Flow Q : 0.184982176 m³/s
Discharge Factor K : 1

Design Volume:	**90.96 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.810	0.810	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.820	0.820	0.820	0.820

Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 22, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 22, 2021
PEO No.: 100067842

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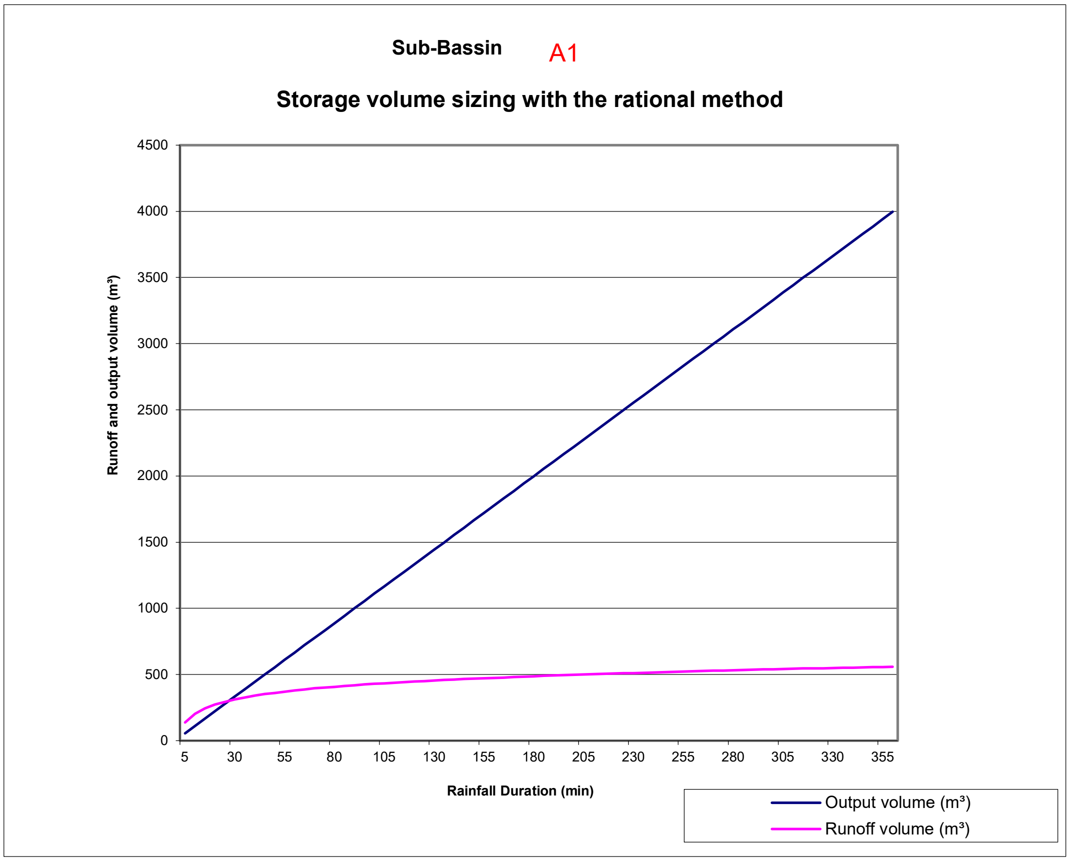
Rainfall Duration (min) T (1)	Rainfall Intensity (mm/h) I (2)	Runoff Volume (m^3) $CIAT$ (4)	Output Volume (m^3) kQT (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	137.25	55.4946527	81.75
10.0	178.56	201.95	110.989305	90.96
15.0	142.89	242.41	166.483958	75.93
20.0	119.95	271.32	221.978611	49.34
25.0	103.85	293.62	277.473264	16.15
30.0	91.87	311.70	332.967916	-21.27
35.0	82.58	326.88	388.462569	-61.58
40.0	75.15	339.95	443.957222	-104.01
45.0	69.05	351.42	499.451874	-148.03
50.0	63.95	361.65	554.946527	-193.30
55.0	59.62	370.88	610.44118	-239.56
60.0	55.89	379.29	665.935833	-286.64
65.0	52.65	387.02	721.430485	-334.41
70.0	49.79	394.17	776.925138	-382.75
75.0	47.26	400.83	832.419791	-431.59
80.0	44.99	407.07	887.914443	-480.85
85.0	42.95	412.93	943.409096	-530.48
90.0	41.11	418.46	998.903749	-580.45
95.0	39.43	423.70	1054.3984	-630.70
100.0	37.90	428.67	1109.89305	-681.22
105.0	36.50	433.41	1165.38771	-731.97
110.0	35.20	437.94	1220.88236	-782.94
115.0	34.01	442.28	1276.37701	-834.10
120.0	32.89	446.44	1331.87167	-885.43
125.0	31.86	450.44	1387.36632	-936.93
130.0	30.90	454.28	1442.86097	-988.58
135.0	30.00	458.00	1498.35562	-1040.36
140.0	29.15	461.58	1553.85028	-1092.27
145.0	28.36	465.05	1609.34493	-1144.30
150.0	27.61	468.40	1664.83958	-1196.44
155.0	26.91	471.66	1720.33423	-1248.68
160.0	26.24	474.81	1775.82889	-1301.01
165.0	25.61	477.88	1831.32354	-1353.44
170.0	25.01	480.87	1886.81819	-1405.95
175.0	24.44	483.77	1942.31285	-1458.54
180.0	23.90	486.60	1997.8075	-1511.21
185.0	23.39	489.35	2053.30215	-1563.95
190.0	22.90	492.04	2108.7968	-1616.76
195.0	22.43	494.67	2164.29146	-1669.63
200.0	21.98	497.23	2219.78611	-1722.56
205.0	21.55	499.74	2275.28076	-1775.54
210.0	21.14	502.19	2330.77541	-1828.59
215.0	20.75	504.59	2386.27007	-1881.68
220.0	20.37	506.94	2441.76472	-1934.83
225.0	20.01	509.24	2497.25937	-1988.02
230.0	19.66	511.50	2552.75402	-2041.26
235.0	19.33	513.71	2608.24868	-2094.54
240.0	19.01	515.88	2663.74333	-2147.87

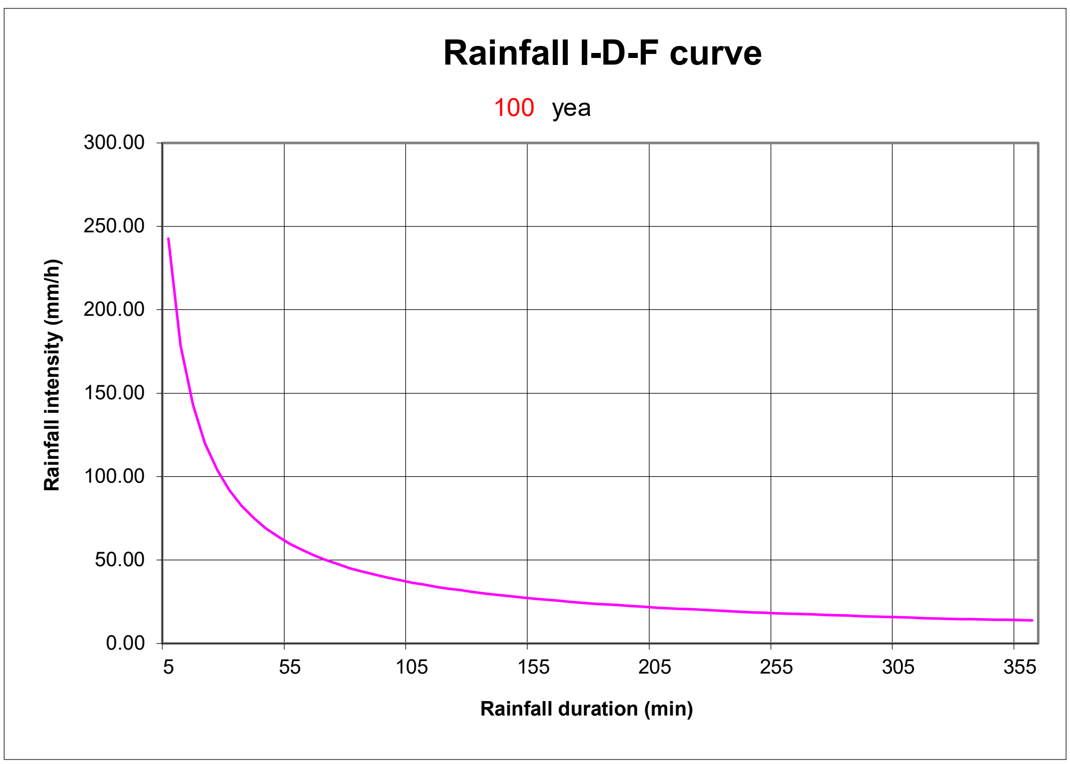
Init.________

245.0	18.69	518.01	2719.23798	-2201.23
250.0	18.39	520.10	2774.73264	-2254.63
255.0	18.11	522.15	2830.22729	-2308.07
260.0	17.83	524.17	2885.72194	-2361.55
265.0	17.56	526.16	2941.21659	-2415.06
270.0	17.29	528.11	2996.71125	-2468.60
275.0	17.04	530.03	3052.2059	-2522.18
280.0	16.80	531.92	3107.70055	-2575.78
285.0	16.56	533.78	3163.1952	-2629.42
290.0	16.33	535.61	3218.68986	-2683.08
295.0	16.11	537.41	3274.18451	-2736.78
300.0	15.89	539.18	3329.67916	-2790.50
305.0	15.68	540.93	3385.17382	-2844.24
310.0	15.48	542.66	3440.66847	-2898.01
315.0	15.28	544.36	3496.16312	-2951.81
320.0	15.09	546.03	3551.65777	-3005.62
325.0	14.90	547.69	3607.15243	-3059.47
330.0	14.72	549.32	3662.64708	-3113.33
335.0	14.54	550.93	3718.14173	-3167.21
340.0	14.37	552.52	3773.63638	-3221.12
345.0	14.20	554.08	3829.13104	-3275.05
350.0	14.04	555.63	3884.62569	-3328.99
355.0	13.88	557.16	3940.12034	-3382.96
360.0	13.72	558.67	3995.615	-3436.94
Max Volume (V max):				90.96
Design Volume (V design) :				**90.96**

Init.________

Fastfrate Warehouse Development
Industrial/Commercial Development





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STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9332667 L/s/ha

Area :	A2	1.2138	ha
Runoff Coefficient C (unfactored		0.72	
C_runoff factor:		1.25	
Runoff Coefficient C :		0.9	
Rainfall Event :		100	year
Discharge Flow Q :		0.293658599	m^3/s
Discharge Factor K :		1	

Design Volume:	**148.91**	**m^3**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

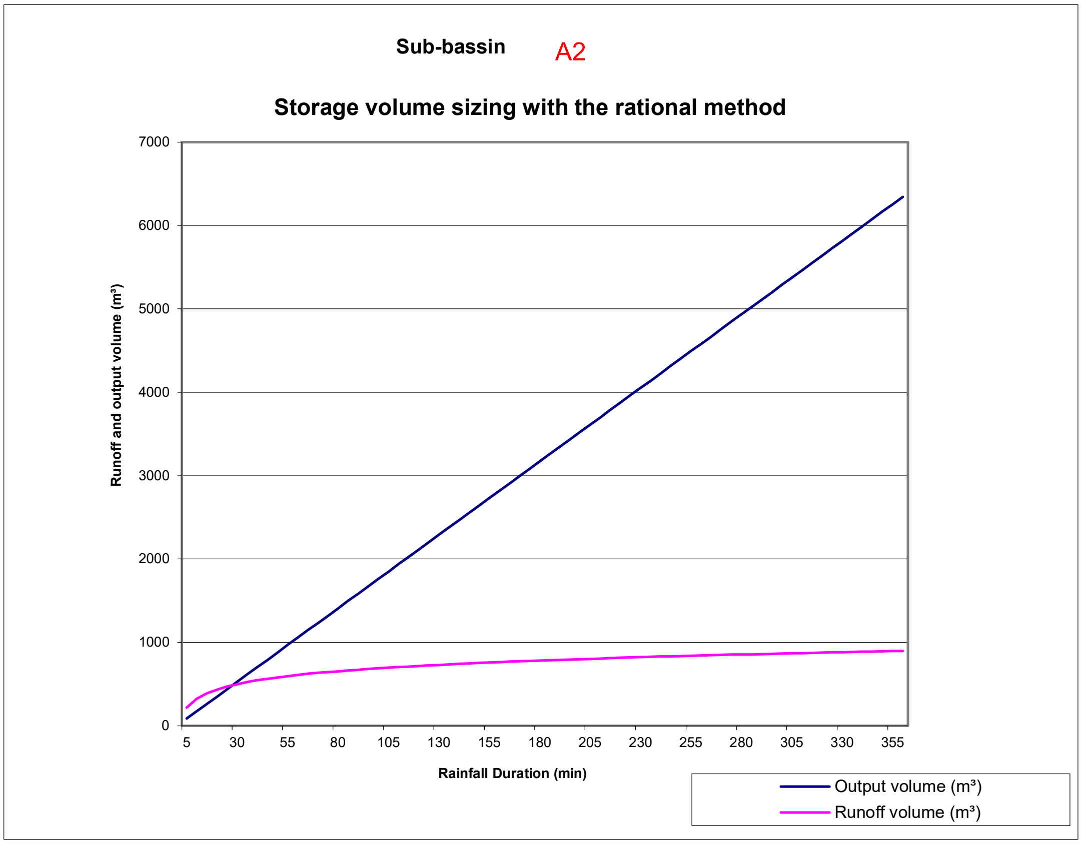
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

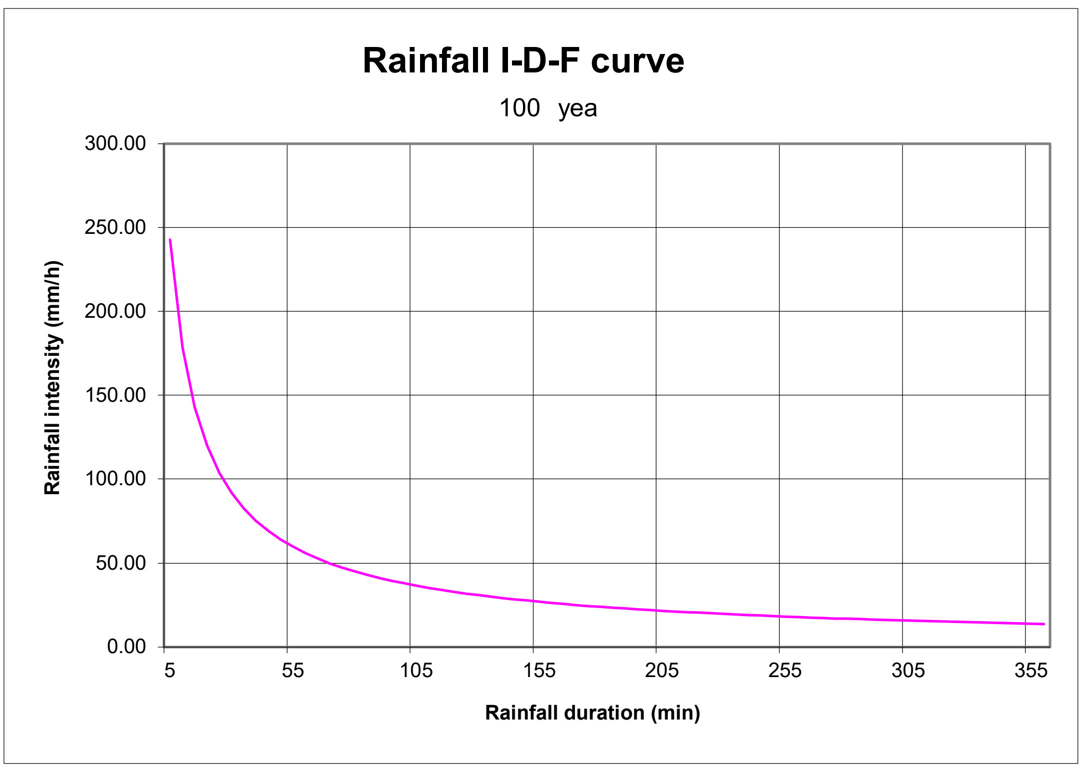
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

Rainfall Duration (min) T (1)	Rainfall Intensity (mm/h) I (2)	Runoff Volume (m³) $CIAT$ (4)	Output Volume (m³) kQT (5)	Retention Volume (m³) *(4)-(5)* (6)
5.0	242.70	220.95	88.0975797	132.85
10.0	178.56	325.10	176.195159	148.91
15.0	142.89	390.25	264.292739	125.96
20.0	119.95	436.79	352.390319	84.40
25.0	103.85	472.69	440.487899	32.20
30.0	91.87	501.79	528.585478	-26.79
35.0	82.58	526.23	616.683058	-90.46
40.0	75.15	547.27	704.780638	-157.51
45.0	69.05	565.74	792.878218	-227.14
50.0	63.95	582.21	880.975797	-298.77
55.0	59.62	597.06	969.073377	-372.01
60.0	55.89	610.60	1057.17096	-446.57
65.0	52.65	623.05	1145.26854	-522.22
70.0	49.79	634.56	1233.36612	-598.80
75.0	47.26	645.29	1321.4637	-676.18
80.0	44.99	655.32	1409.56128	-754.24
85.0	42.95	664.75	1497.65886	-832.91
90.0	41.11	673.66	1585.75644	-912.10
95.0	39.43	682.09	1673.85402	-991.77
100.0	37.90	690.10	1761.95159	-1071.85
105.0	36.50	697.73	1850.04917	-1152.32
110.0	35.20	705.02	1938.14675	-1233.12
115.0	34.01	712.00	2026.24433	-1314.24
120.0	32.89	718.70	2114.34191	-1395.64
125.0	31.86	725.14	2202.43949	-1477.30
130.0	30.90	731.33	2290.53707	-1559.20
135.0	30.00	737.31	2378.63465	-1641.33
140.0	29.15	743.08	2466.73223	-1723.65
145.0	28.36	748.66	2554.82981	-1806.17
150.0	27.61	754.06	2642.92739	-1888.87
155.0	26.91	759.30	2731.02497	-1971.72
160.0	26.24	764.38	2819.12255	-2054.74
165.0	25.61	769.32	2907.22013	-2137.90
170.0	25.01	774.12	2995.31771	-2221.19
175.0	24.44	778.80	3083.41529	-2304.62
180.0	23.90	783.35	3171.51287	-2388.16
185.0	23.39	787.79	3259.61045	-2471.82
190.0	22.90	792.12	3347.70803	-2555.59
195.0	22.43	796.34	3435.80561	-2639.46
200.0	21.98	800.47	3523.90319	-2723.43
205.0	21.55	804.50	3612.00077	-2807.50
210.0	21.14	808.45	3700.09835	-2891.65
215.0	20.75	812.31	3788.19593	-2975.88
220.0	20.37	816.10	3876.29351	-3060.20
225.0	20.01	819.80	3964.39109	-3144.59
230.0	19.66	823.43	4052.48867	-3229.05
235.0	19.33	827.00	4140.58625	-3313.59
240.0	19.01	830.49	4228.68383	-3398.19

245.0	18.69	833.92	4316.78141	-3482.86
250.0	18.39	837.29	4404.87899	-3567.59
255.0	18.11	840.59	4492.97657	-3652.38
260.0	17.83	843.84	4581.07415	-3737.23
265.0	17.56	847.04	4669.17173	-3822.13
270.0	17.29	850.18	4757.26931	-3907.09
275.0	17.04	853.27	4845.36689	-3992.10
280.0	16.80	856.31	4933.46447	-4077.16
285.0	16.56	859.30	5021.56205	-4162.26
290.0	16.33	862.25	5109.65962	-4247.41
295.0	16.11	865.15	5197.7572	-4332.61
300.0	15.89	868.01	5285.85478	-4417.85
305.0	15.68	870.82	5373.95236	-4503.13
310.0	15.48	873.60	5462.04994	-4588.45
315.0	15.28	876.34	5550.14752	-4673.81
320.0	15.09	879.04	5638.2451	-4759.21
325.0	14.90	881.70	5726.34268	-4844.65
330.0	14.72	884.32	5814.44026	-4930.12
335.0	14.54	886.91	5902.53784	-5015.62
340.0	14.37	889.47	5990.63542	-5101.16
345.0	14.20	892.00	6078.733	-5186.74
350.0	14.04	894.49	6166.83058	-5272.34
355.0	13.88	896.95	6254.92816	-5357.98
360.0	13.72	899.38	6343.02574	-5443.64
Max Volume (V max):				148.91
Design Volume (V design) :				**148.91**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 247.7840805 L/s/ha

Area : A3 - Building 0.8582 ha
Runoff Coefficient C (unfactored): 0.9
C_runoff factor: -
Runoff Coefficient C : 0.95
Rainfall Event : 100 year
Discharge Flow Q : 0.212648298 m³/s
Discharge Factor K : 1

Design Volume: **115.04 m³**

Rainfall Pluviometry Coefficients	2 year		5 year		10 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall Pluviometry Coefficients	25 year		50 year		100 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

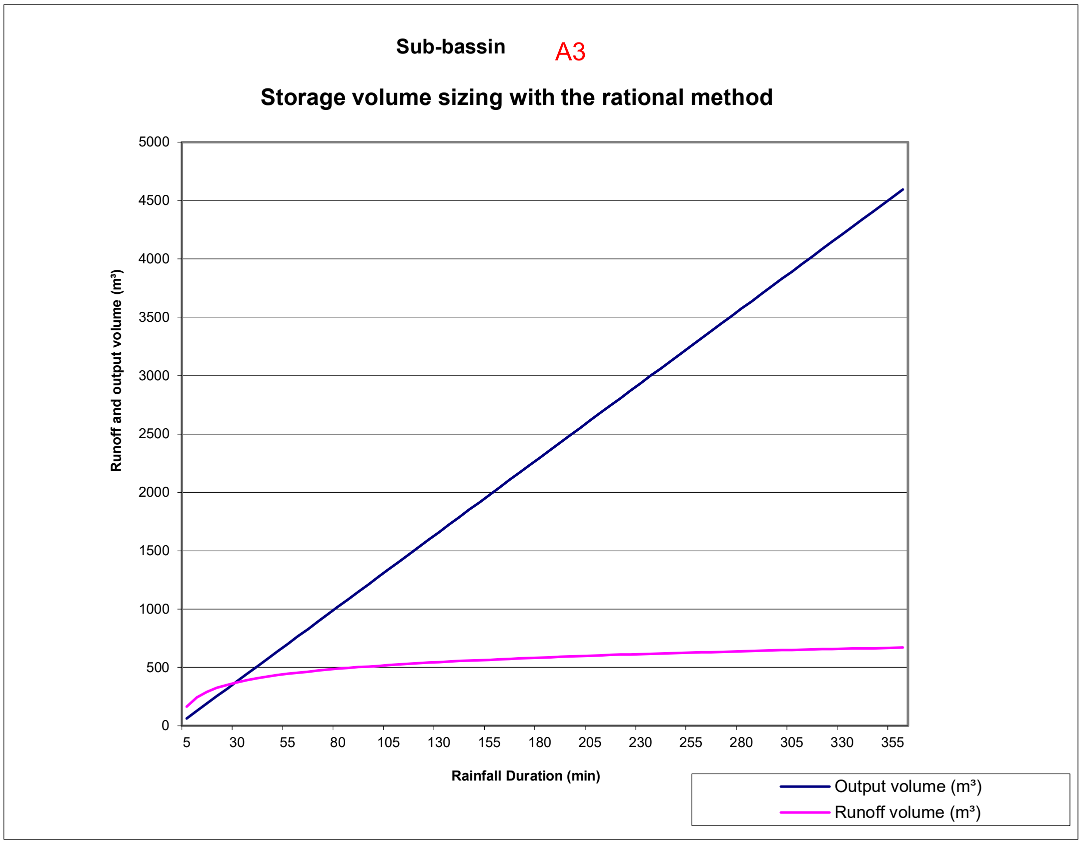
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 22, 2021
PEO No.: 100530467

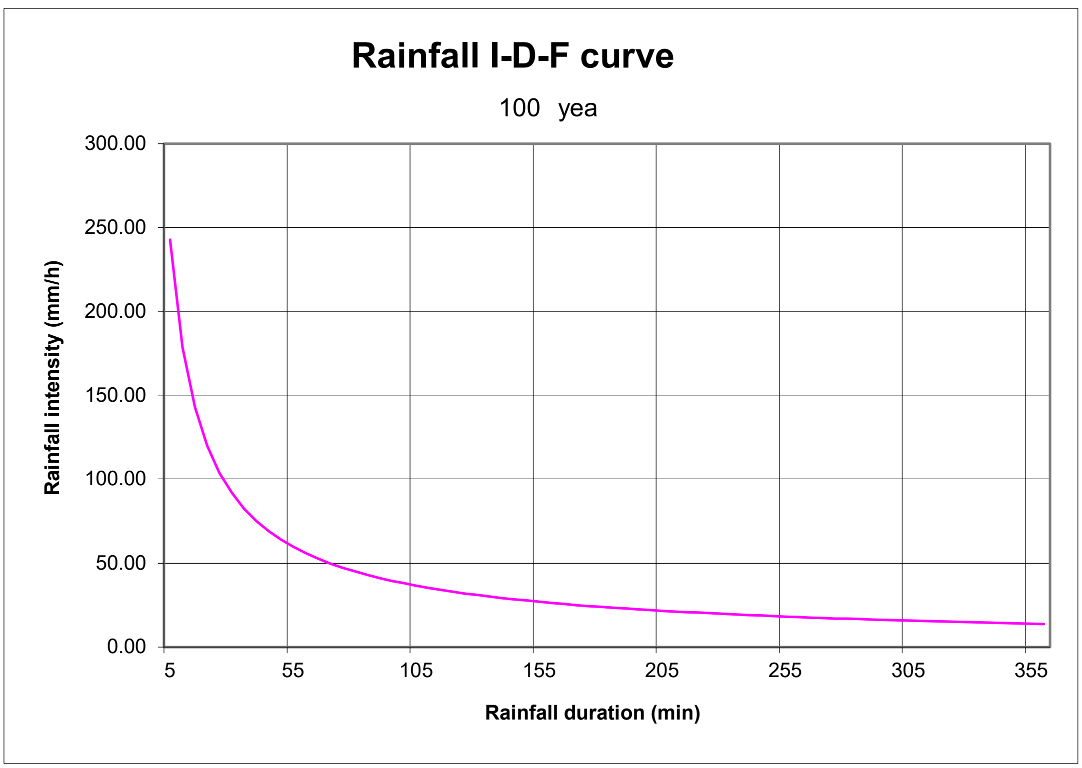
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 22, 2021
PEO No.: 100067842

Rainfall Duration (min) T (1)	Rainfall Intensity (mm/h) I (2)	Runoff Volume (m^3) $CIAT$ (4)	Output Volume (m^3) kQT (5)	Retention Volume (m^3) (4)-(5) (6)
5.0	242.70	164.90	63.7944894	101.10
10.0	178.56	242.63	127.588979	115.04
15.0	142.89	291.25	191.383468	99.87
20.0	119.95	325.98	255.177957	70.80
25.0	103.85	352.77	318.972447	33.80
30.0	91.87	374.50	382.766936	-8.27
35.0	82.58	392.73	446.561426	-53.83
40.0	75.15	408.43	510.355915	-101.92
45.0	69.05	422.22	574.150404	-151.93
50.0	63.95	434.51	637.944894	-203.44
55.0	59.62	445.60	701.739383	-256.14
60.0	55.89	455.70	765.533872	-309.83
65.0	52.65	464.99	829.328362	-364.34
70.0	49.79	473.58	893.122851	-419.54
75.0	47.26	481.59	956.91734	-475.33
80.0	44.99	489.08	1020.71183	-531.64
85.0	42.95	496.12	1084.50632	-588.39
90.0	41.11	502.76	1148.30081	-645.54
95.0	39.43	509.05	1212.0953	-703.04
100.0	37.90	515.03	1275.88979	-760.86
105.0	36.50	520.73	1339.68428	-818.95
110.0	35.20	526.17	1403.47877	-877.31
115.0	34.01	531.38	1467.27326	-935.89
120.0	32.89	536.38	1531.06774	-994.69
125.0	31.86	541.18	1594.86223	-1053.68
130.0	30.90	545.80	1658.65672	-1112.85
135.0	30.00	550.26	1722.45121	-1172.19
140.0	29.15	554.57	1786.2457	-1231.67
145.0	28.36	558.74	1850.04019	-1291.30
150.0	27.61	562.77	1913.83468	-1351.07
155.0	26.91	566.68	1977.62917	-1410.95
160.0	26.24	570.47	2041.42366	-1470.95
165.0	25.61	574.16	2105.21815	-1531.06
170.0	25.01	577.74	2169.01264	-1591.27
175.0	24.44	581.23	2232.80713	-1651.58
180.0	23.90	584.63	2296.60162	-1711.98
185.0	23.39	587.94	2360.39611	-1772.46
190.0	22.90	591.17	2424.1906	-1833.02
195.0	22.43	594.32	2487.98509	-1893.66
200.0	21.98	597.40	2551.77957	-1954.38
205.0	21.55	600.41	2615.57406	-2015.16
210.0	21.14	603.36	2679.36855	-2076.01
215.0	20.75	606.24	2743.16304	-2136.92
220.0	20.37	609.07	2806.95753	-2197.89
225.0	20.01	611.83	2870.75202	-2258.92
230.0	19.66	614.54	2934.54651	-2320.00
235.0	19.33	617.20	2998.341	-2381.14
240.0	19.01	619.81	3062.13549	-2442.33

245.0	18.69	622.37	3125.92998	-2503.56
250.0	18.39	624.88	3189.72447	-2564.84
255.0	18.11	627.35	3253.51896	-2626.17
260.0	17.83	629.77	3317.31345	-2687.54
265.0	17.56	632.16	3381.10794	-2748.95
270.0	17.29	634.50	3444.90243	-2810.40
275.0	17.04	636.81	3508.69691	-2871.89
280.0	16.80	639.08	3572.4914	-2933.41
285.0	16.56	641.31	3636.28589	-2994.98
290.0	16.33	643.51	3700.08038	-3056.57
295.0	16.11	645.67	3763.87487	-3118.20
300.0	15.89	647.81	3827.66936	-3179.86
305.0	15.68	649.91	3891.46385	-3241.55
310.0	15.48	651.98	3955.25834	-3303.28
315.0	15.28	654.02	4019.05283	-3365.03
320.0	15.09	656.04	4082.84732	-3426.81
325.0	14.90	658.02	4146.64181	-3488.62
330.0	14.72	659.98	4210.4363	-3550.45
335.0	14.54	661.92	4274.23079	-3612.31
340.0	14.37	663.83	4338.02528	-3674.20
345.0	14.20	665.71	4401.81977	-3736.11
350.0	14.04	667.57	4465.61426	-3798.04
355.0	13.88	669.41	4529.40874	-3860.00
360.0	13.72	671.22	4593.20323	-3921.98
Max Volume (V max):				115.04
Design Volume (V design) :				**115.04**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9332667 L/s/ha

Area : A4 0.1486 ha
Runoff Coefficient C (unfactored 0.57
C_runoff factor: 1.25
Runoff Coefficient C : 0.7125
Rainfall Event : 100 year
Discharge Flow Q : 0.035951283 m³/s
Discharge Factor K : 1

Design Volume:	**10.63 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

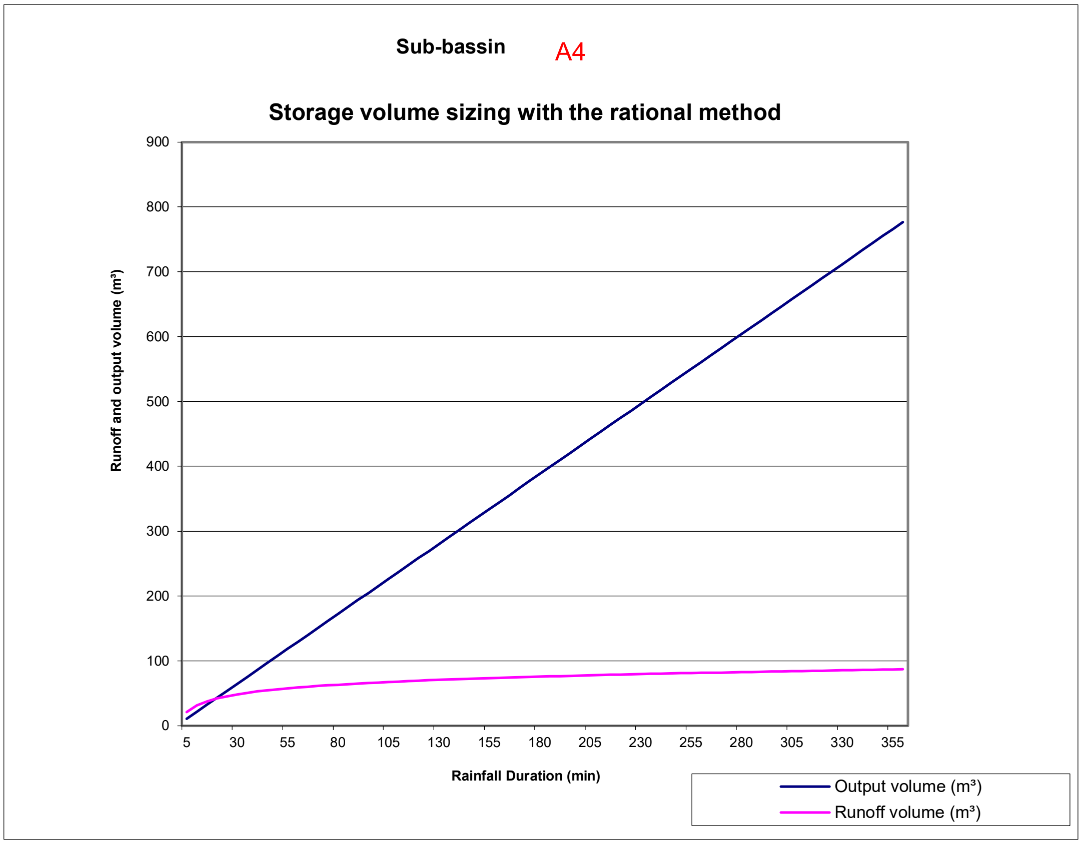
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 22, 2021
PEO No.: 100530467

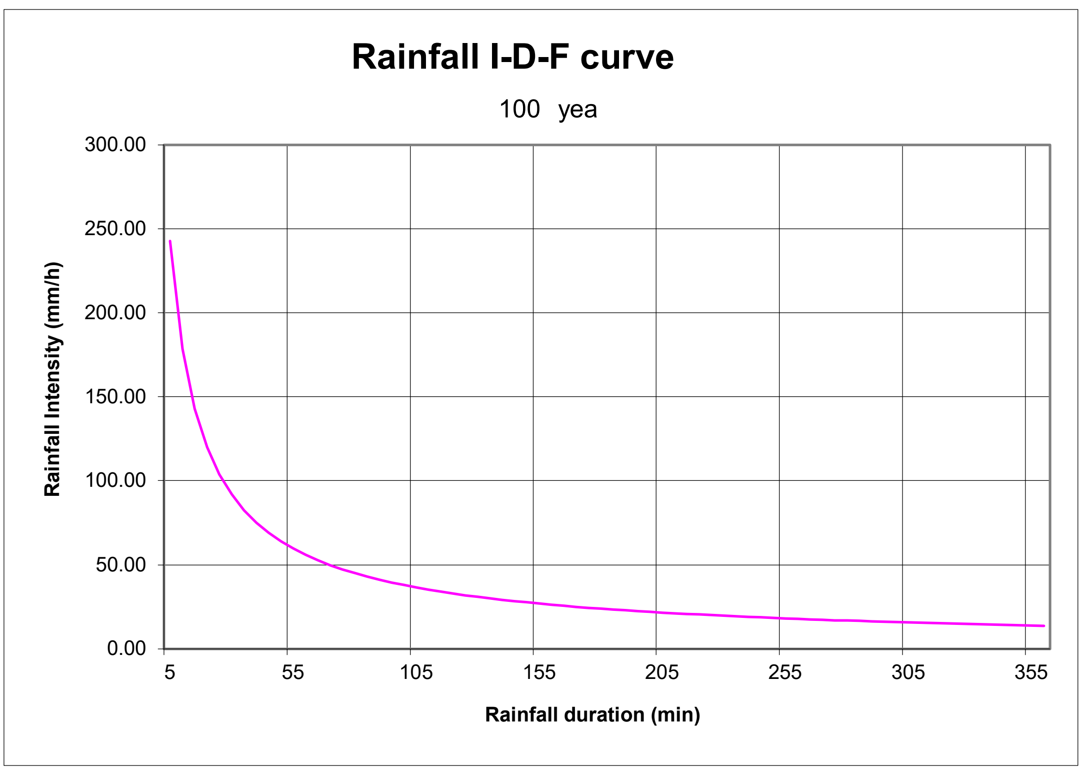
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 22, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m^3) *CIAT* (4)	Output Volume (m^3) *kQT* (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	21.41	10.785385	10.63
10.0	178.56	31.51	21.5707701	9.94
15.0	142.89	37.82	32.3561551	5.47
20.0	119.95	42.33	43.1415401	-0.81
25.0	103.85	45.81	53.9269251	-8.11
30.0	91.87	48.63	64.7123102	-16.08
35.0	82.58	51.00	75.4976952	-24.50
40.0	75.15	53.04	86.2830802	-33.24
45.0	69.05	54.83	97.0684653	-42.24
50.0	63.95	56.43	107.85385	-51.43
55.0	59.62	57.87	118.639235	-60.77
60.0	55.89	59.18	129.42462	-70.24
65.0	52.65	60.39	140.210005	-79.82
70.0	49.79	61.50	150.99539	-89.49
75.0	47.26	62.54	161.780775	-99.24
80.0	44.99	63.51	172.56616	-109.05
85.0	42.95	64.43	183.351546	-118.92
90.0	41.11	65.29	194.136931	-128.85
95.0	39.43	66.11	204.922316	-138.81
100.0	37.90	66.88	215.707701	-148.82
105.0	36.50	67.62	226.493086	-158.87
110.0	35.20	68.33	237.278471	-168.95
115.0	34.01	69.01	248.063856	-179.06
120.0	32.89	69.66	258.849241	-189.19
125.0	31.86	70.28	269.634626	-199.35
130.0	30.90	70.88	280.420011	-209.54
135.0	30.00	71.46	291.205396	-219.75
140.0	29.15	72.02	301.990781	-229.97
145.0	28.36	72.56	312.776166	-240.22
150.0	27.61	73.08	323.561551	-250.48
155.0	26.91	73.59	334.346936	-260.76
160.0	26.24	74.08	345.132321	-271.05
165.0	25.61	74.56	355.917706	-281.35
170.0	25.01	75.03	366.703091	-291.67
175.0	24.44	75.48	377.488476	-302.01
180.0	23.90	75.92	388.273861	-312.35
185.0	23.39	76.35	399.059246	-322.71
190.0	22.90	76.77	409.844631	-333.07
195.0	22.43	77.18	420.630016	-343.45
200.0	21.98	77.58	431.415401	-353.83
205.0	21.55	77.97	442.200786	-364.23
210.0	21.14	78.36	452.986171	-374.63
215.0	20.75	78.73	463.771556	-385.04
220.0	20.37	79.10	474.556941	-395.46
225.0	20.01	79.46	485.342326	-405.89
230.0	19.66	79.81	496.127711	-416.32
235.0	19.33	80.15	506.913096	-426.76
240.0	19.01	80.49	517.698481	-437.21

245.0	18.69	80.82	528.483866	-447.66
250.0	18.39	81.15	539.269251	-458.12
255.0	18.11	81.47	550.054637	-468.58
260.0	17.83	81.79	560.840022	-479.05
265.0	17.56	82.10	571.625407	-489.53
270.0	17.29	82.40	582.410792	-500.01
275.0	17.04	82.70	593.196177	-510.50
280.0	16.80	82.99	603.981562	-520.99
285.0	16.56	83.28	614.766947	-531.48
290.0	16.33	83.57	625.552332	-541.98
295.0	16.11	83.85	636.337717	-552.49
300.0	15.89	84.13	647.123102	-563.00
305.0	15.68	84.40	657.908487	-573.51
310.0	15.48	84.67	668.693872	-584.02
315.0	15.28	84.93	679.479257	-594.54
320.0	15.09	85.20	690.264642	-605.07
325.0	14.90	85.45	701.050027	-615.60
330.0	14.72	85.71	711.835412	-626.13
335.0	14.54	85.96	722.620797	-636.66
340.0	14.37	86.21	733.406182	-647.20
345.0	14.20	86.45	744.191567	-657.74
350.0	14.04	86.69	754.976952	-668.28
355.0	13.88	86.93	765.762337	-678.83
360.0	13.72	87.17	776.547722	-689.38
Max Volume (V max):				10.63
Design Volume (V design) :				**10.63**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development

Project #: A001083 (360)

Station OTTAWA SEWER DESIGN GUIDELINES

Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9332667 L/s/ha

Area :	A5	0.1069	ha
Runoff Coefficient C (unfactored		0.9	
C_runoff factor:	-		
Runoff Coefficient C :		0.95	
Rainfall Event :		100	year
Discharge Flow Q :		0.025862666	m³/s
Discharge Factor K :		1	

Design Volume:	**14.71 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

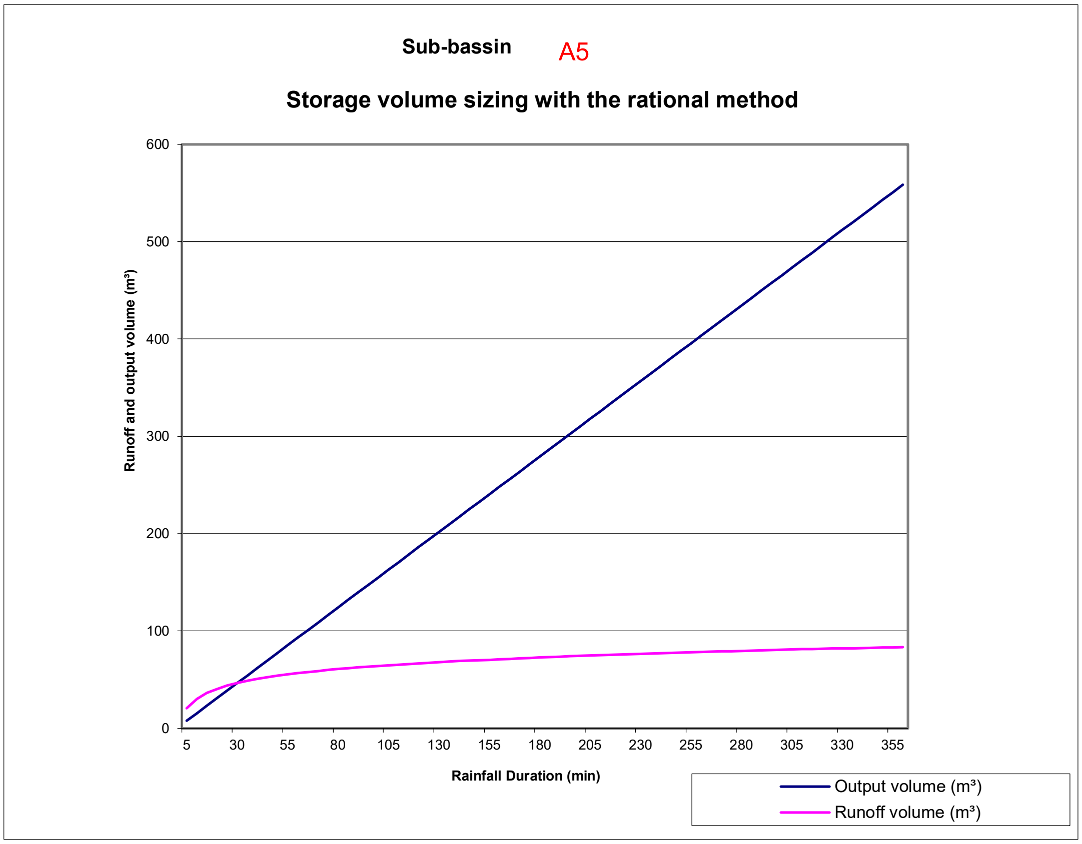
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

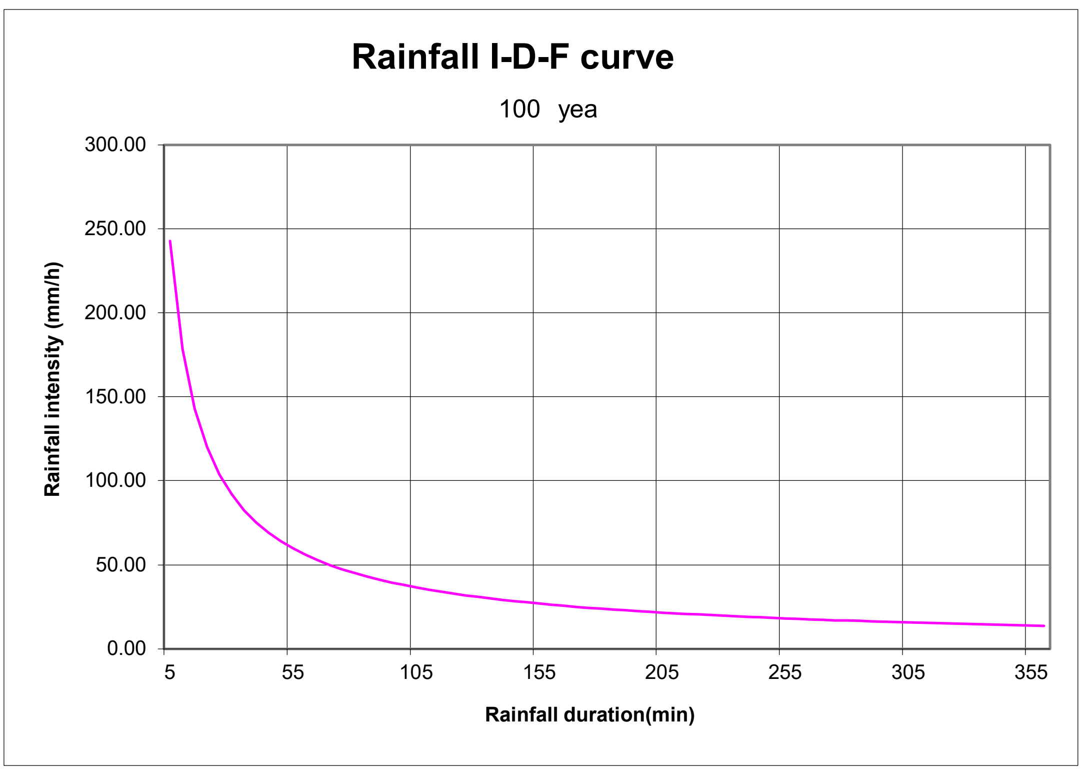
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

Rainfall Duration (min) T (1)	Rainfall Intensity (mm/h) I (2)	Runoff Volume (m³) $CIAT$ (4)	Output Volume (m³) kQT (5)	Retention Volume (m³) (4)-(5) (6)
5.0	242.70	20.54	7.75879986	12.78
10.0	178.56	30.22	15.5175997	14.71
15.0	142.89	36.28	23.2763996	13.00
20.0	119.95	40.61	31.0351995	9.57
25.0	103.85	43.94	38.7939993	5.15
30.0	91.87	46.65	46.5527992	0.10
35.0	82.58	48.92	54.311599	-5.39
40.0	75.15	50.88	62.0703989	-11.19
45.0	69.05	52.59	69.8291988	-17.24
50.0	63.95	54.12	77.5879986	-23.46
55.0	59.62	55.51	85.3467985	-29.84
60.0	55.89	56.76	93.1055984	-36.34
65.0	52.65	57.92	100.864398	-42.94
70.0	49.79	58.99	108.623198	-49.63
75.0	47.26	59.99	116.381998	-56.39
80.0	44.99	60.92	124.140798	-63.22
85.0	42.95	61.80	131.899598	-70.10
90.0	41.11	62.63	139.658398	-77.03
95.0	39.43	63.41	147.417197	-84.01
100.0	37.90	64.15	155.175997	-91.02
105.0	36.50	64.86	162.934797	-98.07
110.0	35.20	65.54	170.693597	-105.15
115.0	34.01	66.19	178.452397	-112.26
120.0	32.89	66.81	186.211197	-119.40
125.0	31.86	67.41	193.969997	-126.56
130.0	30.90	67.99	201.728796	-133.74
135.0	30.00	68.54	209.487596	-140.95
140.0	29.15	69.08	217.246396	-148.17
145.0	28.36	69.60	225.005196	-155.41
150.0	27.61	70.10	232.763996	-162.66
155.0	26.91	70.59	240.522796	-169.94
160.0	26.24	71.06	248.281596	-177.22
165.0	25.61	71.52	256.040395	-184.52
170.0	25.01	71.97	263.799195	-191.83
175.0	24.44	72.40	271.557995	-199.16
180.0	23.90	72.82	279.316795	-206.49
185.0	23.39	73.24	287.075595	-213.84
190.0	22.90	73.64	294.834395	-221.20
195.0	22.43	74.03	302.593195	-228.56
200.0	21.98	74.41	310.351995	-235.94
205.0	21.55	74.79	318.110794	-243.32
210.0	21.14	75.16	325.869594	-250.71
215.0	20.75	75.52	333.628394	-258.11
220.0	20.37	75.87	341.387194	-265.52
225.0	20.01	76.21	349.145994	-272.93
230.0	19.66	76.55	356.904794	-280.36
235.0	19.33	76.88	364.663594	-287.78
240.0	19.01	77.21	372.422393	-295.22

245.0	18.69	77.52	380.181193	-302.66
250.0	18.39	77.84	387.939993	-310.10
255.0	18.11	78.14	395.698793	-317.55
260.0	17.83	78.45	403.457593	-325.01
265.0	17.56	78.74	411.216393	-332.47
270.0	17.29	79.04	418.975193	-339.94
275.0	17.04	79.32	426.733992	-347.41
280.0	16.80	79.61	434.492792	-354.89
285.0	16.56	79.88	442.251592	-362.37
290.0	16.33	80.16	450.010392	-369.85
295.0	16.11	80.43	457.769192	-377.34
300.0	15.89	80.69	465.527992	-384.84
305.0	15.68	80.95	473.286792	-392.33
310.0	15.48	81.21	481.045592	-399.83
315.0	15.28	81.47	488.804391	-407.34
320.0	15.09	81.72	496.563191	-414.85
325.0	14.90	81.97	504.321991	-422.36
330.0	14.72	82.21	512.080791	-429.87
335.0	14.54	82.45	519.839591	-437.39
340.0	14.37	82.69	527.598391	-444.91
345.0	14.20	82.92	535.357191	-452.43
350.0	14.04	83.15	543.11599	-459.96
355.0	13.88	83.38	550.87479	-467.49
360.0	13.72	83.61	558.63359	-475.02
Max Volume (V max):				14.71
Design Volume (V design) :				**14.71**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development

Project #: A001083 (360)

Station OTTAWA SEWER DESIGN GUIDELINES

Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9332667 L/s/ha

Area :	A6	0.486	ha
Runoff Coefficient C (unfactored		0.34	
C_runoff factor:		1.25	
Runoff Coefficient C :		0.425	
Rainfall Event :		100	year
Discharge Flow Q :		0.117579568	m³/s
Discharge Factor K :		1	

Design Volume:	**6.50 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

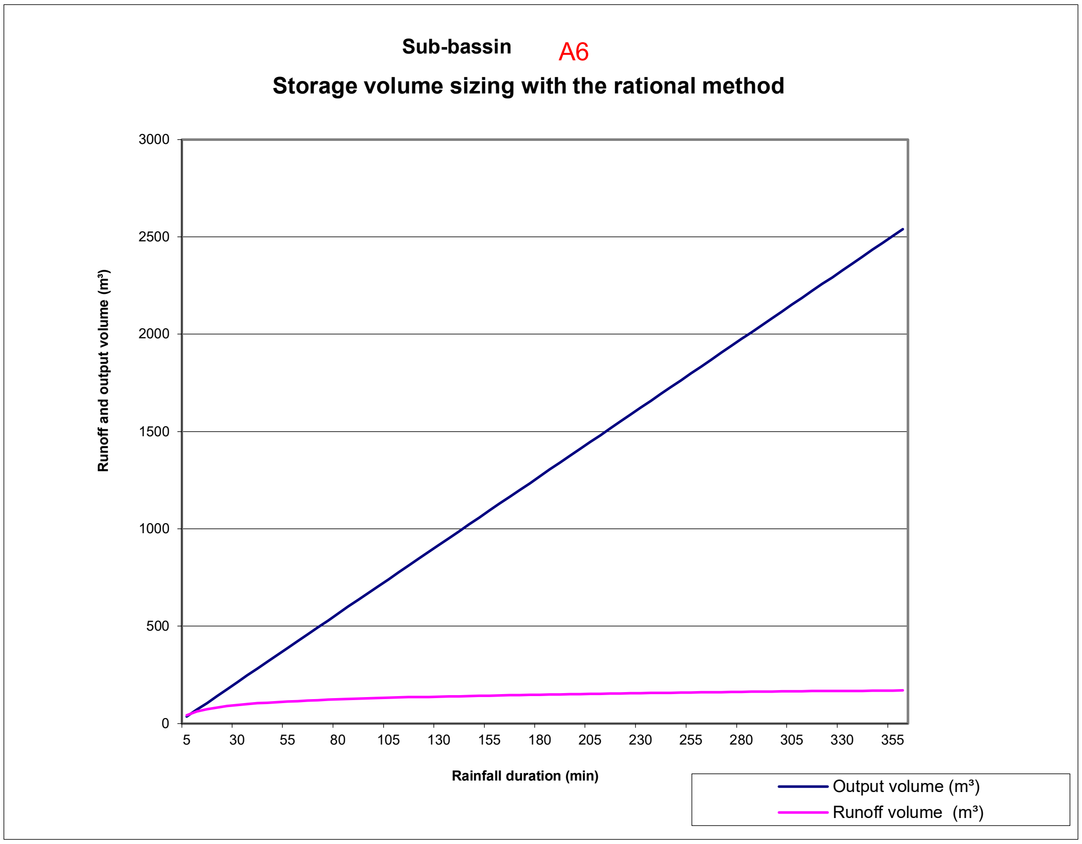
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

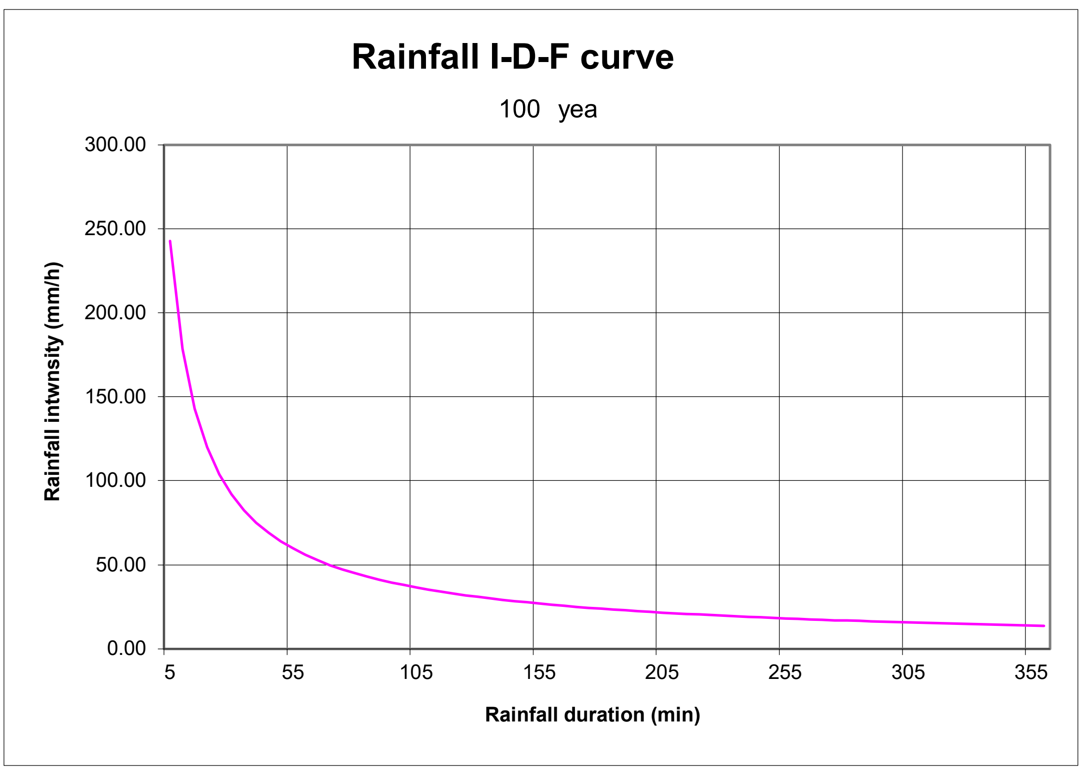
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

Rainfall Duration (min) T (1)	Rainfall Intensity (mm/h) I (2)	Runoff Volume (m^3) $CIAT$ (4)	Output Volume (m^3) kQT (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	41.78	35.2738703	6.50
10.0	178.56	61.47	70.5477406	-9.08
15.0	142.89	73.79	105.821611	-32.03
20.0	119.95	82.59	141.095481	-58.51
25.0	103.85	89.37	176.369351	-87.00
30.0	91.87	94.88	211.643222	-116.77
35.0	82.58	99.50	246.917092	-147.42
40.0	75.15	103.48	282.190962	-178.72
45.0	69.05	106.97	317.464833	-210.50
50.0	63.95	110.08	352.738703	-242.66
55.0	59.62	112.89	388.012573	-275.12
60.0	55.89	115.45	423.286443	-307.84
65.0	52.65	117.80	458.560314	-340.76
70.0	49.79	119.98	493.834184	-373.85
75.0	47.26	122.01	529.108054	-407.10
80.0	44.99	123.91	564.381925	-440.48
85.0	42.95	125.69	599.655795	-473.97
90.0	41.11	127.37	634.929665	-507.56
95.0	39.43	128.97	670.203535	-541.24
100.0	37.90	130.48	705.477406	-575.00
105.0	36.50	131.92	740.751276	-608.83
110.0	35.20	133.30	776.025146	-642.72
115.0	34.01	134.62	811.299017	-676.68
120.0	32.89	135.89	846.572887	-710.68
125.0	31.86	137.11	881.846757	-744.74
130.0	30.90	138.28	917.120627	-778.84
135.0	30.00	139.41	952.394498	-812.99
140.0	29.15	140.50	987.668368	-847.17
145.0	28.36	141.55	1022.94224	-881.39
150.0	27.61	142.57	1058.21611	-915.64
155.0	26.91	143.57	1093.48998	-949.92
160.0	26.24	144.53	1128.76385	-984.24
165.0	25.61	145.46	1164.03772	-1018.58
170.0	25.01	146.37	1199.31159	-1052.94
175.0	24.44	147.25	1234.58546	-1087.33
180.0	23.90	148.11	1269.85933	-1121.75
185.0	23.39	148.95	1305.1332	-1156.18
190.0	22.90	149.77	1340.40707	-1190.64
195.0	22.43	150.57	1375.68094	-1225.11
200.0	21.98	151.35	1410.95481	-1259.61
205.0	21.55	152.11	1446.22868	-1294.12
210.0	21.14	152.86	1481.50255	-1328.64
215.0	20.75	153.59	1516.77642	-1363.19
220.0	20.37	154.30	1552.05029	-1397.75
225.0	20.01	155.00	1587.32416	-1432.32
230.0	19.66	155.69	1622.59803	-1466.91
235.0	19.33	156.36	1657.8719	-1501.51
240.0	19.01	157.03	1693.14577	-1536.12

245.0	18.69	157.67	1728.41964	-1570.75
250.0	18.39	158.31	1763.69351	-1605.38
255.0	18.11	158.94	1798.96738	-1640.03
260.0	17.83	159.55	1834.24125	-1674.69
265.0	17.56	160.15	1869.51513	-1709.36
270.0	17.29	160.75	1904.789	-1744.04
275.0	17.04	161.33	1940.06287	-1778.73
280.0	16.80	161.91	1975.33674	-1813.43
285.0	16.56	162.47	2010.61061	-1848.14
290.0	16.33	163.03	2045.88448	-1882.85
295.0	16.11	163.58	2081.15835	-1917.58
300.0	15.89	164.12	2116.43222	-1952.31
305.0	15.68	164.65	2151.70609	-1987.05
310.0	15.48	165.18	2186.97996	-2021.80
315.0	15.28	165.69	2222.25383	-2056.56
320.0	15.09	166.20	2257.5277	-2091.32
325.0	14.90	166.71	2292.80157	-2126.09
330.0	14.72	167.20	2328.07544	-2160.87
335.0	14.54	167.69	2363.34931	-2195.66
340.0	14.37	168.18	2398.62318	-2230.45
345.0	14.20	168.65	2433.89705	-2265.24
350.0	14.04	169.13	2469.17092	-2300.04
355.0	13.88	169.59	2504.44479	-2334.85
360.0	13.72	170.05	2539.71866	-2369.67
Max Volume (V max):				6.50
Design Volume (V design) :				**6.50**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210719_Storm Water Management - Storage and Drawdown_full RR.xlsx]A7*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9332667 L/s/ha

Area : A7	0.1497	ha
Runoff Coefficient C (unfactored	0.52	
C_runoff factor:	1.25	
Runoff Coefficient C :	0.65	
Rainfall Event :	100	year
Discharge Flow Q :	0.03621741	m³/s
Discharge Factor K :	1	

Design Volume:	**8.82 m³**

Rainfall Pluviometry Coefficients	2 year		5 year		10 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall Pluviometry Coefficients	25 year		50 year		100 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

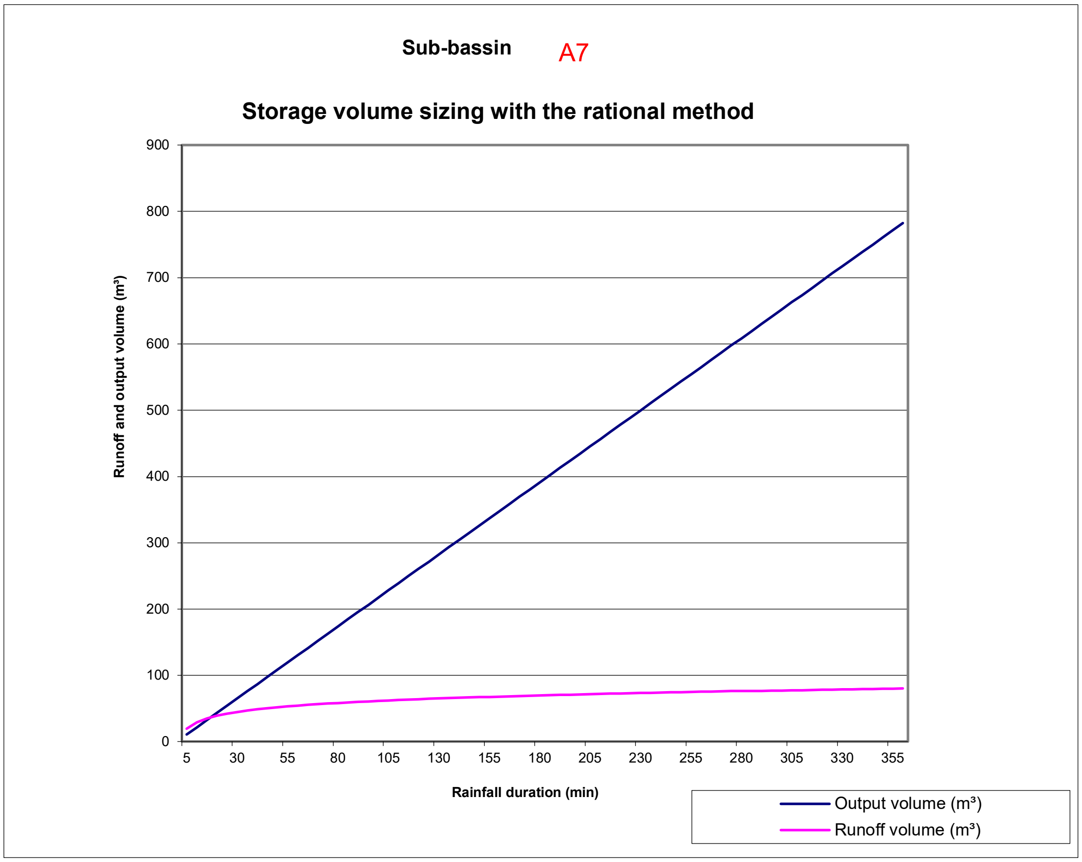
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

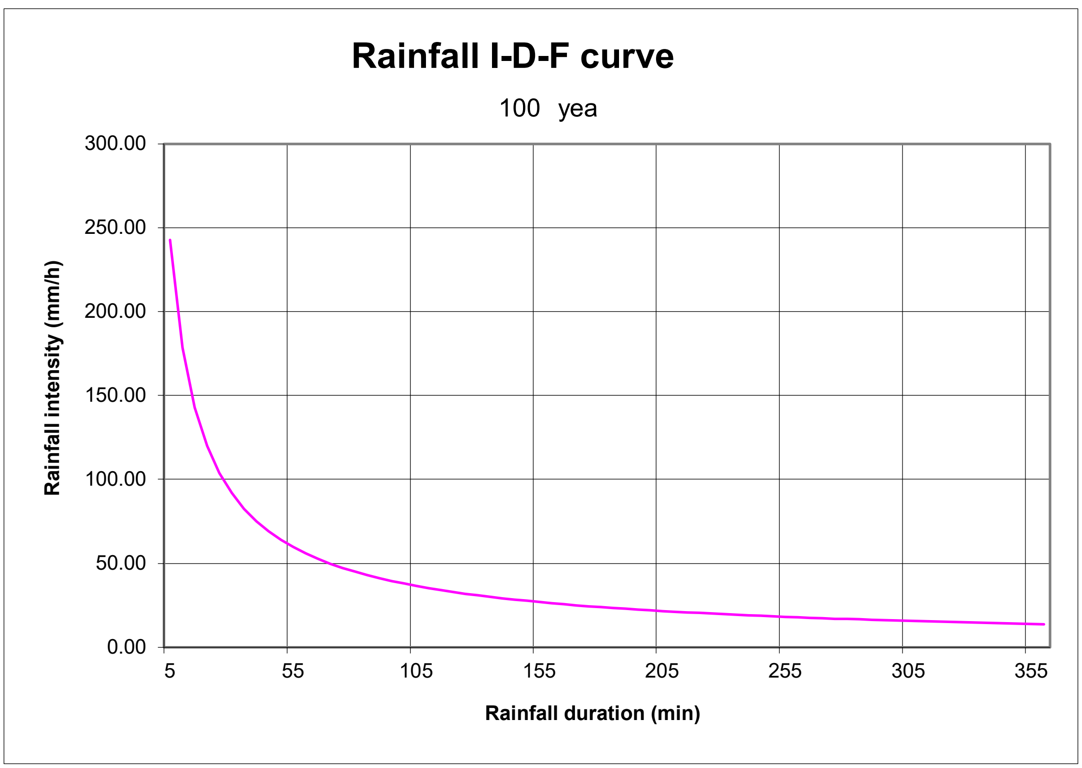
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m^3) *CIAT* (4)	Output Volume (m^3) *kQT* (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	19.68	10.865223	8.82
10.0	178.56	28.96	21.730446	7.23
15.0	142.89	34.76	32.595669	2.17
20.0	119.95	38.91	43.460892	-4.55
25.0	103.85	42.10	54.326115	-12.22
30.0	91.87	44.70	65.191338	-20.50
35.0	82.58	46.87	76.0565611	-29.18
40.0	75.15	48.75	86.9217841	-38.18
45.0	69.05	50.39	97.7870071	-47.39
50.0	63.95	51.86	108.65223	-56.79
55.0	59.62	53.18	119.517453	-66.34
60.0	55.89	54.39	130.382676	-75.99
65.0	52.65	55.50	141.247899	-85.75
70.0	49.79	56.52	152.113122	-95.59
75.0	47.26	57.48	162.978345	-105.50
80.0	44.99	58.37	173.843568	-115.47
85.0	42.95	59.21	184.708791	-125.50
90.0	41.11	60.00	195.574014	-135.57
95.0	39.43	60.76	206.439237	-145.68
100.0	37.90	61.47	217.30446	-155.84
105.0	36.50	62.15	228.169683	-166.02
110.0	35.20	62.80	239.034906	-176.24
115.0	34.01	63.42	249.900129	-186.48
120.0	32.89	64.02	260.765352	-196.75
125.0	31.86	64.59	271.630575	-207.04
130.0	30.90	65.14	282.495798	-217.35
135.0	30.00	65.67	293.361021	-227.69
140.0	29.15	66.19	304.226244	-238.04
145.0	28.36	66.69	315.091467	-248.41
150.0	27.61	67.17	325.95669	-258.79
155.0	26.91	67.63	336.821913	-269.19
160.0	26.24	68.09	347.687136	-279.60
165.0	25.61	68.53	358.552359	-290.03
170.0	25.01	68.95	369.417582	-300.46
175.0	24.44	69.37	380.282805	-310.91
180.0	23.90	69.78	391.148028	-321.37
185.0	23.39	70.17	402.013251	-331.84
190.0	22.90	70.56	412.878474	-342.32
195.0	22.43	70.93	423.743697	-352.81
200.0	21.98	71.30	434.60892	-363.31
205.0	21.55	71.66	445.474143	-373.81
210.0	21.14	72.01	456.339366	-384.33
215.0	20.75	72.36	467.204589	-394.85
220.0	20.37	72.69	478.069812	-405.38
225.0	20.01	73.02	488.935035	-415.91
230.0	19.66	73.35	499.800258	-426.45
235.0	19.33	73.66	510.665481	-437.00

240.0	19.01	73.97	521.530704	-447.56
245.0	18.69	74.28	532.395927	-458.12
250.0	18.39	74.58	543.26115	-468.68
255.0	18.11	74.87	554.126373	-479.25
260.0	17.83	75.16	564.991596	-489.83
265.0	17.56	75.45	575.856819	-500.41
270.0	17.29	75.73	586.722042	-510.99
275.0	17.04	76.00	597.587265	-521.58
280.0	16.80	76.27	608.452488	-532.18
285.0	16.56	76.54	619.317711	-542.78
290.0	16.33	76.80	630.182934	-553.38
295.0	16.11	77.06	641.048157	-563.99
300.0	15.89	77.32	651.91338	-574.60
305.0	15.68	77.57	662.778603	-585.21
310.0	15.48	77.81	673.643826	-595.83
315.0	15.28	78.06	684.509049	-606.45
320.0	15.09	78.30	695.374272	-617.08
325.0	14.90	78.54	706.239495	-627.70
330.0	14.72	78.77	717.104719	-638.34
335.0	14.54	79.00	727.969942	-648.97
340.0	14.37	79.23	738.835165	-659.61
345.0	14.20	79.45	749.700388	-670.25
350.0	14.04	79.67	760.565611	-680.89
355.0	13.88	79.89	771.430834	-691.54
360.0	13.72	80.11	782.296057	-702.19
Max Volume (V max):				8.82
Design Volume (V design) :				**8.82**

Fastfrate Warehouse Development
Industrial/Commercial Development





Date: **2021-09-21**

Fastfrate Warehouse Development
Industrial/Commercial Development
A001083 (360)
STORM WATER MANAGEMENT - SUMMARY - HALF RELEASE RATE

Rainfall event 100 years

Sub-Area	Total Area	Capacity Area	Catchbasin Elev.	Max. Elev.	Y_{max}	V_{max}	V_{rain}	Difference	V_{acc}	Y_{rain}	$Elev_{rain}$	A_{rain}	Q_{ave}	Drawdown Time	Comments
	(m^2)	(m^2)	(m)	(m)	(m)	(m^3)	(m^3)	(m^3)	(m^3)	(m)	(m)	(m^2)	(L/s)	(min)	
A1	7646	2294	10.000	10.001	0.001	0.76	197.16	-196.39	0.76	0.00	10.001	2294	64.300	0	
A2	12138	3641	10.000	10.001	0.001	1.21	319.55	-318.34	1.21	0.00	10.001	3641	102.076	0	
A3 - Building	8582	8582	10.000	10.050	0.050	143.03	115.04	27.99	115.04	0.04	10.045	7697	211.132	9	
A4	1486	446	10.000	10.001	0.001	0.15	27.34	-27.19	0.15	0.00	10.001	446	12.497	0	
A5	1069	321	10.000	10.001	0.001	0.11	30.46	-30.36	0.11	0.00	10.001	321	8.990	0	
A6	4860	1458	10.000	10.001	0.001	0.49	37.00	-36.51	0.49	0.00	10.001	1458	40.871	0	
A7	1497	449	10.000	10.001	0.001	0.15	23.80	-23.65	0.15	0.00	10.001	449	12.589	0	
Total	37278	17191				145.90	750.35	-604.44	117.91						

Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half RR.xlsx]Sommaire

Legend:

NC = Non-controlled areas (no storage available)
Capacity Area = Area of water accumulated in sub-area at Max. Elev.
Catchbasin Elev. = Elevation of catchbasin inlet (top of grate).
Max. Elev. = Maximum elevation of water that may be accumulated within sub-area.
Y_{max} = Maximum depth of water that may be accumulated within the sub-area.
V_{max} = Maximum volume of water (capacity) that may be accumulated within the sub-area.
V_{rain} = Volume of water generated by rainfall.
Difference = Difference between V_{max} and V_{rain} (remaining capacity of sub-area)
V_{acc} = Total volume of water accumulated within the sub-area in the event of a specific rainfall.
Y_{rain} = Depth of water generated by rainfall.
$Elev_{rain}$ = Elevation of water generated by rainfall.
A_{rain} = Area of water generated by rainfall.
Q_{ave} = Average flow (for drawndown time calculation).
Drawdown Time = Time required for the total volume of water accumulated within sub-area to evacuate (following rainfall event).

Design Criteria:

1) Maximum Allowable Release Rate = 124.04 L/s/ha
2) ~~Pipe size for 10 years~~
3) Rainfall event of 100 years
4) ~~Pre-development flow (5 year) = ____ L/s (or ____ L/s/ha)~~

Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 23, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 23, 2021
PEO No.: 100067842

ment

Date: 2021-09-21

Industrial/Commercial Development
A001083 (360)
STORM WATER MANAGEMENT - AVERAGE FLOW CALCULATION FOR DRAWDOWN TIME

Catchment ID	Release Rate	Specified Flow rate	Calculated area
	L/s/ha	L/s	(mm^2)
A1	84.11	64.31	17550
A2	84.11	102.09	27861
A3 - Building	247.78	212.64	57298
A4	84.11	12.50	3411
A5	84.11	8.99	2454
A6	84.11	40.88	11155
A7	84.11	12.59	3436
	Total Flowrate	454.00	

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Préparé par: Guillaume LeBlond, M.A.Sc., EIT Date: July 23, 2021
PEO No.: 100530467

Vérifié par: Christian Lavoi 2) Pipe size for 10 years Date: July 23, 2021
PEO No.: 100067842

CIMA+

STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 84.10757773 L/s/ha

Area	: A1	0.7646	ha
Runoff Coefficient C (unfactored		0.71	
C_runoff factor:		1.25	
Runoff Coefficient C :		0.8875	
Rainfall Event :		100	year
Discharge Flow Q :		0.064308654	m³/s
Discharge Factor K :		1	

Design Volume:	**197.16 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.810	0.810	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.820	0.820	0.820	0.820

Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 23, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 23, 2021
PEO No.: 100067842

Init.________

Rainfall Duration (min) T (1)	Rainfall Intensity (mm/h) I (2)	Runoff Volume (m^3) $CIAT$ (4)	Output Volume (m^3) kQT (5)	Retention Volume (m^3) (4)-(5) (6)
5.0	242.70	137.25	19.2925962	117.95
10.0	178.56	201.95	38.5851924	163.36
15.0	142.89	242.41	57.8777885	184.54
20.0	119.95	271.32	77.1703847	194.15
25.0	103.85	293.62	96.4629809	197.16
30.0	91.87	311.70	115.755577	195.95
35.0	82.58	326.88	135.048173	191.83
40.0	75.15	339.95	154.340769	185.61
45.0	69.05	351.42	173.633366	177.79
50.0	63.95	361.65	192.925962	168.73
55.0	59.62	370.88	212.218558	158.66
60.0	55.89	379.29	231.511154	147.78
65.0	52.65	387.02	250.80375	136.22
70.0	49.79	394.17	270.096347	124.08
75.0	47.26	400.83	289.388943	111.45
80.0	44.99	407.07	308.681539	98.39
85.0	42.95	412.93	327.974135	84.95
90.0	41.11	418.46	347.266731	71.19
95.0	39.43	423.70	366.559327	57.14
100.0	37.90	428.67	385.851924	42.82
105.0	36.50	433.41	405.14452	28.27
110.0	35.20	437.94	424.437116	13.51
115.0	34.01	442.28	443.729712	-1.45
120.0	32.89	446.44	463.022308	-16.58
125.0	31.86	450.44	482.314904	-31.88
130.0	30.90	454.28	501.607501	-47.32
135.0	30.00	458.00	520.900097	-62.90
140.0	29.15	461.58	540.192693	-78.61
145.0	28.36	465.05	559.485289	-94.44
150.0	27.61	468.40	578.777885	-110.37
155.0	26.91	471.66	598.070482	-126.41
160.0	26.24	474.81	617.363078	-142.55
165.0	25.61	477.88	636.655674	-158.77
170.0	25.01	480.87	655.94827	-175.08
175.0	24.44	483.77	675.240866	-191.47
180.0	23.90	486.60	694.533462	-207.94
185.0	23.39	489.35	713.826059	-224.47
190.0	22.90	492.04	733.118655	-241.08
195.0	22.43	494.67	752.411251	-257.75
200.0	21.98	497.23	771.703847	-274.47
205.0	21.55	499.74	790.996443	-291.26
210.0	21.14	502.19	810.28904	-308.10
215.0	20.75	504.59	829.581636	-324.99
220.0	20.37	506.94	848.874232	-341.94
225.0	20.01	509.24	868.166828	-358.93
230.0	19.66	511.50	887.459424	-375.96
235.0	19.33	513.71	906.75202	-393.04
240.0	19.01	515.88	926.044617	-410.17

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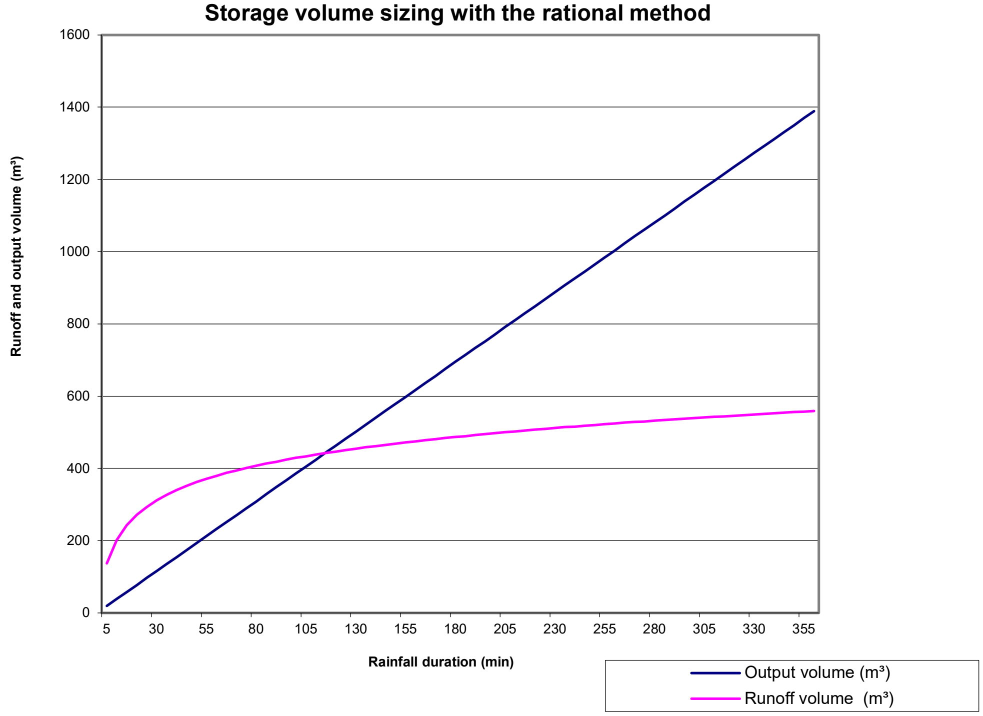
245.0	18.69	518.01	945.337213	-427.33
250.0	18.39	520.10	964.629809	-444.53
255.0	18.11	522.15	983.922405	-461.77
260.0	17.83	524.17	1003.215	-479.04
265.0	17.56	526.16	1022.5076	-496.35
270.0	17.29	528.11	1041.80019	-513.69
275.0	17.04	530.03	1061.09279	-531.06
280.0	16.80	531.92	1080.38539	-548.47
285.0	16.56	533.78	1099.67798	-565.90
290.0	16.33	535.61	1118.97058	-583.37
295.0	16.11	537.41	1138.26317	-600.86
300.0	15.89	539.18	1157.55577	-618.37
305.0	15.68	540.93	1176.84837	-635.92
310.0	15.48	542.66	1196.14096	-653.48
315.0	15.28	544.36	1215.43356	-671.08
320.0	15.09	546.03	1234.72616	-688.69
325.0	14.90	547.69	1254.01875	-706.33
330.0	14.72	549.32	1273.31135	-723.99
335.0	14.54	550.93	1292.60394	-741.68
340.0	14.37	552.52	1311.89654	-759.38
345.0	14.20	554.08	1331.18914	-777.10
350.0	14.04	555.63	1350.48173	-794.85
355.0	13.88	557.16	1369.77433	-812.61
360.0	13.72	558.67	1389.06692	-830.39
Max Volume (V max):				197.16
Design Volume (V design) :				**197.16**

Fastfrate Warehouse Development
Industrial/Commercial Development

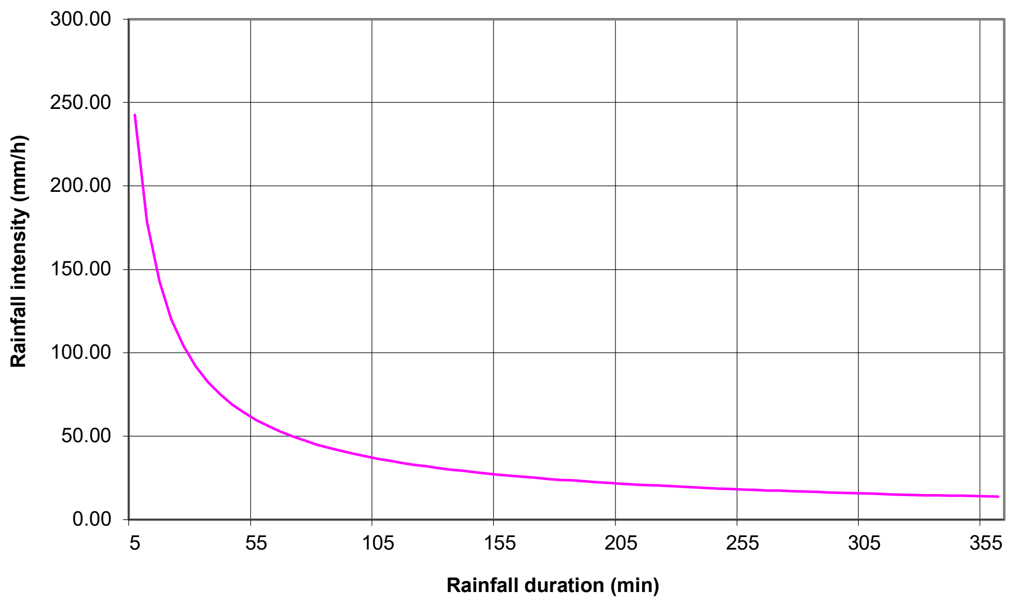
Sub-bassin A1

Storage volume sizing with the rational method



Rainfall I-D-F curve

100 yea



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STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: ***Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half***

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 84.10757773 L/s/ha

Area :	A2	1.2138	ha
Runoff Coefficient C (unfactored		0.72	
C_runoff factor:		1.25	
Runoff Coefficient C :		0.9	
Rainfall Event :		100	year
Discharge Flow Q :		0.102089778	m³/s
Discharge Factor K :		1	

Design Volume:	**319.55 m³**

Rainfall Pluviometry Coefficients	2 year		5 year		10 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall Pluviometry Coefficients	25 year		50 year		100 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

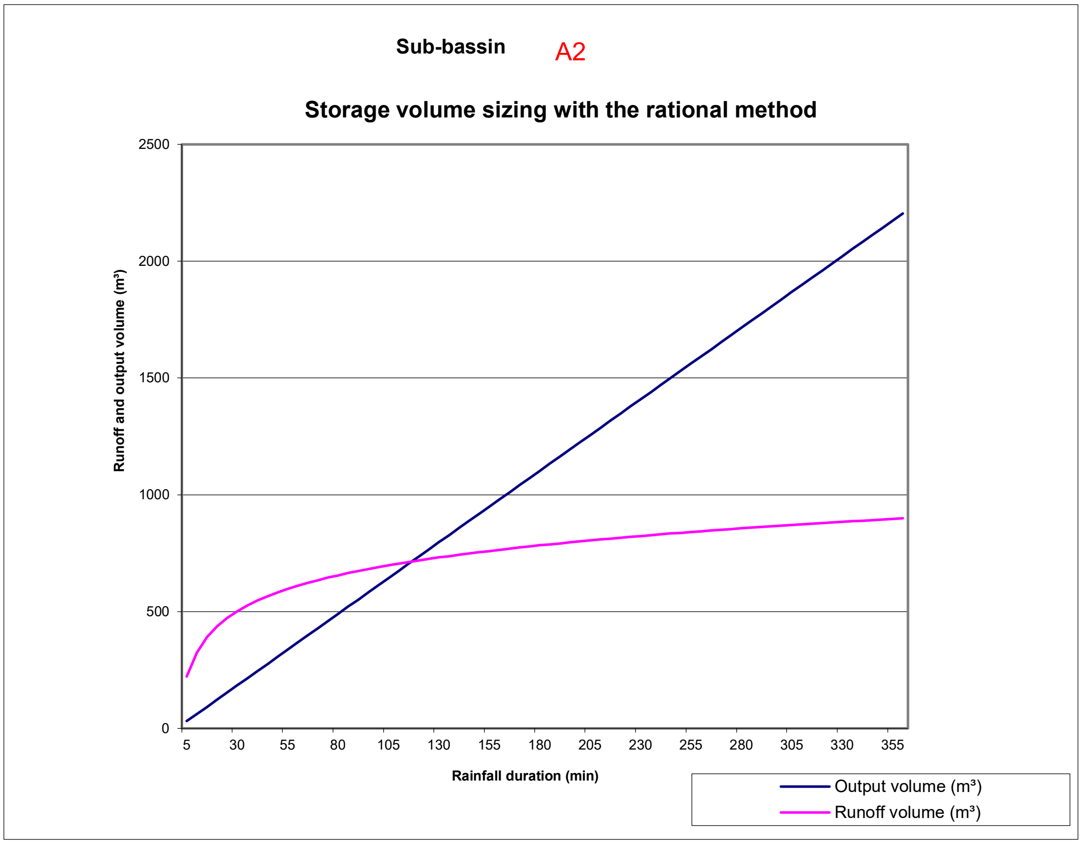
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 23, 2021
PEO No.: 100530467

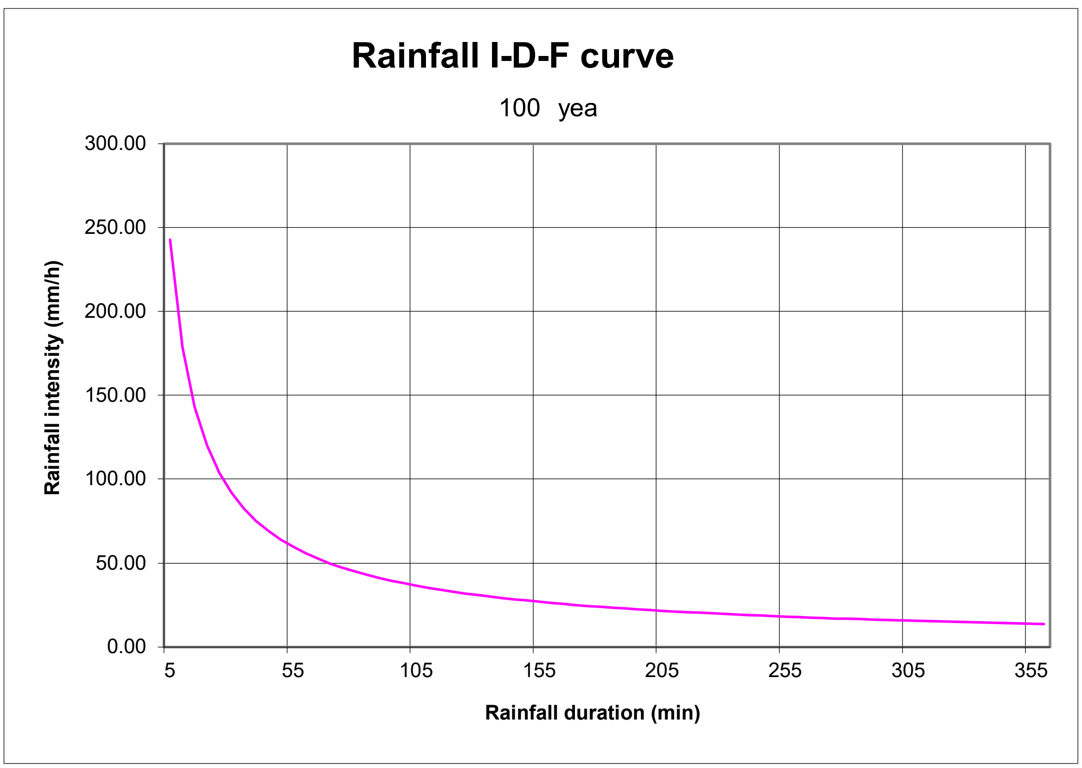
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 23, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m^3) *CIAT* (4)	Output Volume (m^3) *kQT* (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	220.95	30.6269334	190.32
10.0	178.56	325.10	61.2538667	263.85
15.0	142.89	390.25	91.8808001	298.37
20.0	119.95	436.79	122.507733	314.28
25.0	103.85	472.69	153.134667	319.55
30.0	91.87	501.79	183.7616	318.03
35.0	82.58	526.23	214.388533	311.84
40.0	75.15	547.27	245.015467	302.25
45.0	69.05	565.74	275.6424	290.10
50.0	63.95	582.21	306.269334	275.94
55.0	59.62	597.06	336.896267	260.17
60.0	55.89	610.60	367.5232	243.08
65.0	52.65	623.05	398.150134	224.90
70.0	49.79	634.56	428.777067	205.79
75.0	47.26	645.29	459.404	185.88
80.0	44.99	655.32	490.030934	165.29
85.0	42.95	664.75	520.657867	144.10
90.0	41.11	673.66	551.2848	122.37
95.0	39.43	682.09	581.911734	100.18
100.0	37.90	690.10	612.538667	77.56
105.0	36.50	697.73	643.1656	54.57
110.0	35.20	705.02	673.792534	31.23
115.0	34.01	712.00	704.419467	7.58
120.0	32.89	718.70	735.046401	-16.35
125.0	31.86	725.14	765.673334	-40.54
130.0	30.90	731.33	796.300267	-64.97
135.0	30.00	737.31	826.927201	-89.62
140.0	29.15	743.08	857.554134	-114.48
145.0	28.36	748.66	888.181067	-139.52
150.0	27.61	754.06	918.808001	-164.75
155.0	26.91	759.30	949.434934	-190.13
160.0	26.24	764.38	980.061867	-215.68
165.0	25.61	769.32	1010.6888	-241.37
170.0	25.01	774.12	1041.31573	-267.19
175.0	24.44	778.80	1071.94267	-293.15
180.0	23.90	783.35	1102.5696	-319.22
185.0	23.39	787.79	1133.19653	-345.41
190.0	22.90	792.12	1163.82347	-371.71
195.0	22.43	796.34	1194.4504	-398.11
200.0	21.98	800.47	1225.07733	-424.61
205.0	21.55	804.50	1255.70427	-451.20
210.0	21.14	808.45	1286.3312	-477.88
215.0	20.75	812.31	1316.95813	-504.64
220.0	20.37	816.10	1347.58507	-531.49
225.0	20.01	819.80	1378.212	-558.41
230.0	19.66	823.43	1408.83893	-585.40
235.0	19.33	827.00	1439.46587	-612.47
240.0	19.01	830.49	1470.0928	-639.60

245.0	18.69	833.92	1500.71973	-666.80
250.0	18.39	837.29	1531.34667	-694.06
255.0	18.11	840.59	1561.9736	-721.38
260.0	17.83	843.84	1592.60053	-748.76
265.0	17.56	847.04	1623.22747	-776.19
270.0	17.29	850.18	1653.8544	-803.68
275.0	17.04	853.27	1684.48133	-831.21
280.0	16.80	856.31	1715.10827	-858.80
285.0	16.56	859.30	1745.7352	-886.43
290.0	16.33	862.25	1776.36213	-914.11
295.0	16.11	865.15	1806.98907	-941.84
300.0	15.89	868.01	1837.616	-969.61
305.0	15.68	870.82	1868.24293	-997.42
310.0	15.48	873.60	1898.86987	-1025.27
315.0	15.28	876.34	1929.4968	-1053.16
320.0	15.09	879.04	1960.12373	-1081.09
325.0	14.90	881.70	1990.75067	-1109.05
330.0	14.72	884.32	2021.3776	-1137.05
335.0	14.54	886.91	2052.00453	-1165.09
340.0	14.37	889.47	2082.63147	-1193.16
345.0	14.20	892.00	2113.2584	-1221.26
350.0	14.04	894.49	2143.88533	-1249.40
355.0	13.88	896.95	2174.51227	-1277.56
360.0	13.72	899.38	2205.1392	-1305.76
Max Volume (V max):				319.55
Design Volume (V design) :				**319.55**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: ***Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half***

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 247.7801153 L/s/ha

Area : A3 - Building 0.8582 ha
Runoff Coefficient C (unfactored): 0.9
C_runoff factor: -
Runoff Coefficient C : 0.95
Rainfall Event : 100 year
Discharge Flow Q : 0.212644895 m³/s
Discharge Factor K : 1

Design Volume:	**115.04 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

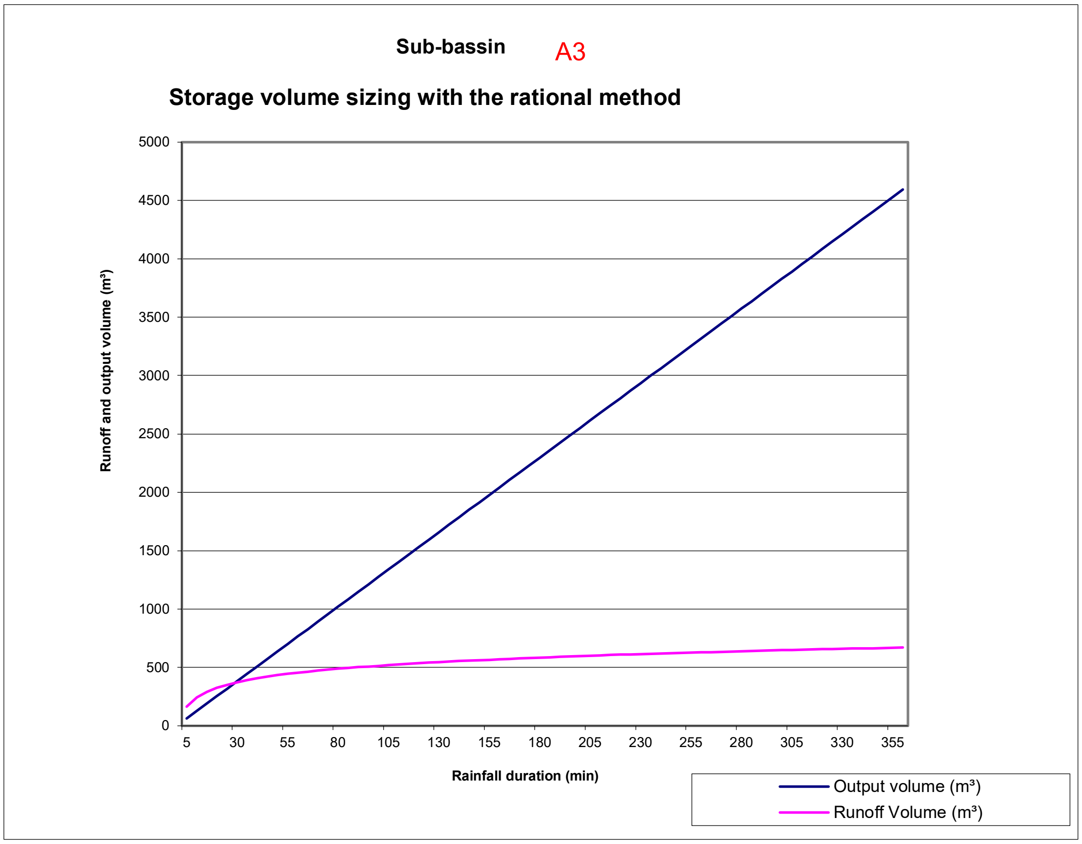
Prepared by: Guillaume LeBlond, M.A.Sc., EIT — Date: July 23, 2021
PEO No.: 100530467

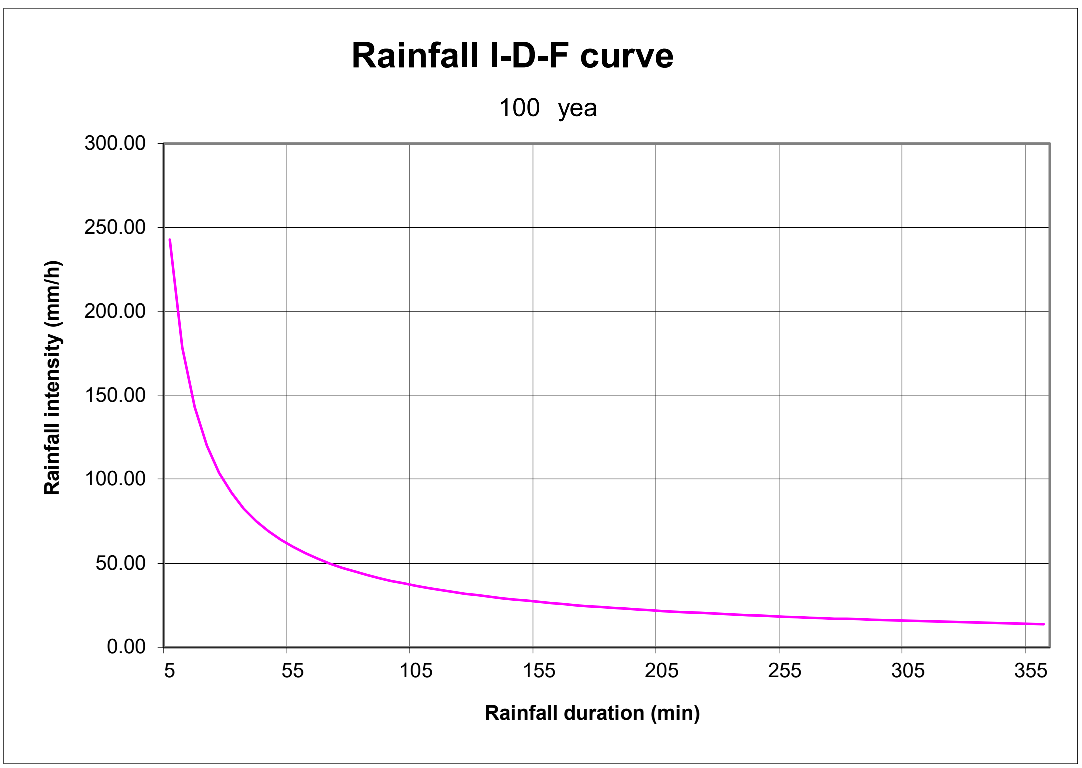
Verified by: Christian Lavoie-Lebel, P.Eng. — Date: July 23, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m^3) *CIAT* (4)	Output Volume (m^3) *kQT* (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	164.90	63.7934685	101.10
10.0	178.56	242.63	127.586937	115.04
15.0	142.89	291.25	191.380405	99.87
20.0	119.95	325.98	255.173874	70.81
25.0	103.85	352.77	318.967342	33.81
30.0	91.87	374.50	382.760811	-8.26
35.0	82.58	392.73	446.554279	-53.82
40.0	75.15	408.43	510.347748	-101.91
45.0	69.05	422.22	574.141216	-151.92
50.0	63.95	434.51	637.934685	-203.43
55.0	59.62	445.60	701.728153	-256.13
60.0	55.89	455.70	765.521622	-309.82
65.0	52.65	464.99	829.31509	-364.32
70.0	49.79	473.58	893.108559	-419.52
75.0	47.26	481.59	956.902027	-475.32
80.0	44.99	489.08	1020.6955	-531.62
85.0	42.95	496.12	1084.48896	-588.37
90.0	41.11	502.76	1148.28243	-645.52
95.0	39.43	509.05	1212.0759	-703.02
100.0	37.90	515.03	1275.86937	-760.84
105.0	36.50	520.73	1339.66284	-818.93
110.0	35.20	526.17	1403.45631	-877.29
115.0	34.01	531.38	1467.24978	-935.87
120.0	32.89	536.38	1531.04324	-994.67
125.0	31.86	541.18	1594.83671	-1053.66
130.0	30.90	545.80	1658.63018	-1112.83
135.0	30.00	550.26	1722.42365	-1172.16
140.0	29.15	554.57	1786.21712	-1231.65
145.0	28.36	558.74	1850.01059	-1291.27
150.0	27.61	562.77	1913.80405	-1351.04
155.0	26.91	566.68	1977.59752	-1410.92
160.0	26.24	570.47	2041.39099	-1470.92
165.0	25.61	574.16	2105.18446	-1531.03
170.0	25.01	577.74	2168.97793	-1591.24
175.0	24.44	581.23	2232.7714	-1651.54
180.0	23.90	584.63	2296.56487	-1711.94
185.0	23.39	587.94	2360.35833	-1772.42
190.0	22.90	591.17	2424.1518	-1832.98
195.0	22.43	594.32	2487.94527	-1893.62
200.0	21.98	597.40	2551.73874	-1954.34
205.0	21.55	600.41	2615.53221	-2015.12
210.0	21.14	603.36	2679.32568	-2075.97
215.0	20.75	606.24	2743.11914	-2136.88
220.0	20.37	609.07	2806.91261	-2197.85
225.0	20.01	611.83	2870.70608	-2258.87
230.0	19.66	614.54	2934.49955	-2319.96
235.0	19.33	617.20	2998.29302	-2381.09
240.0	19.01	619.81	3062.08649	-2442.28

245.0	18.69	622.37	3125.87996	-2503.51
250.0	18.39	624.88	3189.67342	-2564.79
255.0	18.11	627.35	3253.46689	-2626.12
260.0	17.83	629.77	3317.26036	-2687.49
265.0	17.56	632.16	3381.05383	-2748.90
270.0	17.29	634.50	3444.8473	-2810.35
275.0	17.04	636.81	3508.64077	-2871.83
280.0	16.80	639.08	3572.43424	-2933.36
285.0	16.56	641.31	3636.2277	-2994.92
290.0	16.33	643.51	3700.02117	-3056.51
295.0	16.11	645.67	3763.81464	-3118.14
300.0	15.89	647.81	3827.60811	-3179.80
305.0	15.68	649.91	3891.40158	-3241.49
310.0	15.48	651.98	3955.19505	-3303.21
315.0	15.28	654.02	4018.98851	-3364.96
320.0	15.09	656.04	4082.78198	-3426.74
325.0	14.90	658.02	4146.57545	-3488.55
330.0	14.72	659.98	4210.36892	-3550.38
335.0	14.54	661.92	4274.16239	-3612.24
340.0	14.37	663.83	4337.95586	-3674.13
345.0	14.20	665.71	4401.74933	-3736.04
350.0	14.04	667.57	4465.54279	-3797.97
355.0	13.88	669.41	4529.33626	-3859.93
360.0	13.72	671.22	4593.12973	-3921.91
Max Volume (V max):				115.04
Design Volume (V design) :				**115.04**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project:	Fastfrate Warehouse Development
	Industrial/Commercial Development
Project #:	A001083 (360)
Station	OTTAWA SEWER DESIGN GUIDELINES
Date:	2021-09-21 14:40
File Location:	*Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half*

Description: **Storage volume calculations with the rational method**

Specified Release Rate:		84.10757773	L/s/ha
Area :	A4	0.1486	ha
Runoff Coefficient C (unfactored		0.57	
C_runoff factor:		1.25	
Runoff Coefficient C :		0.7125	
Rainfall Event :		100	year
Discharge Flow Q :		0.012498386	m³/s
Discharge Factor K :		1	

Design Volume: **27.34 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

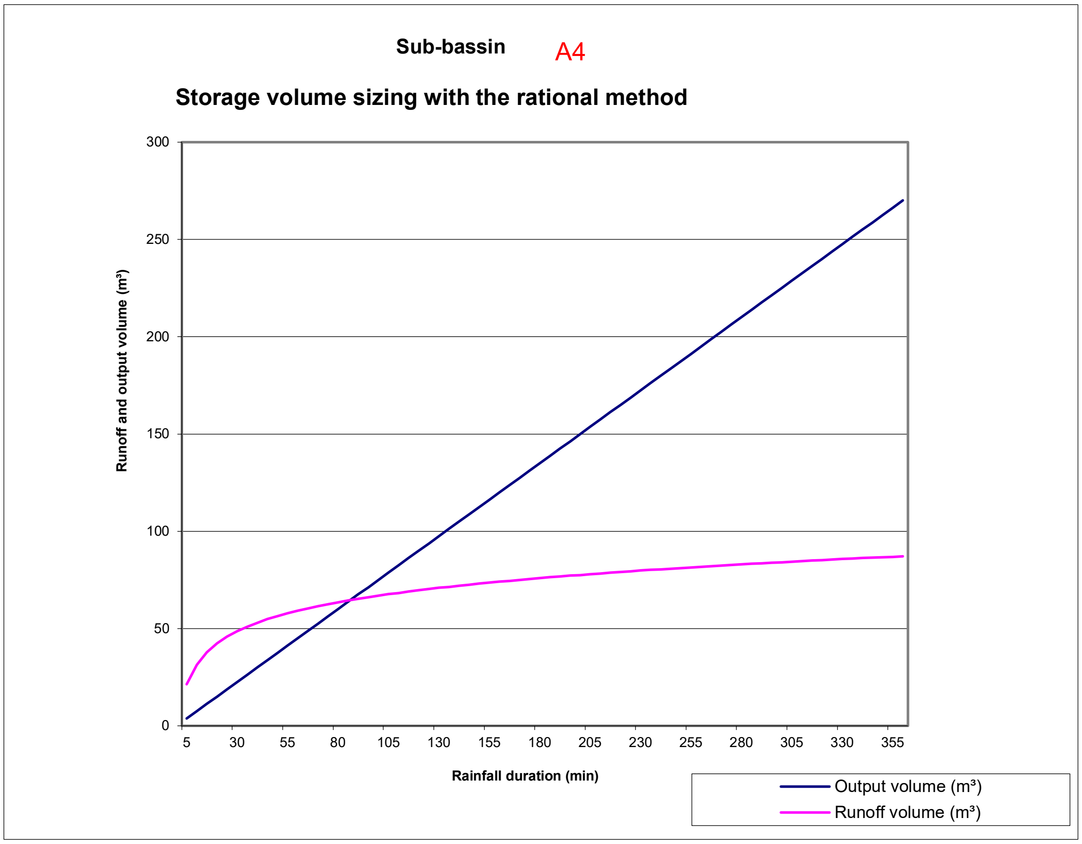
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 23, 2021
PEO No.: 100530467

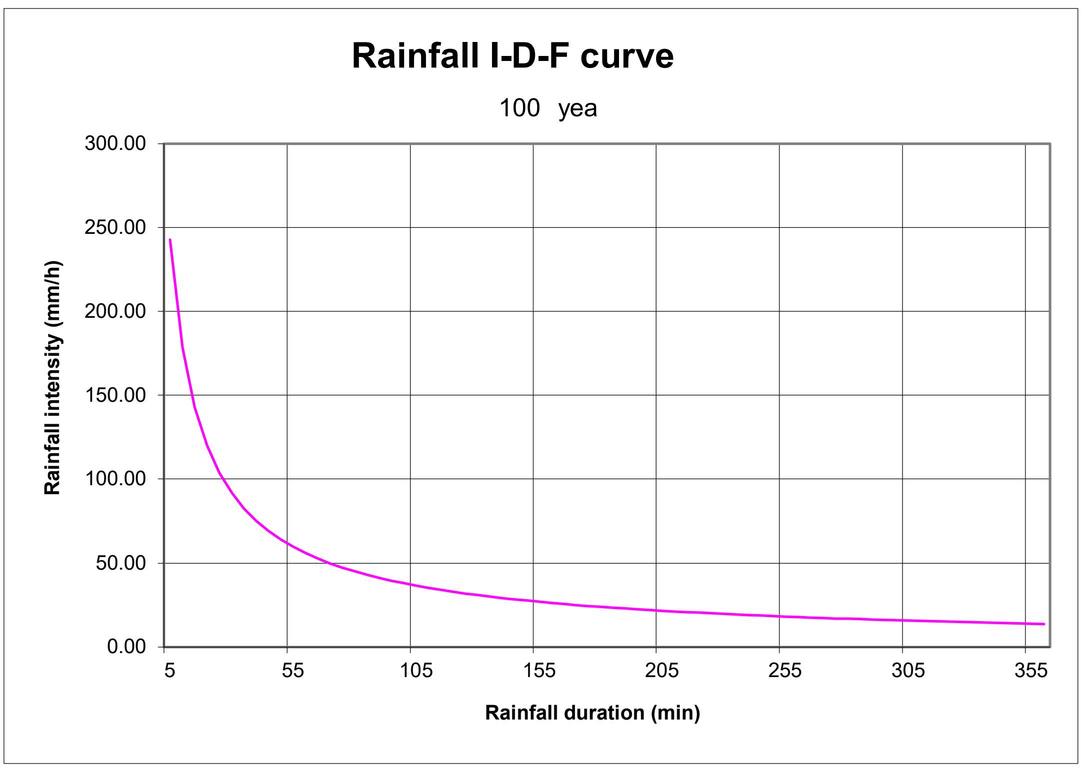
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 23, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m^3) *CIAT* (4)	Output Volume (m^3) *kQT* (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	21.41	3.74951582	17.66
10.0	178.56	31.51	7.49903163	24.01
15.0	142.89	37.82	11.2485474	26.57
20.0	119.95	42.33	14.9980633	27.34
25.0	103.85	45.81	18.7475791	27.07
30.0	91.87	48.63	22.4970949	26.14
35.0	82.58	51.00	26.2466107	24.76
40.0	75.15	53.04	29.9961265	23.05
45.0	69.05	54.83	33.7456423	21.09
50.0	63.95	56.43	37.4951582	18.93
55.0	59.62	57.87	41.244674	16.62
60.0	55.89	59.18	44.9941898	14.19
65.0	52.65	60.39	48.7437056	11.64
70.0	49.79	61.50	52.4932214	9.01
75.0	47.26	62.54	56.2427372	6.30
80.0	44.99	63.51	59.992253	3.52
85.0	42.95	64.43	63.7417689	0.69
90.0	41.11	65.29	67.4912847	-2.20
95.0	39.43	66.11	71.2408005	-5.13
100.0	37.90	66.88	74.9903163	-8.11
105.0	36.50	67.62	78.7398321	-11.12
110.0	35.20	68.33	82.4893479	-14.16
115.0	34.01	69.01	86.2388637	-17.23
120.0	32.89	69.66	89.9883796	-20.33
125.0	31.86	70.28	93.7378954	-23.46
130.0	30.90	70.88	97.4874112	-26.61
135.0	30.00	71.46	101.236927	-29.78
140.0	29.15	72.02	104.986443	-32.97
145.0	28.36	72.56	108.735959	-36.18
150.0	27.61	73.08	112.485474	-39.40
155.0	26.91	73.59	116.23499	-42.64
160.0	26.24	74.08	119.984506	-45.90
165.0	25.61	74.56	123.734022	-49.17
170.0	25.01	75.03	127.483538	-52.46
175.0	24.44	75.48	131.233054	-55.75
180.0	23.90	75.92	134.982569	-59.06
185.0	23.39	76.35	138.732085	-62.38
190.0	22.90	76.77	142.481601	-65.71
195.0	22.43	77.18	146.231117	-69.05
200.0	21.98	77.58	149.980633	-72.40
205.0	21.55	77.97	153.730148	-75.76
210.0	21.14	78.36	157.479664	-79.12
215.0	20.75	78.73	161.22918	-82.50
220.0	20.37	79.10	164.978696	-85.88
225.0	20.01	79.46	168.728212	-89.27
230.0	19.66	79.81	172.477727	-92.67
235.0	19.33	80.15	176.227243	-96.07
240.0	19.01	80.49	179.976759	-99.49

245.0	18.69	80.82	183.726275	-102.90
250.0	18.39	81.15	187.475791	-106.33
255.0	18.11	81.47	191.225307	-109.75
260.0	17.83	81.79	194.974822	-113.19
265.0	17.56	82.10	198.724338	-116.63
270.0	17.29	82.40	202.473854	-120.07
275.0	17.04	82.70	206.22337	-123.52
280.0	16.80	82.99	209.972886	-126.98
285.0	16.56	83.28	213.722401	-130.44
290.0	16.33	83.57	217.471917	-133.90
295.0	16.11	83.85	221.221433	-137.37
300.0	15.89	84.13	224.970949	-140.84
305.0	15.68	84.40	228.720465	-144.32
310.0	15.48	84.67	232.469981	-147.80
315.0	15.28	84.93	236.219496	-151.28
320.0	15.09	85.20	239.969012	-154.77
325.0	14.90	85.45	243.718528	-158.26
330.0	14.72	85.71	247.468044	-161.76
335.0	14.54	85.96	251.21756	-165.26
340.0	14.37	86.21	254.967075	-168.76
345.0	14.20	86.45	258.716591	-172.26
350.0	14.04	86.69	262.466107	-175.77
355.0	13.88	86.93	266.215623	-179.28
360.0	13.72	87.17	269.965139	-182.80
Max Volume (V max):				27.34
Design Volume (V design) :				**27.34**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: ***Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half***

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 84.10757773 L/s/ha

Area :	A5	0.1069	ha
Runoff Coefficient C (unfactored		0.9	
C_runoff factor:	-		
Runoff Coefficient C :		0.95	
Rainfall Event :		100	year
Discharge Flow Q :		0.0089911	m³/s
Discharge Factor K :		1	

Design Volume:	**30.46 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

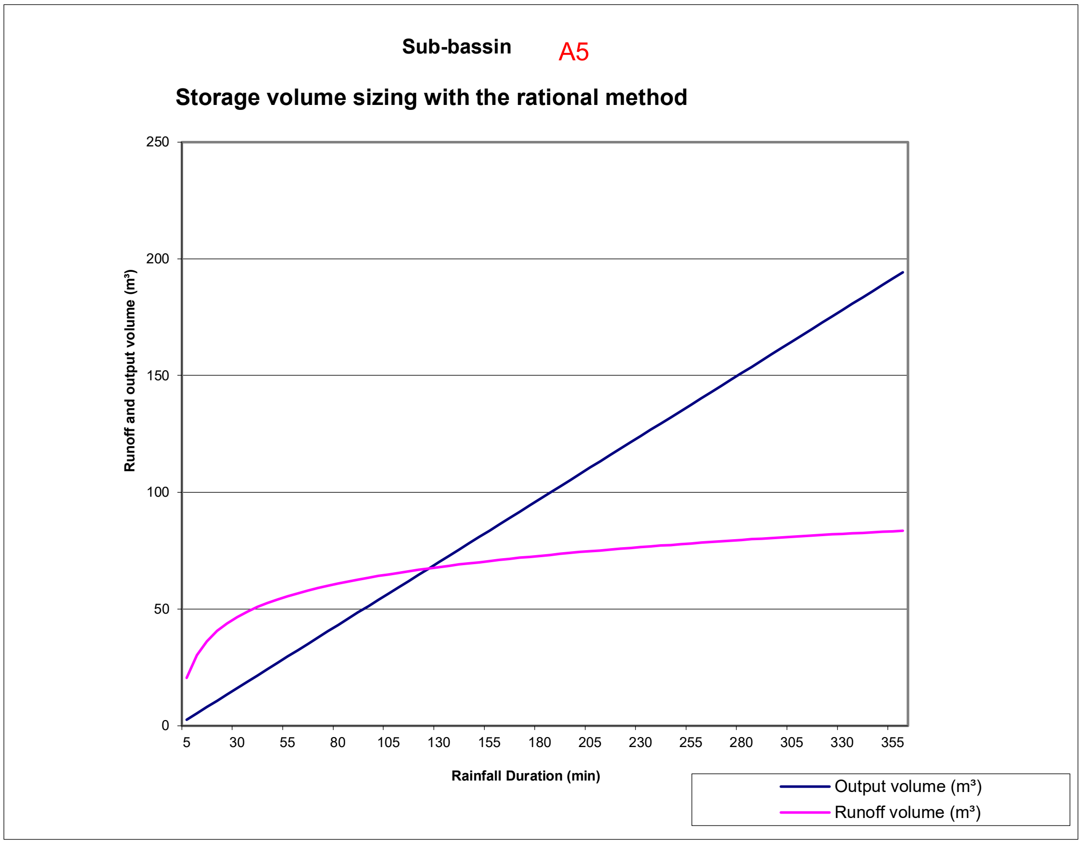
Prepared by: Guillaume LeBlond, M.A.Sc., EIT — Date: July 23, 2021
PEO No.: 100530467

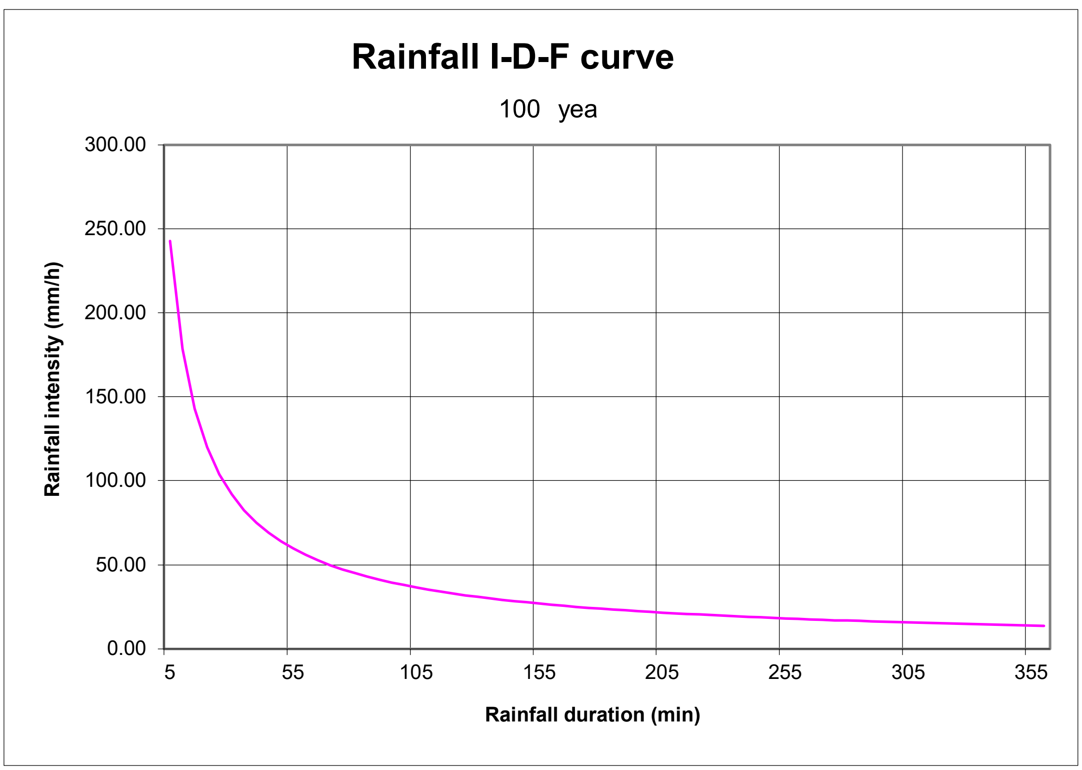
Verified by: Christian Lavoie-Lebel, P.Eng. — Date: July 23, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	**Rainfall Intensity** (mm/h) *I* (2)	**Runoff Volume** (m^3) *CIAT* (4)	**Output Volume** (m^3) *kQT* (5)	**Retention Volume** (m^3) *(4)-(5)* (6)
5.0	242.70	20.54	2.69733002	17.84
10.0	178.56	30.22	5.39466004	24.83
15.0	142.89	36.28	8.09199005	28.19
20.0	119.95	40.61	10.7893201	29.82
25.0	103.85	43.94	13.4866501	30.46
30.0	91.87	46.65	16.1839801	30.46
35.0	82.58	48.92	18.8813101	30.04
40.0	75.15	50.88	21.5786401	29.30
45.0	69.05	52.59	24.2759702	28.32
50.0	63.95	54.12	26.9733002	27.15
55.0	59.62	55.51	29.6706302	25.83
60.0	55.89	56.76	32.3679602	24.40
65.0	52.65	57.92	35.0652902	22.86
70.0	49.79	58.99	37.7626202	21.23
75.0	47.26	59.99	40.4599503	19.53
80.0	44.99	60.92	43.1572803	17.76
85.0	42.95	61.80	45.8546103	15.94
90.0	41.11	62.63	48.5519403	14.07
95.0	39.43	63.41	51.2492703	12.16
100.0	37.90	64.15	53.9466004	10.21
105.0	36.50	64.86	56.6439304	8.22
110.0	35.20	65.54	59.3412604	6.20
115.0	34.01	66.19	62.0385904	4.15
120.0	32.89	66.81	64.7359204	2.08
125.0	31.86	67.41	67.4332504	-0.02
130.0	30.90	67.99	70.1305805	-2.14
135.0	30.00	68.54	72.8279105	-4.29
140.0	29.15	69.08	75.5252405	-6.45
145.0	28.36	69.60	78.2225705	-8.62
150.0	27.61	70.10	80.9199005	-10.82
155.0	26.91	70.59	83.6172306	-13.03
160.0	26.24	71.06	86.3145606	-15.25
165.0	25.61	71.52	89.0118906	-17.49
170.0	25.01	71.97	91.7092206	-19.74
175.0	24.44	72.40	94.4065506	-22.01
180.0	23.90	72.82	97.1038806	-24.28
185.0	23.39	73.24	99.8012107	-26.57
190.0	22.90	73.64	102.498541	-28.86
195.0	22.43	74.03	105.195871	-31.17
200.0	21.98	74.41	107.893201	-33.48
205.0	21.55	74.79	110.590531	-35.80
210.0	21.14	75.16	113.287861	-38.13
215.0	20.75	75.52	115.985191	-40.47
220.0	20.37	75.87	118.682521	-42.82
225.0	20.01	76.21	121.379851	-45.17
230.0	19.66	76.55	124.077181	-47.53
235.0	19.33	76.88	126.774511	-49.89
240.0	19.01	77.21	129.471841	-52.27

245.0	18.69	77.52	132.169171	-54.65
250.0	18.39	77.84	134.866501	-57.03
255.0	18.11	78.14	137.563831	-59.42
260.0	17.83	78.45	140.261161	-61.81
265.0	17.56	78.74	142.958491	-64.22
270.0	17.29	79.04	145.655821	-66.62
275.0	17.04	79.32	148.353151	-69.03
280.0	16.80	79.61	151.050481	-71.45
285.0	16.56	79.88	153.747811	-73.86
290.0	16.33	80.16	156.445141	-76.29
295.0	16.11	80.43	159.142471	-78.72
300.0	15.89	80.69	161.839801	-81.15
305.0	15.68	80.95	164.537131	-83.58
310.0	15.48	81.21	167.234461	-86.02
315.0	15.28	81.47	169.931791	-88.46
320.0	15.09	81.72	172.629121	-90.91
325.0	14.90	81.97	175.326451	-93.36
330.0	14.72	82.21	178.023781	-95.81
335.0	14.54	82.45	180.721111	-98.27
340.0	14.37	82.69	183.418441	-100.73
345.0	14.20	82.92	186.115771	-103.19
350.0	14.04	83.15	188.813101	-105.66
355.0	13.88	83.38	191.510431	-108.13
360.0	13.72	83.61	194.207761	-110.60
Max Volume (V max):				30.46
Design Volume (V design) :				**30.46**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 84.10757773 L/s/ha

Area : A6	0.486	ha
Runoff Coefficient C (unfactored	0.34	
C_runoff factor:	1.25	
Runoff Coefficient C :	0.425	
Rainfall Event :	100	year
Discharge Flow Q :	0.040876283	m^3/s
Discharge Factor K :	1	

Design Volume: **37.00 m^3**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

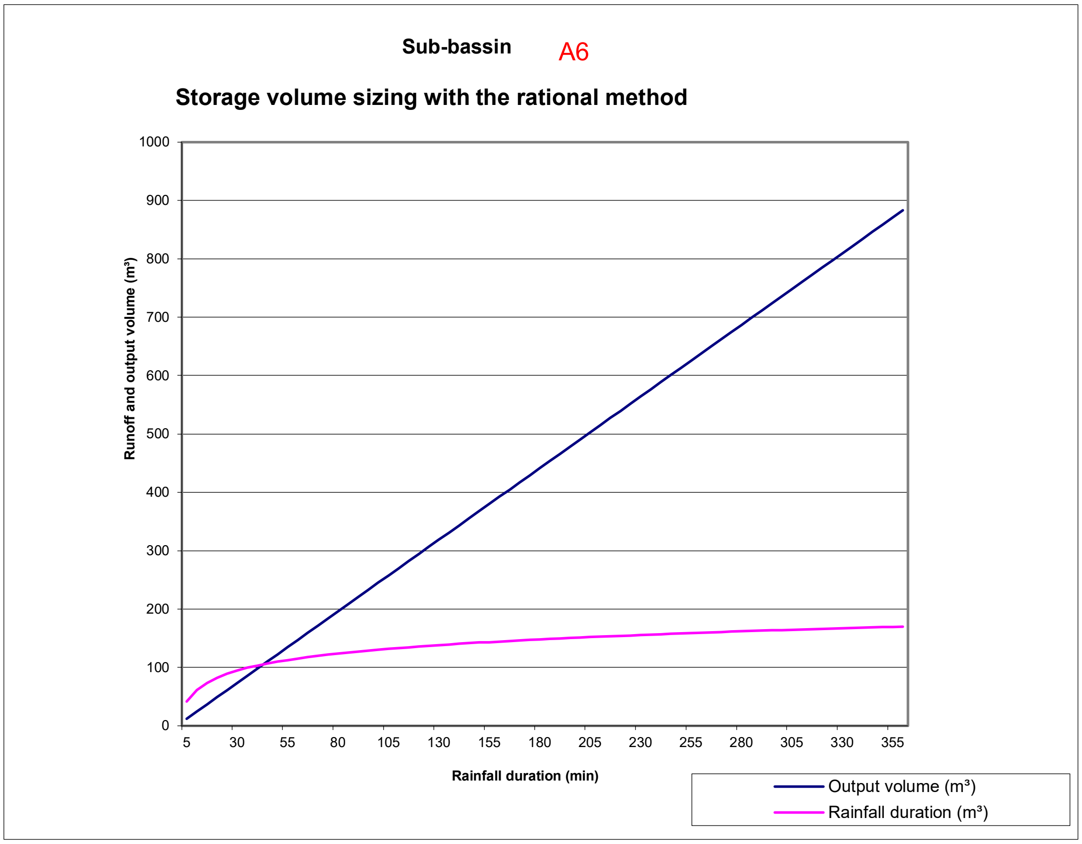
Prepared by: Guillaume LeBlond, M.A.Sc., EIT — Date: July 23, 2021
PEO No.: 100530467

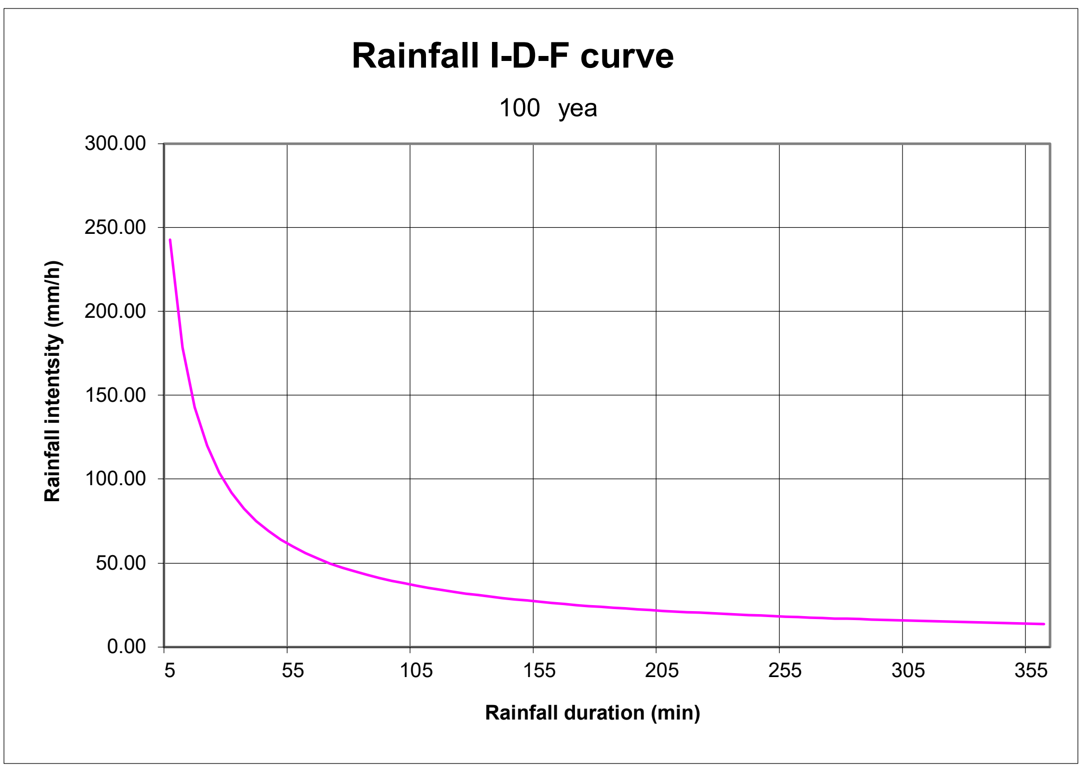
Verified by: Christian Lavoie-Lebel, P.Eng. — Date: July 23, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m^3) *CIAT* (4)	Output Volume (m^3) *kQT* (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	41.78	12.2628848	29.51
10.0	178.56	61.47	24.5257697	36.94
15.0	142.89	73.79	36.7886545	37.00
20.0	119.95	82.59	49.0515393	33.53
25.0	103.85	89.37	61.3144242	28.06
30.0	91.87	94.88	73.577309	21.30
35.0	82.58	99.50	85.8401938	13.66
40.0	75.15	103.48	98.1030787	5.37
45.0	69.05	106.97	110.365963	-3.40
50.0	63.95	110.08	122.628848	-12.55
55.0	59.62	112.89	134.891733	-22.00
60.0	55.89	115.45	147.154618	-31.70
65.0	52.65	117.80	159.417503	-41.61
70.0	49.79	119.98	171.680388	-51.70
75.0	47.26	122.01	183.943272	-61.94
80.0	44.99	123.91	196.206157	-72.30
85.0	42.95	125.69	208.469042	-82.78
90.0	41.11	127.37	220.731927	-93.36
95.0	39.43	128.97	232.994812	-104.03
100.0	37.90	130.48	245.257697	-114.78
105.0	36.50	131.92	257.520581	-125.60
110.0	35.20	133.30	269.783466	-136.48
115.0	34.01	134.62	282.046351	-147.42
120.0	32.89	135.89	294.309236	-158.42
125.0	31.86	137.11	306.572121	-169.47
130.0	30.90	138.28	318.835006	-180.56
135.0	30.00	139.41	331.09789	-191.69
140.0	29.15	140.50	343.360775	-202.86
145.0	28.36	141.55	355.62366	-214.07
150.0	27.61	142.57	367.886545	-225.31
155.0	26.91	143.57	380.14943	-236.58
160.0	26.24	144.53	392.412315	-247.89
165.0	25.61	145.46	404.675199	-259.22
170.0	25.01	146.37	416.938084	-270.57
175.0	24.44	147.25	429.200969	-281.95
180.0	23.90	148.11	441.463854	-293.35
185.0	23.39	148.95	453.726739	-304.78
190.0	22.90	149.77	465.989624	-316.22
195.0	22.43	150.57	478.252508	-327.68
200.0	21.98	151.35	490.515393	-339.17
205.0	21.55	152.11	502.778278	-350.67
210.0	21.14	152.86	515.041163	-362.18
215.0	20.75	153.59	527.304048	-373.72
220.0	20.37	154.30	539.566933	-385.26
225.0	20.01	155.00	551.829817	-396.83
230.0	19.66	155.69	564.092702	-408.40
235.0	19.33	156.36	576.355587	-419.99
240.0	19.01	157.03	588.618472	-431.59

245.0	18.69	157.67	600.881357	-443.21
250.0	18.39	158.31	613.144242	-454.83
255.0	18.11	158.94	625.407126	-466.47
260.0	17.83	159.55	637.670011	-478.12
265.0	17.56	160.15	649.932896	-489.78
270.0	17.29	160.75	662.195781	-501.45
275.0	17.04	161.33	674.458666	-513.13
280.0	16.80	161.91	686.721551	-524.81
285.0	16.56	162.47	698.984435	-536.51
290.0	16.33	163.03	711.24732	-548.22
295.0	16.11	163.58	723.510205	-559.93
300.0	15.89	164.12	735.77309	-571.65
305.0	15.68	164.65	748.035975	-583.38
310.0	15.48	165.18	760.29886	-595.12
315.0	15.28	165.69	772.561744	-606.87
320.0	15.09	166.20	784.824629	-618.62
325.0	14.90	166.71	797.087514	-630.38
330.0	14.72	167.20	809.350399	-642.15
335.0	14.54	167.69	821.613284	-653.92
340.0	14.37	168.18	833.876169	-665.70
345.0	14.20	168.65	846.139053	-677.48
350.0	14.04	169.13	858.401938	-689.28
355.0	13.88	169.59	870.664823	-701.07
360.0	13.72	170.05	882.927708	-712.88
Max Volume (V max):				37.00
Design Volume (V design) :				**37.00**

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-09-21 14:40

File Location: *Z:\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\210921_Fully Translated Spreadsheets\[210723_Storm Water Management - Storage and Drawdown_half RR.xlsx]A7*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 84.10757773 L/s/ha

Area : A7	0.1497	ha
Runoff Coefficient C (unfactored	0.52	
C_runoff factor:	1.25	
Runoff Coefficient C :	0.65	
Rainfall Event :	100	year
Discharge Flow Q :	0.012590904	m³/s
Discharge Factor K :	1	

Design Volume: **23.80 m³**

Rainfall	2 year		5 year		10 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.81	0.81	0.814	0.814	0.816	0.816
Rainfall	25 year		50 year		100 year	
Pluviometry Coefficients	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.82	0.82	0.82	0.82

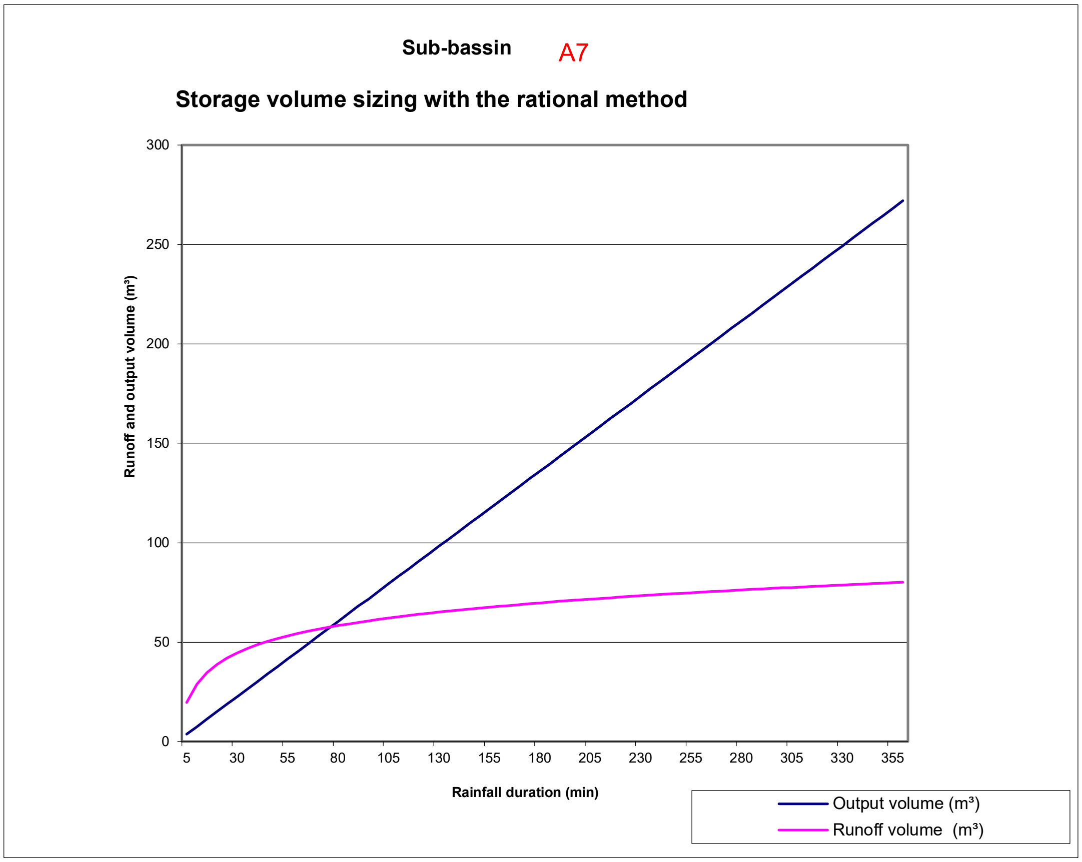
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 23, 2021
PEO No.: 100530467

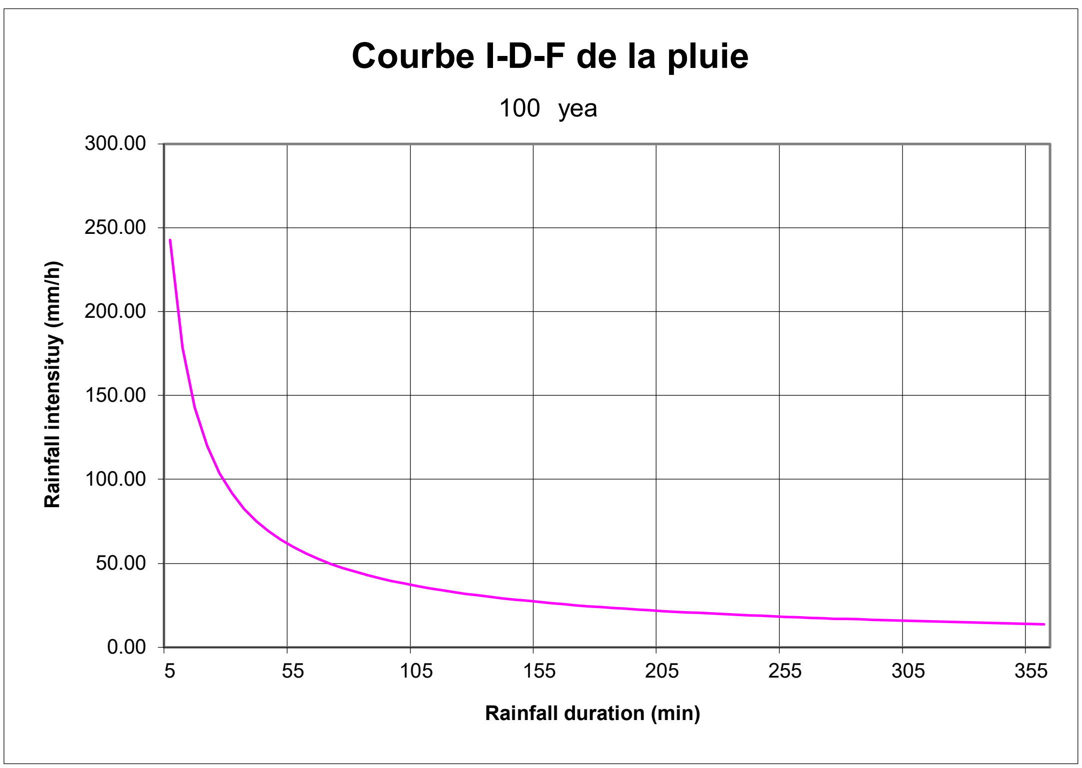
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 23, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m^3) *CIAT* (4)	Output Volume (m^3) *kQT* (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	19.68	3.77727132	15.90
10.0	178.56	28.96	7.55454263	21.40
15.0	142.89	34.76	11.3318139	23.43
20.0	119.95	38.91	15.1090853	23.80
25.0	103.85	42.10	18.8863566	23.22
30.0	91.87	44.70	22.6636279	22.03
35.0	82.58	46.87	26.4408992	20.43
40.0	75.15	48.75	30.2181705	18.53
45.0	69.05	50.39	33.9954418	16.40
50.0	63.95	51.86	37.7727132	14.09
55.0	59.62	53.18	41.5499845	11.63
60.0	55.89	54.39	45.3272558	9.06
65.0	52.65	55.50	49.1045271	6.39
70.0	49.79	56.52	52.8817984	3.64
75.0	47.26	57.48	56.6590697	0.82
80.0	44.99	58.37	60.4363411	-2.07
85.0	42.95	59.21	64.2136124	-5.00
90.0	41.11	60.00	67.9908837	-7.99
95.0	39.43	60.76	71.768155	-11.01
100.0	37.90	61.47	75.5454263	-14.08
105.0	36.50	62.15	79.3226976	-17.17
110.0	35.20	62.80	83.0999689	-20.30
115.0	34.01	63.42	86.8772403	-23.46
120.0	32.89	64.02	90.6545116	-26.64
125.0	31.86	64.59	94.4317829	-29.84
130.0	30.90	65.14	98.2090542	-33.07
135.0	30.00	65.67	101.986326	-36.31
140.0	29.15	66.19	105.763597	-39.58
145.0	28.36	66.69	109.540868	-42.86
150.0	27.61	67.17	113.318139	-46.15
155.0	26.91	67.63	117.095411	-49.46
160.0	26.24	68.09	120.872682	-52.79
165.0	25.61	68.53	124.649953	-56.12
170.0	25.01	68.95	128.427225	-59.47
175.0	24.44	69.37	132.204496	-62.83
180.0	23.90	69.78	135.981767	-66.21
185.0	23.39	70.17	139.759039	-69.59
190.0	22.90	70.56	143.53631	-72.98
195.0	22.43	70.93	147.313581	-76.38
200.0	21.98	71.30	151.090853	-79.79
205.0	21.55	71.66	154.868124	-83.21
210.0	21.14	72.01	158.645395	-86.63
215.0	20.75	72.36	162.422667	-90.07
220.0	20.37	72.69	166.199938	-93.51
225.0	20.01	73.02	169.977209	-96.96
230.0	19.66	73.35	173.754481	-100.41
235.0	19.33	73.66	177.531752	-103.87

240.0	19.01	73.97	181.309023	-107.33
245.0	18.69	74.28	185.086294	-110.81
250.0	18.39	74.58	188.863566	-114.28
255.0	18.11	74.87	192.640837	-117.77
260.0	17.83	75.16	196.418108	-121.25
265.0	17.56	75.45	200.19538	-124.75
270.0	17.29	75.73	203.972651	-128.24
275.0	17.04	76.00	207.749922	-131.75
280.0	16.80	76.27	211.527194	-135.25
285.0	16.56	76.54	215.304465	-138.76
290.0	16.33	76.80	219.081736	-142.28
295.0	16.11	77.06	222.859008	-145.80
300.0	15.89	77.32	226.636279	-149.32
305.0	15.68	77.57	230.41355	-152.85
310.0	15.48	77.81	234.190822	-156.38
315.0	15.28	78.06	237.968093	-159.91
320.0	15.09	78.30	241.745364	-163.45
325.0	14.90	78.54	245.522636	-166.99
330.0	14.72	78.77	249.299907	-170.53
335.0	14.54	79.00	253.077178	-174.08
340.0	14.37	79.23	256.854449	-177.63
345.0	14.20	79.45	260.631721	-181.18
350.0	14.04	79.67	264.408992	-184.73
355.0	13.88	79.89	268.186263	-188.29
360.0	13.72	80.11	271.963535	-191.85
Max Volume (V max):				23.80
Design Volume (V design) :				**23.80**

Fastfrate Warehouse Development
Industrial/Commercial Development





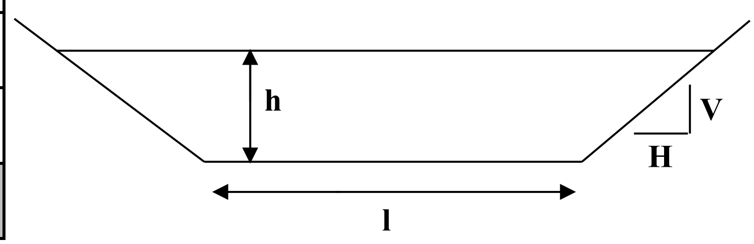
Date: **2021-08-13**

FASTFRATE

A001083 (360)

CHANNEL CHECK AT DITCH ON SOMME STREET (100-YEAR)

Bed Length (l)	m	0.000		
Side Slopes (H:V)	H/V	3.0000	1.0000	
Slope (S)	m/m	0.0050	%	0.50
Roughness Coefficient	n	0.0300		
Flow (Q)	m^3/s	3.857	l/s	3,857
Velocity (V)	m/s	1.395	cm/s	140
Hydraulic Radius (R_h)	m	0.455		
Wetted Area	m^2	2.765		
Wetted Perimeter	m	6.072		
Height of water (h)	m	0.960		



Notes: The ditch on Somme street at which our site is connecting will have a headwater height of 0.96m during the 100-year storm event. The bottom of the ditch at that location is 89.110 which means the hydraulic grade line within the ditch will be at 90.07.

Prepared by: Julien Sauvé, P.Eng — Date: July 20, 2021

100200100

Verified by: Julien Sauvé, P.Eng — Date: July 20, 2021

PEO No.: 100200100

##

Piezometric line calculation
Calculation sheet

Aquapraxis

Project Title:	Fastfrate Warehouse Development	**Location:**	Outfall
Project Number:	A001083 (360)	**Road:**	n.a.
Designed by:	Guillaume LeBlond, M.A.Sc. **Date:** 2021-07-23	**Initial water level (m):**	90.07
Verified by:	Christian Lavoie-Lebel, P.En **Date:** 2021-07-23	**Initial velocity (m/s):**	1.4
		Manning number:	0.013

Initial EGL$_s$ (m):
Initial HGL (m):

Erase | Graphic

Manhole Num.	D (mm)	Q (m^3/s)	S (m/m)	L (m)	V (m/s)	y (m)	A (m^2)	y_c (m)	$V^2/2g$ (m)	S_f (m/m)	h_f (m)	EGL$_s$ (m)	K	$K(V^2/2g)$ (m)	EGL$_e$ (m)	HGL$_e$ (m)	Cur. Elev. (m)	Surface Elev. (m)	Flow Type	Surface Elev. - LGH (m)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Outlet	900	0.907			1.4				0.100			90.170			90.190	90.070	90.18	91	super-critical	
STM 900	900	0.907	0.0022	6.1	1.537	0.788	0.5903	0.555	0.120	0.002	0.013	90.201	0.5	0.060	-	-	90.19342	91	sub-critical	-

Comment:

Piezometric line calculation
Calculation sheet

Project Title: Fastfrate Warehouse Development
Project Number: A001083 (360)
Designed by: Guillaume LeBlond, M.A.Sc. **Date:** 2021-07-23
Verified by: Christian Lavoie-Lebel, P.En **Date:** 2021-07-23

Location: Outfall
Road: n.a.
Initial water level (m): 89.11
Initial velocity (m/s): 0.3
Manning number: 0.013

Initial EGLs (m):
Initial HGL (m):

Erase | Graphic

Manhole Num. (1)	D (mm) (2)	Q (m^3/s) (3)	S (m/m) (4)	L (m) (5)	V (m/s) (6)	y (m) (7)	A (m^2) (8)	y_c (m) (9)	$V^2/2g$ (m) (10)	S_f (m/m) (11)	h_f (m) (12)	LGE_s (m) (13)	K (14)	$K(V^2/2g)$ (m) (15)	LGE_e (m) (16)	LGH_e (m) (17)	Cur. Elev. (m) (18)	Surface Elev. (m) (19)	Flow Type (20)
Outlet	900	0.4965			1.4				0.100			90.034			90.030	89.934	90.18	91	super-critical
STM 900	900	0.4965	0.0022	6.1	1.367	0.500	0.3631	0.409	0.095	0.002	0.013	89.889	0.5	0.048	-	-	90.19342	91	sub-critical

Comment:

Surface Elev. - LGH (m)
(21)
-

PROJECT NAME:	Fastfrate (Ottawa) Warehouse Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS:	90 % Design (Site plan Approval)

Prepared by: Guillaume LeBlond, M.A.Sc., EIT — Date: August 9, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. — Date: August 9, 2021
PEO No.: 100067842

Numerical Analysis; Orifice sizing

Extended Detention Control

Extended Detention Orifice

Control Type	Circular Orifice plate			
Elevation Range (m)	89.3 to 89.5	**Weir Equation Comparison**	Values	Notes
Base elevation (m)	89.3	Weir Elevation (m)	89.3	
Initial head over Orifice	0	Head over weir, H_w (m)	0.20	
Orifice Diameter (mm)	80	Weir Discharge Coeff., C_w	0.61	
No. of orifices	1	Weir Length, L_w (m):	0.1	
Gravitational Acceleration, g (m/s^2)	9.81	Weir Flow, q_w (m^3/s) – Peak Flow	0.02	(2/3*C_w*L_w*sqrt(2*g)*H_w^(3/2))
Discharge Coefficient, C_d	0.63	Weir Flow, q_w (L/s) – Peak Flow	16.11	

Water Elevation (m)	Head over Orifice, hf (m)	Head differential, dh (m)	Pond Area "A" (m2)	Orifice Area "a" (m2)	Q=a*C*sqrt(2*g*hf) (m3/s)	Time differential, dt (s)	Q=2/3*C_w*L_w*sqrt(2*g)*h_w^(3/2) (m3/s)	Time differential, dt (s)
89.30	0.00	0	846.29	5.03E-03	1.00E-06	0	0.00E+00	0
89.31	0.01	0.01	849.30	5.03E-03	1.40E-03	6055	1.80E-04	47149
89.32	0.02	0.01	852.32	5.03E-03	1.98E-03	4297	5.09E-04	16729
89.33	0.03	0.01	855.34	5.03E-03	2.43E-03	3521	9.36E-04	9138
89.34	0.04	0.01	858.37	5.03E-03	2.81E-03	3060	1.44E-03	5957
89.35	0.05	0.01	861.40	5.03E-03	3.14E-03	2746	2.01E-03	4277
89.36	0.06	0.01	864.44	5.03E-03	3.44E-03	2516	2.65E-03	3265
89.37	0.07	0.01	867.48	5.03E-03	3.71E-03	2338	3.34E-03	2600
89.38	0.08	0.01	870.53	5.03E-03	3.97E-03	2194	4.08E-03	2136
89.39	0.09	0.01	873.59	5.03E-03	4.21E-03	2076	4.86E-03	1796
89.40	0.10	0.01	876.65	5.03E-03	4.44E-03	1976	5.70E-03	1539
89.41	0.11	0.01	879.71	5.03E-03	4.65E-03	1891	6.57E-03	1339
89.42	0.12	0.01	882.78	5.03E-03	4.86E-03	1817	7.49E-03	1179
89.43	0.13	0.01	885.86	5.03E-03	5.06E-03	1752	8.44E-03	1049
89.44	0.14	0.01	888.94	5.03E-03	5.25E-03	1694	9.44E-03	942
89.45	0.15	0.01	892.03	5.03E-03	5.43E-03	1642	1.05E-02	852
89.46	0.16	0.01	895.12	5.03E-03	5.61E-03	1595	1.15E-02	776
89.47	0.17	0.01	898.22	5.03E-03	5.78E-03	1553	1.26E-02	711
89.48	0.18	0.01	901.32	5.03E-03	5.95E-03	1515	1.38E-02	655
89.49	0.19	0.01	904.43	5.03E-03	6.11E-03	1479	1.49E-02	606
89.50	0.20	0.01	907.55	5.03E-03	6.27E-03	1447	1.61E-02	563

Numerical Results:

Parameter	Value	Units		
Peak Flowrate (L/s)	6.27	L/s	16.11	L/s
Average Flowrate (L/s)	4.12	L/s	6.53	L/s
Water Quality Volume (m^3)	175.65	m^3	175.65	m^3
Drawdown Time (h)	13.1	h	28.7	h
90% Drawdown Time (h)	11.4	h	15.6	h

MOE Equation 4.10 Results:

Parameter	Value	Units
Area of Pond	878.2696766	m2
Orifice Discharge Coeff. C	0.63	unls.
Orifice Area, A_0	5.03E-03	m2
g	9.81	m/s^2
h1	0.2	m
h2	0.0	m
Drawdown Time, t	5.6E+04	s
Drawdown Time, t	**15.6**	h

Prepared by:	Guillaume LeBlond, M.A.Sc., EIT	Date:	August 9, 2021
PEO No.:	100530467		
Verified by:	Christian Lavoie-Lebel, P.Eng.	Date:	August 9, 2021
PEO No.:	100067842		

Retention Control - Freeflow condition

Retention Control Orifice

			Values	Notes
Control Type	Rectangular Orifice			
Elevation Range (m)	89.5- 89.85	**Weir Equation Comparison**		
Base elevation (m)	89.5	Weir Elevation (m)	89.5	
Initial head over Orifice	0	Head over weir, H_w (m)	0.60	
Orifice Depth (mm)	600	Weir Discharge Coeff., C_w	0.61	
Orifice Width (mm)	1040			
No. of orifices	1	Weir Length, L_w (m): 3x 780mm	1040	
Gravitational Acceleration, g (m/s^2)	9.81	Weir Flow, q_w (m^3/s)	870.66	(2/3*C_w*L_w*sqrt(2*g)*H_w^(3/2))
Orifice Discharge Coeff., C_d	0.63	Weir Flow, q_w (L/s)	870659.40	

Water Elevation (m)	Head over Orifice, hf (m)	Head differential, dh (m)	Pond Area "A" (m2)	Orifice Area "a" (m2)	Q=a*C_d*sqrt(2*g*hf) (m3/s)	Time differential, dt (s)
89.50	0.00	0	907.55	6.24E-01	1.00E-06	0.00
89.51	0.01	0.01	910.67	6.24E-01	1.74E-01	52.30
89.52	0.02	0.01	913.79	6.24E-01	2.46E-01	37.11
89.53	0.03	0.01	916.93	6.24E-01	3.02E-01	30.40
89.54	0.04	0.01	920.06	6.24E-01	3.48E-01	26.42
89.55	0.05	0.01	923.21	6.24E-01	3.89E-01	23.71
89.56	0.06	0.01	926.35	6.24E-01	4.27E-01	21.72
89.57	0.07	0.01	929.51	6.24E-01	4.61E-01	20.18
89.58	0.08	0.01	932.67	6.24E-01	4.93E-01	18.94
89.59	0.09	0.01	935.83	6.24E-01	5.22E-01	17.91
89.60	0.10	0.01	939.00	6.24E-01	5.51E-01	17.05
89.61	0.11	0.01	942.18	6.24E-01	5.78E-01	16.31
89.62	0.12	0.01	945.36	6.24E-01	6.03E-01	15.67
89.63	0.13	0.01	948.54	6.24E-01	6.28E-01	15.11
89.64	0.14	0.01	951.73	6.24E-01	6.52E-01	14.61
89.65	0.15	0.01	954.93	6.24E-01	6.74E-01	14.16
89.66	0.16	0.01	958.13	6.24E-01	6.97E-01	13.76
89.67	0.17	0.01	961.34	6.24E-01	7.18E-01	13.39
89.68	0.18	0.01	964.56	6.24E-01	7.39E-01	13.06
89.69	0.19	0.01	967.78	6.24E-01	7.59E-01	12.75
89.70	0.20	0.01	971.00	6.24E-01	7.79E-01	12.47
89.71	0.21	0.01	974.23	6.24E-01	7.98E-01	12.21
89.72	0.22	0.01	977.47	6.24E-01	8.17E-01	11.97
89.73	0.23	0.01	980.71	6.24E-01	8.35E-01	11.74
89.74	0.24	0.01	983.95	6.24E-01	8.53E-01	11.53
89.75	0.25	0.01	987.21	6.24E-01	8.71E-01	11.34
89.76	0.26	0.01	990.46	6.24E-01	8.88E-01	11.16
89.77	0.27	0.01	993.73	6.24E-01	9.05E-01	10.98
89.78	0.28	0.01	997.00	6.24E-01	9.21E-01	10.82
89.79	0.29	0.01	1000.27	6.24E-01	9.38E-01	10.67
89.80	0.30	0.01	1003.55	6.24E-01	9.54E-01	10.52
89.81	0.31	0.01	1006.84	6.24E-01	9.70E-01	10.38
89.82	0.32	0.01	1010.13	6.24E-01	9.85E-01	10.25
89.83	0.33	0.01	1013.42	6.24E-01	1.00E+00	10.13
89.84	0.34	0.01	1016.72	6.24E-01	1.02E+00	10.01
89.85	0.35	0.01	1020.03	6.24E-01	1.03E+00	9.90
89.86	0.36	0.01	1023.34	6.24E-01	1.04E+00	9.79
89.87	0.37	0.01	1026.66	6.24E-01	1.06E+00	9.69
89.88	0.38	0.01	1029.99	6.24E-01	1.07E+00	9.60
89.89	0.39	0.01	1033.32	6.24E-01	1.09E+00	9.50
89.90	0.40	0.01	1036.65	6.24E-01	1.10E+00	9.41
89.91	0.41	0.01	1039.99	6.24E-01	1.11E+00	9.33
89.92	0.42	0.01	1043.34	6.24E-01	1.13E+00	9.25
89.93	0.43	0.01	1046.69	6.24E-01	1.14E+00	9.17
89.94	0.44	0.01	1050.04	6.24E-01	1.16E+00	9.09
89.95	0.45	0.01	1053.41	6.24E-01	1.17E+00	9.02
89.96	0.46	0.01	1056.77	6.24E-01	1.18E+00	8.95
89.97	0.47	0.01	1060.15	6.24E-01	1.19E+00	8.88
89.98	0.48	0.01	1063.53	6.24E-01	1.21E+00	8.82
89.99	0.49	0.01	1066.91	6.24E-01	1.22E+00	8.75
90.00	0.50	0.01	1070.30	6.24E-01	1.23E+00	8.69
90.01	0.51	0.01	1073.70	6.24E-01	1.24E+00	8.63
90.02	0.52	0.01	1077.10	6.24E-01	1.26E+00	8.58
90.03	0.53	0.01	1080.50	6.24E-01	1.27E+00	8.52
90.04	0.54	0.01	1083.91	6.24E-01	1.28E+00	8.47
90.05	0.55	0.01	1087.33	6.24E-01	1.29E+00	8.42
90.06	0.56	0.01	1090.75	6.24E-01	1.30E+00	8.37
90.07	0.57	0.01	1094.18	6.24E-01	1.31E+00	8.32
90.08	0.58	0.01	1097.62	6.24E-01	1.33E+00	8.28
90.09	0.59	0.01	1101.05	6.24E-01	1.34E+00	8.23
90.10	0.60	0.01	1104.50	6.24E-01	1.35E+00	8.19

Numerical Results:

Average Flowrate - Quantity Control Orifice	894.9	L/s
Average Flowrate - Extended Detention Orifice	9.6	L/s
Total Average Flowrate	904.6	L/s
Allowable Flowrate	906.9	L/s

	Prepared by: Guillaume LeBlond, M.A.Sc., EIT	Date: August 9, 2021
	PEO No.: 100530467	
Retention Control - Freeflow condition	Verified by: Christian Lavoie-Lebel, P.Eng.	Date: August 9, 2021
	PEO No.: 100067842	

Extended Detention Orifice

Control Type	Circular Orifice plate
Elevation Range (m)	89.5- 89.85
Base elevation (m)	89.5
Initial head over Orifice	0.2
Orifice Diameter (mm)	80
No. of orifices	1
Gravitational Acceleration, g (m/s^2)	9.81
Discharge Coefficient, C_d	0.63

Water Elevation (m)	Head over Orifice, hf (m)	Head differential, dh (m)	Pond Area "A" (m2)	Orifice Area "a" (m2)	Q=a*C*sqrt(2*g*hf) (m3/s)	Time differential, dt (s)
89.50	0.20	0	907.55	5.03E-03	1.00E-06	0.00
89.51	0.21	0.01	910.67	5.03E-03	6.43E-03	1416.74
89.52	0.22	0.01	913.79	5.03E-03	6.58E-03	1388.92
89.53	0.23	0.01	916.93	5.03E-03	6.73E-03	1363.05
89.54	0.24	0.01	920.06	5.03E-03	6.87E-03	1338.91
89.55	0.25	0.01	923.21	5.03E-03	7.01E-03	1316.34
89.56	0.26	0.01	926.35	5.03E-03	7.15E-03	1295.18
89.57	0.27	0.01	929.51	5.03E-03	7.29E-03	1275.30
89.58	0.28	0.01	932.67	5.03E-03	7.42E-03	1256.57
89.59	0.29	0.01	935.83	5.03E-03	7.55E-03	1238.90
89.60	0.30	0.01	939.00	5.03E-03	7.68E-03	1222.21
89.61	0.31	0.01	942.18	5.03E-03	7.81E-03	1206.40
89.62	0.32	0.01	945.36	5.03E-03	7.93E-03	1191.41
89.63	0.33	0.01	948.54	5.03E-03	8.06E-03	1177.17
89.64	0.34	0.01	951.73	5.03E-03	8.18E-03	1163.63
89.65	0.35	0.01	954.93	5.03E-03	8.30E-03	1150.74
89.66	0.36	0.01	958.13	5.03E-03	8.42E-03	1138.45
89.67	0.37	0.01	961.34	5.03E-03	8.53E-03	1126.72
89.68	0.38	0.01	964.56	5.03E-03	8.65E-03	1115.52
89.69	0.39	0.01	967.78	5.03E-03	8.76E-03	1104.80
89.70	0.40	0.01	971.00	5.03E-03	8.87E-03	1094.53
89.71	0.41	0.01	974.23	5.03E-03	8.98E-03	1084.70
89.72	0.42	0.01	977.47	5.03E-03	9.09E-03	1075.27
89.73	0.43	0.01	980.71	5.03E-03	9.20E-03	1066.22
89.74	0.44	0.01	983.95	5.03E-03	9.30E-03	1057.52
89.75	0.45	0.01	987.21	5.03E-03	9.41E-03	1049.16
89.76	0.46	0.01	990.46	5.03E-03	9.51E-03	1041.12
89.77	0.47	0.01	993.73	5.03E-03	9.62E-03	1033.38
89.78	0.48	0.01	997.00	5.03E-03	9.72E-03	1025.92
89.79	0.49	0.01	1000.27	5.03E-03	9.82E-03	1018.73
89.80	0.50	0.01	1003.55	5.03E-03	9.92E-03	1011.80
89.81	0.51	0.01	1006.84	5.03E-03	1.00E-02	1005.11
89.82	0.52	0.01	1010.13	5.03E-03	1.01E-02	998.65
89.83	0.53	0.01	1013.42	5.03E-03	1.02E-02	992.41
89.84	0.54	0.01	1016.72	5.03E-03	1.03E-02	986.39
89.85	0.55	0.01	1020.03	5.03E-03	1.04E-02	980.56
89.86	0.56	0.01	1023.34	5.03E-03	1.05E-02	974.92
89.87	0.57	0.01	1026.66	5.03E-03	1.06E-02	969.46
89.88	0.58	0.01	1029.99	5.03E-03	1.07E-02	964.18
89.89	0.59	0.01	1033.32	5.03E-03	1.08E-02	959.06
89.90	0.60	0.01	1036.65	5.03E-03	1.09E-02	954.11
89.91	0.61	0.01	1039.99	5.03E-03	1.10E-02	949.30
89.92	0.62	0.01	1043.34	5.03E-03	1.10E-02	944.65
89.93	0.63	0.01	1046.69	5.03E-03	1.11E-02	940.13
89.94	0.64	0.01	1050.04	5.03E-03	1.12E-02	935.75
89.95	0.65	0.01	1053.41	5.03E-03	1.13E-02	931.49
89.96	0.66	0.01	1056.77	5.03E-03	1.14E-02	927.36
89.97	0.67	0.01	1060.15	5.03E-03	1.15E-02	923.36
89.98	0.68	0.01	1063.53	5.03E-03	1.16E-02	919.46
89.99	0.69	0.01	1066.91	5.03E-03	1.17E-02	915.68
90.00	0.70	0.01	1070.30	5.03E-03	1.17E-02	912.00
90.01	0.71	0.01	1073.70	5.03E-03	1.18E-02	908.43
90.02	0.72	0.01	1077.10	5.03E-03	1.19E-02	904.96
90.03	0.73	0.01	1080.50	5.03E-03	1.20E-02	901.58
90.04	0.74	0.01	1083.91	5.03E-03	1.21E-02	898.29
90.05	0.75	0.01	1087.33	5.03E-03	1.21E-02	895.10
90.06	0.76	0.01	1090.75	5.03E-03	1.22E-02	891.99
90.07	0.77	0.01	1094.18	5.03E-03	1.23E-02	888.96
90.08	0.78	0.01	1097.62	5.03E-03	1.24E-02	886.02
90.09	0.79	0.01	1101.05	5.03E-03	1.25E-02	883.15
90.10	0.80	0.01	1104.50	5.03E-03	1.25E-02	880.36

Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: August 9, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng.   Date: August 9, 2021
PEO No.: 100067842

Retention Control - Surcharged condition

Retention Control Orifice

Control Type	Rectangular Orifice
Elevation Range (m)	90.07-90.15
Base elevation (m)	90.07
Initial net head over Orifice	0
Orifice Depth (mm)	600
Orifice Width (mm)	1040
No. of orifices	1
Gravitational Acceleration, g (m/s^2)	9.81
Discharge Coefficient, C_d	0.63
Weir Discharge Coeff., C_w	0.61

Water Elevation (m)	Head over Orifice, hf (m)	Head differential, dh (m)	Pond Area "A" (m2)	Orifice Area "a" (m2)	Q=a*C*sqrt(2*g*hf) (m3/s)	Time differential, dt (s)
90.07	0.00	0	1094.18	6.24E-01	1.00E-06	0.00
90.08	0.01	0.01	1097.62	6.24E-01	1.74E-01	63.03
90.09	0.02	0.01	1101.05	6.24E-01	2.46E-01	44.71
90.10	0.03	0.01	1104.50	6.24E-01	3.02E-01	36.62
90.11	0.04	0.01	1107.95	6.24E-01	3.48E-01	31.81
90.12	0.05	0.01	1111.40	6.24E-01	3.89E-01	28.54
90.13	0.06	0.01	1114.87	6.24E-01	4.27E-01	26.14
90.14	0.07	0.01	1118.33	6.24E-01	4.61E-01	24.27
90.15	0.08	0.01	1121.80	6.24E-01	4.93E-01	22.78

Numerical Results:

Maximum Flowrate - Quantity Control Orifice	492.52 L/s
Maximum Flowrate - Extended Detention Orifice	3.97 L/s
Total Flowrate	496.5 L/s
Allowable Flowrate	906.9 L/s

Prepared by: Guillaume LeBlond, M.A.Sc., EIT
PEO No.: 100530467

Date: August 9, 2021

Retention Control - Surcharged condition

Verified by: Christian Lavoie-Lebel, P.Eng.
PEO No.: 100067842

Date: August 9, 2021

Extended Detention Orifice

Control Type	Circular Orifice plate
Elevation Range (m)	90.07-90.15
Base elevation (m)	90.07
Initial net head over Orifice	0
Orifice Diameter (mm)	80
No. of orifices	1
Gravitational Acceleration, g (m/s^2)	9.81
Discharge Coefficient, C_d	0.63

Water Elevation (m)	Head over Orifice, hf (m)	Head differential, dh (m)	Pond Area "A" (m2)	Orifice Area "a" (m2)	Q=a*C*sqrt(2*g*hf) (m3/s)	Time differential, dt (s)
90.07	0.00	0	1094.18	5.03E-03	1.00E-06	0
90.08	0.01	0.01	1097.62	5.03E-03	1.40E-03	7825
90.09	0.02	0.01	1101.05	5.03E-03	1.98E-03	5551
90.10	0.03	0.01	1104.50	5.03E-03	2.43E-03	4546
90.11	0.04	0.01	1107.95	5.03E-03	2.81E-03	3949
90.12	0.05	0.01	1111.40	5.03E-03	3.14E-03	3543
90.13	0.06	0.01	1114.87	5.03E-03	3.44E-03	3245
90.14	0.07	0.01	1118.33	5.03E-03	3.71E-03	3013
90.15	0.08	0.01	1121.80	5.03E-03	3.97E-03	2828

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 45.7678 cfs

Maximum Flow: 45.7678 cfs

Table 1 - Summary of Culvert Flows at Crossing: West Entrance

Headwater Elevation (m)	Total Discharge (cms)	West Entrance Road Culvert Discharge (cms)	Roadway Discharge (cms)	Iterations
90.37	0.00	0.00	0.00	1
90.37	0.13	0.13	0.00	1
90.38	0.26	0.26	0.00	1
90.38	0.39	0.39	0.00	1
90.40	0.52	0.52	0.00	1
90.42	0.65	0.65	0.00	1
90.44	0.78	0.78	0.00	1
90.46	0.91	0.91	0.00	1
90.49	1.04	1.04	0.00	1
90.52	1.17	1.17	0.00	1
90.55	1.30	1.30	0.00	1
90.87	2.23	2.23	0.00	Overtopping

Rating Curve Plot for Crossing: West Entrance

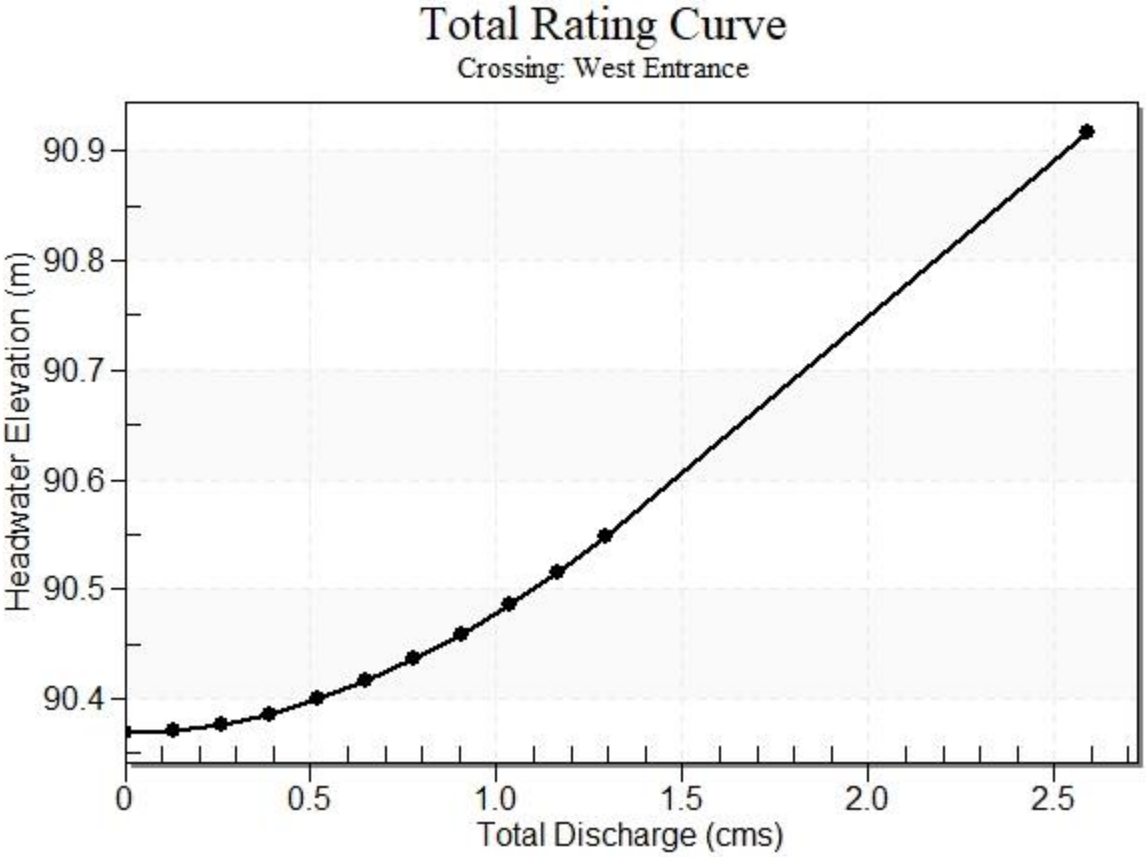


Table 2 - Culvert Summary Table: West Entrance Road Culvert

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	90.37	0.000	0.730	0-NF	0.000	0.000	0.740	0.740	0.000	0.000
0.13	0.13	90.37	0.118	0.732	6-FFt	0.250	0.070	0.740	0.740	0.084	0.000
0.26	0.26	90.38	0.185	0.737	6-FFt	0.395	0.110	0.740	0.740	0.169	0.000
0.39	0.39	90.38	0.240	0.745	6-FFt	0.544	0.144	0.740	0.740	0.253	0.000
0.52	0.52	90.40	0.289	0.760	6-FFt	0.758	0.173	0.740	0.740	0.338	0.000
0.65	0.65	90.42	0.334	0.776	6-FFt	0.758	0.200	0.740	0.740	0.422	0.000
0.78	0.78	90.44	0.376	0.796	6-FFt	0.758	0.224	0.740	0.740	0.506	0.000
0.91	0.91	90.46	0.420	0.819	6-FFt	0.758	0.247	0.740	0.740	0.591	0.000
1.04	1.04	90.49	0.463	0.846	6-FFt	0.758	0.269	0.740	0.740	0.675	0.000
1.17	1.17	90.52	0.507	0.875	6-FFt	0.758	0.290	0.740	0.740	0.759	0.000
1.30	1.30	90.55	0.551	0.908	6-FFt	0.758	0.310	0.740	0.740	0.844	0.000

****

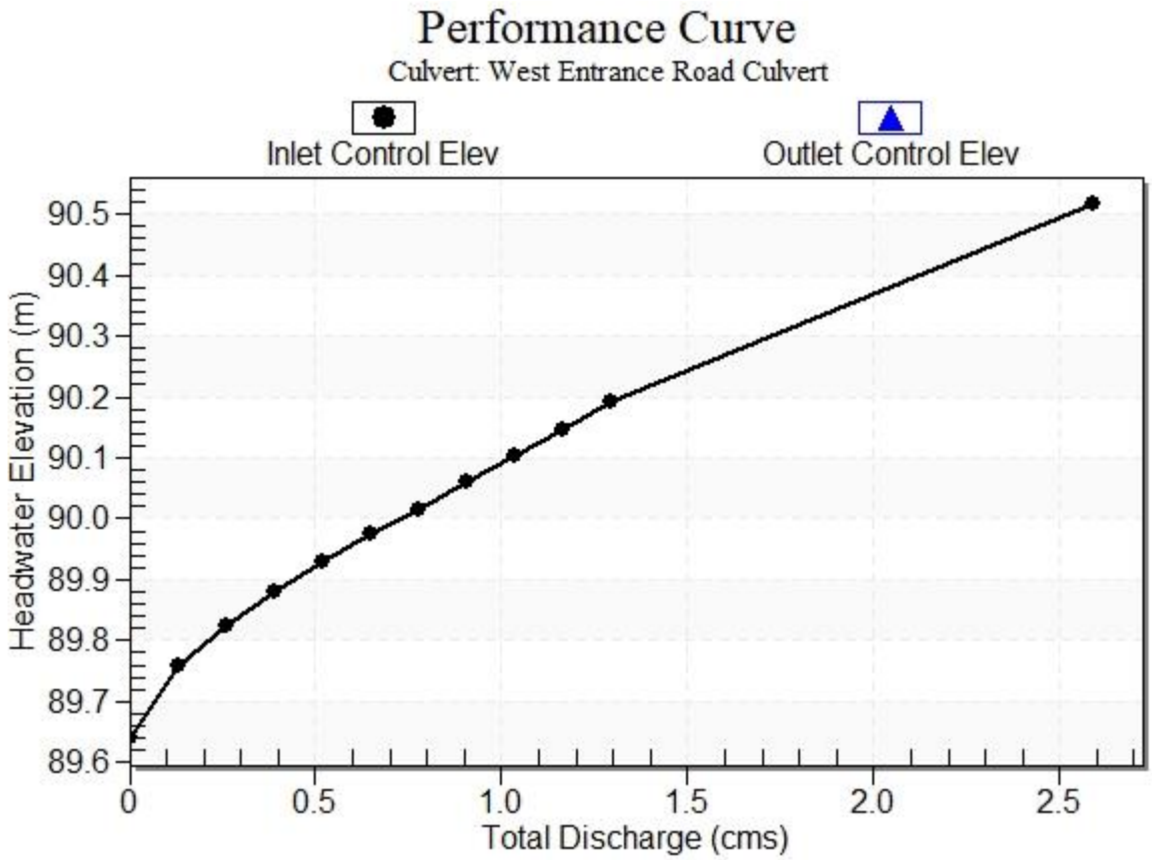
Straight Culvert

Inlet Elevation (invert): 89.64 m, Outlet Elevation (invert): 89.63 m

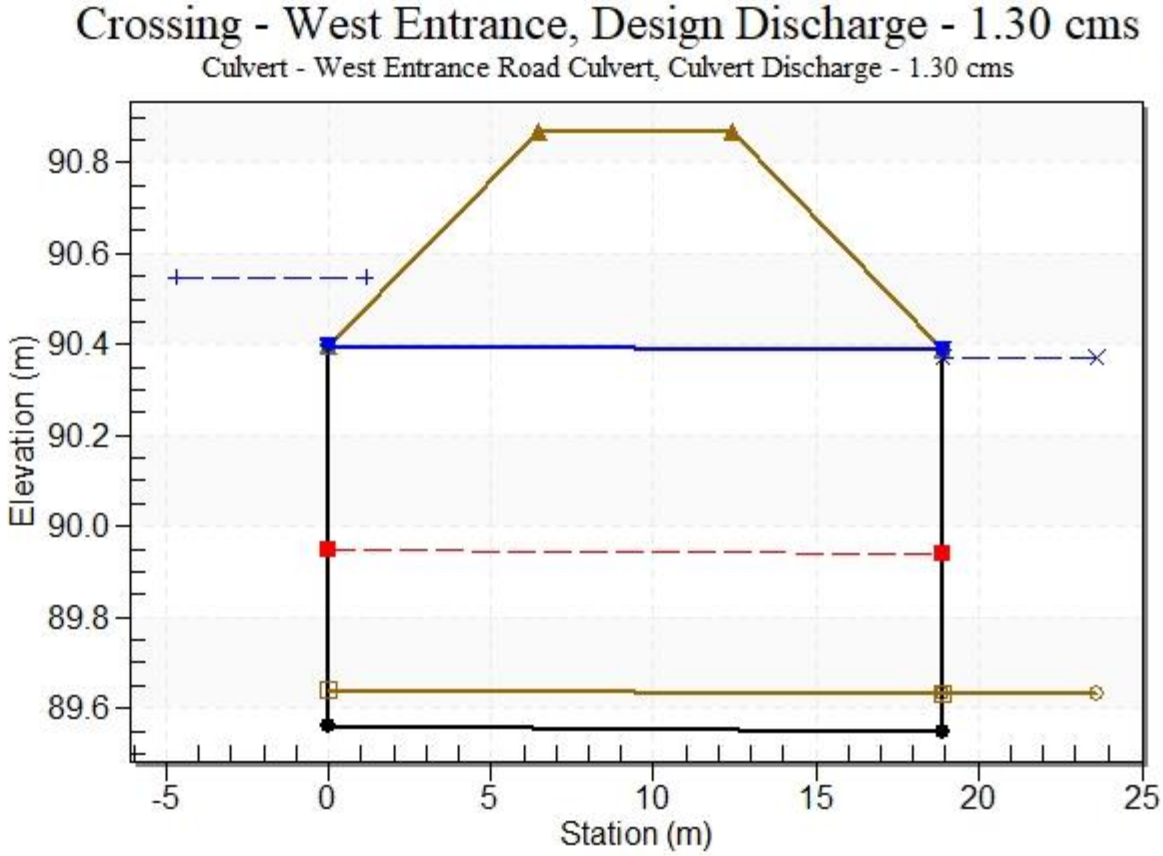
Culvert Length: 18.90 m, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: West Entrance Road Culvert



Water Surface Profile Plot for Culvert: West Entrance Road Culvert



Site Data - West Entrance Road Culvert

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 89.56 m

Outlet Station: 18.90 m

Outlet Elevation: 89.55 m

Number of Barrels: 2

Culvert Data Summary - West Entrance Road Culvert

Barrel Shape: Pipe Arch

Barrel Span: 1244.60 mm

Barrel Rise: 838.20 mm

Barrel Material: Steel or Aluminum

Embedment: 80.00 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 3 - Downstream Channel Rating Curve (Crossing: West Entrance)

Flow (cms)	Water Surface Elev (m)	Depth (m)
0.00	90.37	0.74
4.58	90.37	0.74
9.15	90.37	0.74
13.73	90.37	0.74
18.31	90.37	0.74
22.88	90.37	0.74
27.46	90.37	0.74
32.04	90.37	0.74
36.61	90.37	0.74
41.19	90.37	0.74
45.77	90.37	0.74

Tailwater Channel Data - West Entrance

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 90.37 m

Roadway Data for Crossing: West Entrance

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 14.60 m

Crest Elevation: 90.87 m

Roadway Surface: Paved

Roadway Top Width: 6.00 m

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

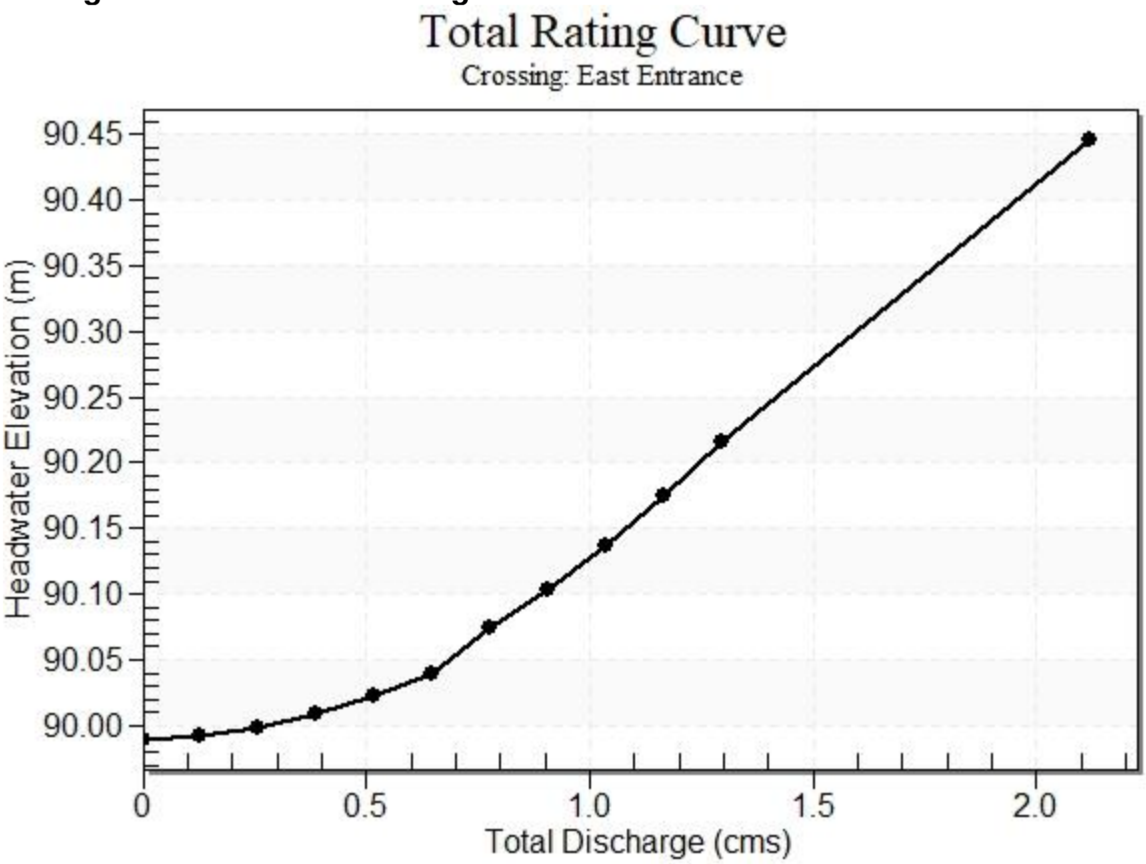
Design Flow: 45.7325 cfs

Maximum Flow: 45.7325 cfs

Table 4 - Summary of Culvert Flows at Crossing: East Entrance

Headwater Elevation (m)	Total Discharge (cms)	East Entrance Road Culvert Discharge (cms)	Roadway Discharge (cms)	Iterations
89.99	0.00	0.00	0.00	1
89.99	0.13	0.13	0.00	1
90.00	0.26	0.26	0.00	1
90.01	0.39	0.39	0.00	1
90.02	0.52	0.52	0.00	1
90.04	0.65	0.65	0.00	1
90.07	0.78	0.78	0.00	1
90.10	0.91	0.91	0.00	1
90.14	1.04	1.04	0.00	1
90.17	1.17	1.17	0.00	1
90.22	1.29	1.29	0.00	1
90.40	1.77	1.77	0.00	Overtopping

Rating Curve Plot for Crossing: East Entrance



Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.99	0.000	0.710	0-NF	0.000	0.000	0.740	0.740	0.000	0.000
0.13	0.13	89.99	0.118	0.712	6-FFt	0.199	0.070	0.740	0.740	0.084	0.000
0.26	0.26	90.00	0.185	0.719	6-FFt	0.308	0.110	0.740	0.740	0.169	0.000
0.39	0.39	90.01	0.240	0.730	6-FFt	0.406	0.143	0.740	0.740	0.253	0.000
0.52	0.52	90.02	0.289	0.743	6-FFt	0.507	0.173	0.740	0.740	0.337	0.000
0.65	0.65	90.04	0.334	0.760	6-FFt	0.636	0.200	0.740	0.740	0.422	0.000
0.78	0.78	90.07	0.376	0.795	6-FFt	0.758	0.224	0.740	0.740	0.506	0.000
0.91	0.91	90.10	0.419	0.824	6-FFt	0.758	0.247	0.740	0.740	0.590	0.000
1.04	1.04	90.14	0.463	0.858	6-FFt	0.758	0.269	0.740	0.740	0.674	0.000
1.17	1.17	90.17	0.507	0.895	6-FFt	0.758	0.290	0.740	0.740	0.759	0.000
1.29	1.29	90.22	0.550	0.936	6-FFt	0.758	0.310	0.740	0.740	0.843	0.000

Table 5 - Culvert Summary Table: East Entrance Road Culvert

****

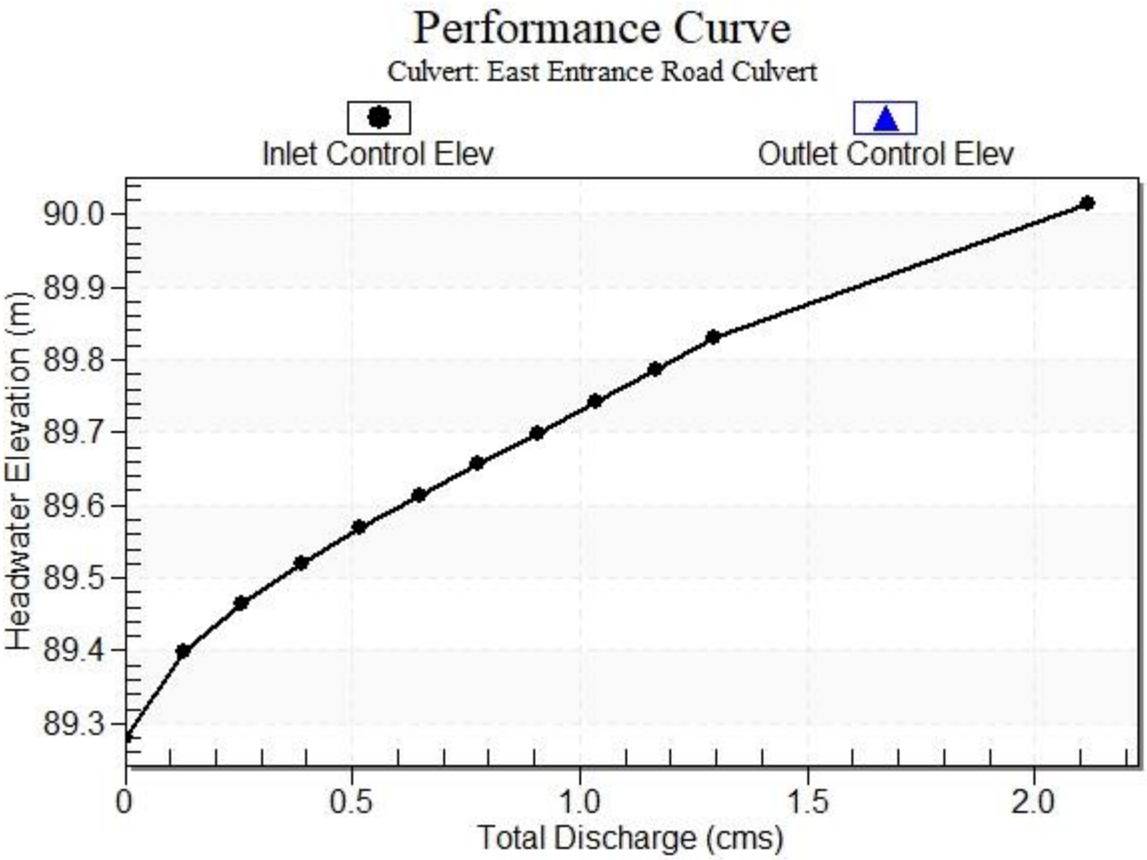
Straight Culvert

Inlet Elevation (invert): 89.28 m,   Outlet Elevation (invert): 89.25 m

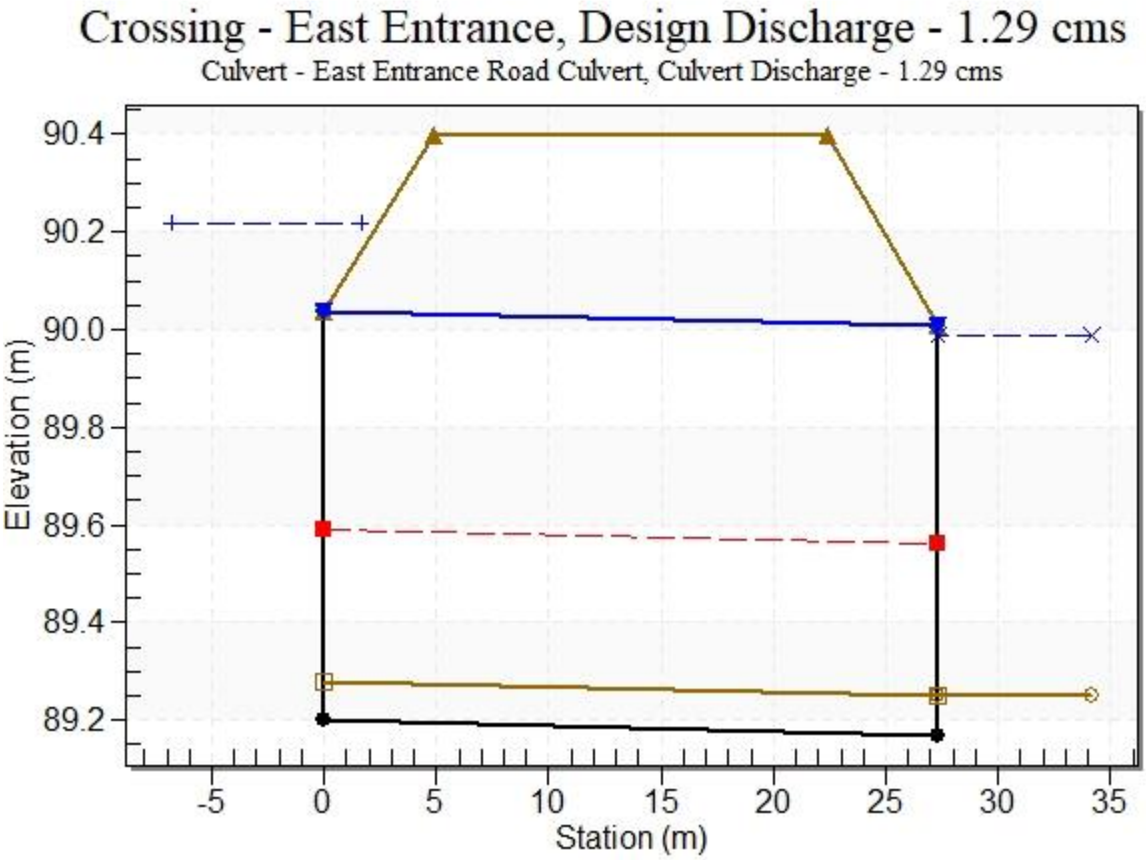
Culvert Length: 27.30 m,   Culvert Slope: 0.0011

****

Culvert Performance Curve Plot: East Entrance Road Culvert



Water Surface Profile Plot for Culvert: East Entrance Road Culvert



Site Data - East Entrance Road Culvert

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 89.20 m

Outlet Station: 27.30 m

Outlet Elevation: 89.17 m

Number of Barrels: 2

Culvert Data Summary - East Entrance Road Culvert

Barrel Shape: Pipe Arch

Barrel Span: 1244.60 mm

Barrel Rise: 838.20 mm

Barrel Material: Steel or Aluminum

Embedment: 80.00 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: East Entrance)

Flow (cms)	Water Surface Elev (m)	Depth (m)
0.00	89.99	0.74
4.57	89.99	0.74
9.15	89.99	0.74
13.72	89.99	0.74
18.29	89.99	0.74
22.87	89.99	0.74
27.44	89.99	0.74
32.01	89.99	0.74
36.59	89.99	0.74
41.16	89.99	0.74
45.73	89.99	0.74

Tailwater Channel Data - East Entrance

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 89.99 m

Roadway Data for Crossing: East Entrance

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 14.60 m

Crest Elevation: 90.40 m

Roadway Surface: Paved

Roadway Top Width: 17.45 m

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 4.02587 cfs

Maximum Flow: 8.15769 cfs

Table 1 - Summary of Culvert Flows at Crossing: West Ditch Site Culvert 10y

Headwater Elevation (m)	Total Discharge (cms)	West Ditch Site Culvert 10y Discharge (cms)	Roadway Discharge (cms)	Iterations
89.78	0.00	0.00	0.00	1
89.79	0.02	0.02	0.00	1
89.81	0.05	0.05	0.00	1
89.84	0.07	0.07	0.00	1
89.87	0.09	0.09	0.00	1
89.90	0.11	0.11	0.00	1
89.94	0.14	0.14	0.00	1
89.97	0.16	0.16	0.00	1
90.00	0.18	0.18	0.00	1
90.03	0.21	0.21	0.00	1
90.06	0.23	0.23	0.00	1
91.00	0.57	0.57	0.00	Overtopping

Rating Curve Plot for Crossing: West Ditch Site Culvert 10y

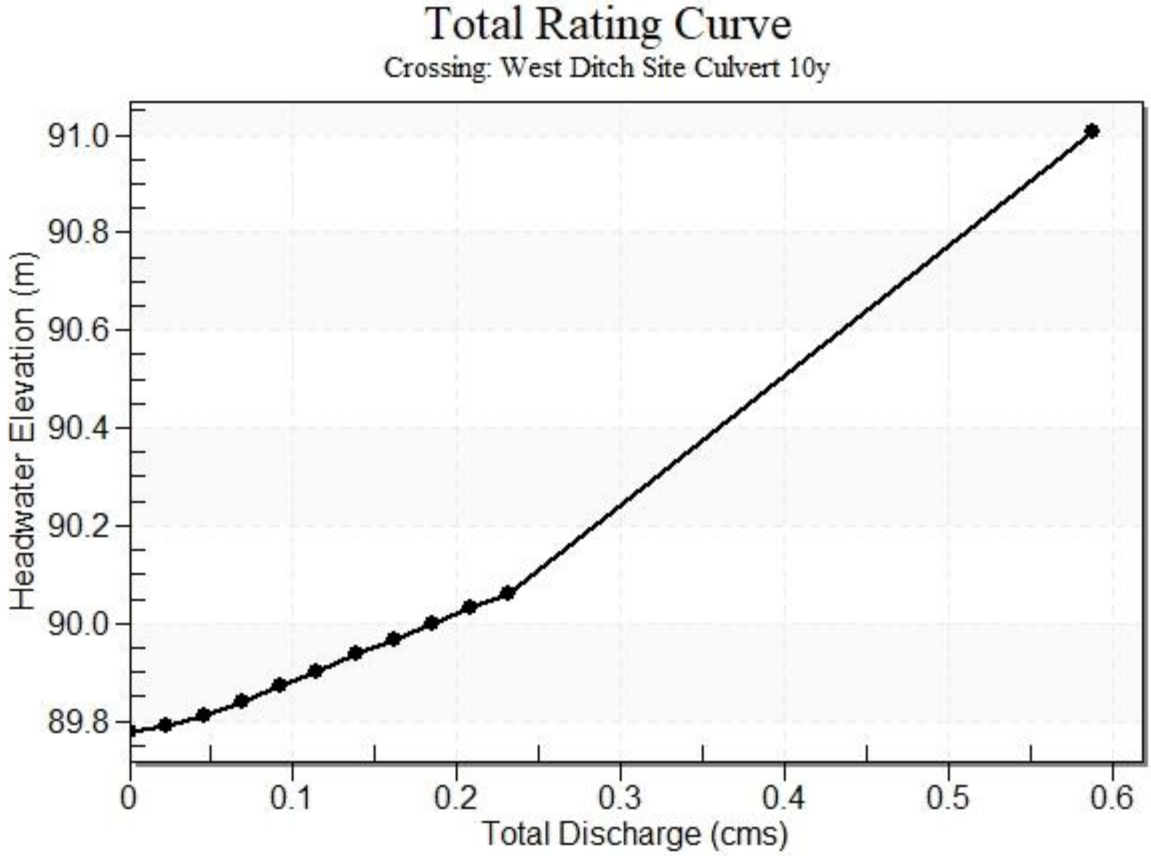


Table 2 - Culvert Summary Table: West Ditch Site Culvert 10y

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.78	0.000	0.195	0-NF	0.000	0.000	0.236	0.240	0.000	0.000
0.02	0.02	89.79	0.075	0.204	3-M1t	0.129	0.044	0.236	0.240	0.114	0.000
0.05	0.05	89.81	0.119	0.227	3-M1t	0.199	0.069	0.236	0.240	0.228	0.000
0.07	0.07	89.84	0.154	0.256	3-M2t	0.261	0.090	0.236	0.240	0.341	0.000
0.09	0.09	89.87	0.186	0.287	3-M2t	0.321	0.109	0.236	0.240	0.455	0.000
0.11	0.11	89.90	0.213	0.317	3-M2t	0.382	0.125	0.236	0.240	0.561	0.000
0.14	0.14	89.94	0.242	0.351	3-M2t	0.480	0.141	0.236	0.240	0.683	0.000
0.16	0.16	89.97	0.267	0.382	3-M2t	0.545	0.156	0.236	0.240	0.796	0.000
0.18	0.18	90.00	0.290	0.414	3-M2t	0.545	0.170	0.236	0.240	0.910	0.000
0.21	0.21	90.03	0.311	0.445	3-M2t	0.545	0.183	0.236	0.240	1.024	0.000
0.23	0.23	90.06	0.333	0.477	3-M2t	0.545	0.196	0.236	0.240	1.138	0.000

****

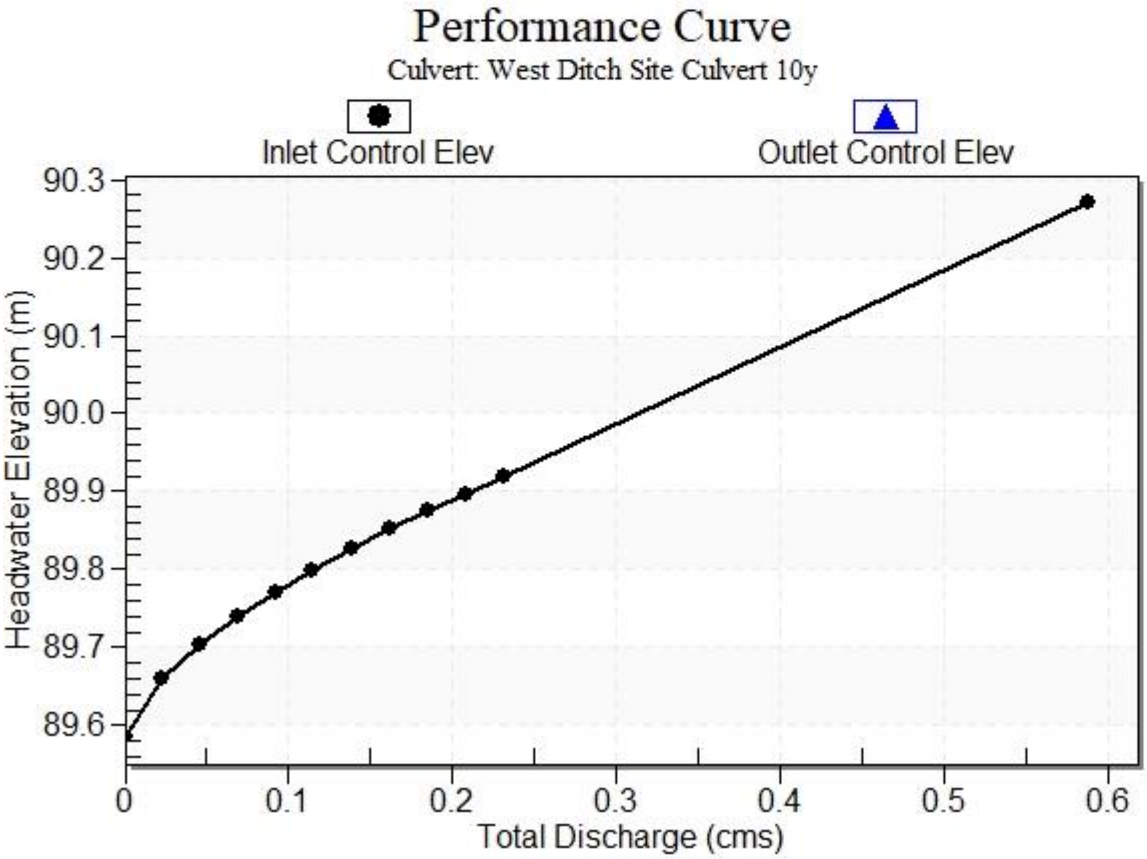
Straight Culvert

Inlet Elevation (invert): 89.58 m, Outlet Elevation (invert): 89.54 m

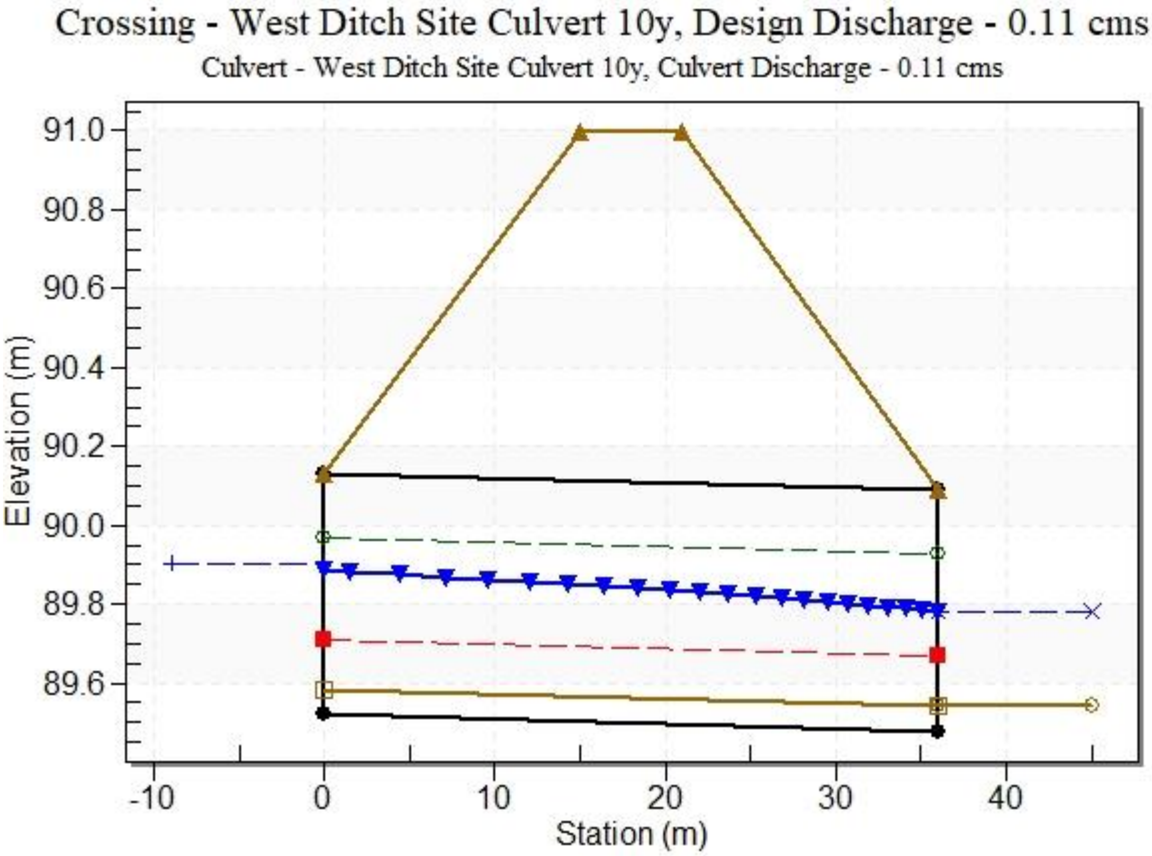
Culvert Length: 36.00 m, Culvert Slope: 0.0011

****

Culvert Performance Curve Plot: West Ditch Site Culvert 10y



Water Surface Profile Plot for Culvert: West Ditch Site Culvert 10y



Site Data - West Ditch Site Culvert 10y

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 89.52 m

Outlet Station: 36.00 m

Outlet Elevation: 89.48 m

Number of Barrels: 1

Culvert Data Summary - West Ditch Site Culvert 10y

Barrel Shape: Pipe Arch

Barrel Span: 889.00 mm

Barrel Rise: 609.60 mm

Barrel Material: Steel or Aluminum

Embedment: 65.00 mm

Barrel Manning's n: 0.0250 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: West Ditch Site Culvert 10y)

Flow (cms)	Water Surface Elev (m)	Depth (m)
0.00	89.78	0.24
0.82	89.78	0.24
1.63	89.78	0.24
2.45	89.78	0.24
3.26	89.78	0.24
4.03	89.78	0.24
4.89	89.78	0.24
5.71	89.78	0.24
6.53	89.78	0.24
7.34	89.78	0.24
8.16	89.78	0.24

Tailwater Channel Data - West Ditch Site Culvert 10y

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 89.78 m

Roadway Data for Crossing: West Ditch Site Culvert 10y

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 14.00 m

Crest Elevation: 91.00 m

Roadway Surface: Paved

Roadway Top Width: 6.00 m

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 7.09825 cfs

Maximum Flow: 14.1259 cfs

Table 4 - Summary of Culvert Flows at Crossing: East Ditch Site Culvert 10y

Headwater Elevation (m)	Total Discharge (cms)	East Ditch Site Culvert 10y Discharge (cms)	Roadway Discharge (cms)	Iterations
89.53	0.00	0.00	0.00	1
89.68	0.04	0.04	0.00	1
89.75	0.08	0.08	0.00	1
89.81	0.12	0.12	0.00	1
89.86	0.16	0.16	0.00	1
89.91	0.20	0.20	0.00	1
89.96	0.24	0.24	0.00	1
90.00	0.28	0.28	0.00	1
90.05	0.32	0.32	0.00	1
90.10	0.36	0.36	0.00	1
90.15	0.40	0.40	0.00	1
90.92	0.74	0.74	0.00	Overtopping

Rating Curve Plot for Crossing: East Ditch Site Culvert 10y

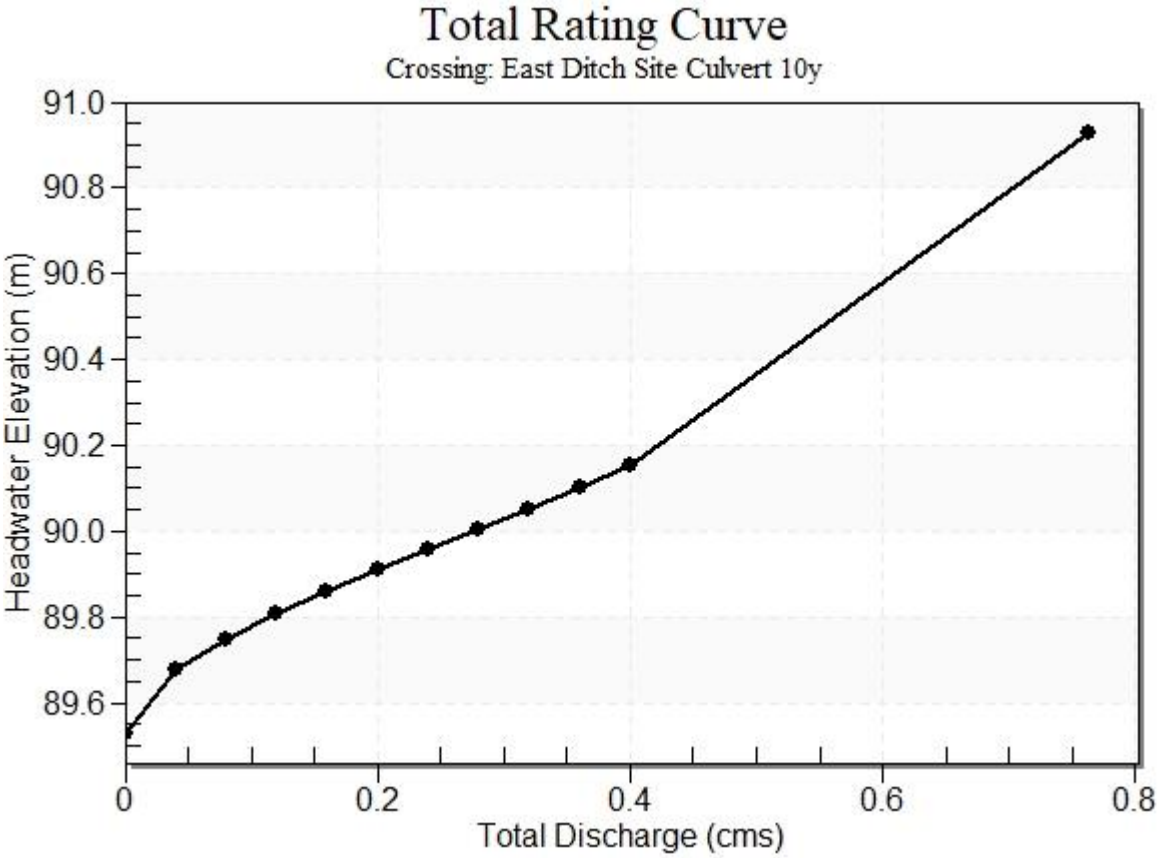


Table 5 - Culvert Summary Table: East Ditch Site Culvert 10y

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.53	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.04	0.04	89.68	0.108	0.147	2-M2c	0.156	0.063	0.063	0.000	0.774	0.000
0.08	0.08	89.75	0.169	0.219	2-M2c	0.245	0.099	0.099	0.000	0.966	0.000
0.12	0.12	89.81	0.220	0.278	2-M2c	0.331	0.129	0.129	0.000	1.100	0.000
0.16	0.16	89.86	0.265	0.330	2-M2c	0.433	0.155	0.155	0.000	1.209	0.000
0.20	0.20	89.91	0.305	0.381	2-M2c	0.550	0.180	0.180	0.000	1.307	0.000
0.24	0.24	89.96	0.342	0.427	2-M2c	0.550	0.201	0.201	0.000	1.392	0.000
0.28	0.28	90.00	0.379	0.474	2-M2c	0.550	0.222	0.222	0.000	1.470	0.000
0.32	0.32	90.05	0.417	0.521	2-M2c	0.550	0.242	0.242	0.000	1.542	0.000
0.36	0.36	90.10	0.453	0.570	7-M2c	0.550	0.260	0.260	0.000	1.611	0.000
0.40	0.40	90.15	0.490	0.623	7-M2c	0.550	0.278	0.278	0.000	1.680	0.000

****

Straight Culvert

Inlet Elevation (invert): 89.53 m, Outlet Elevation (invert): 89.50 m

Culvert Length: 21.55 m, Culvert Slope: 0.0014

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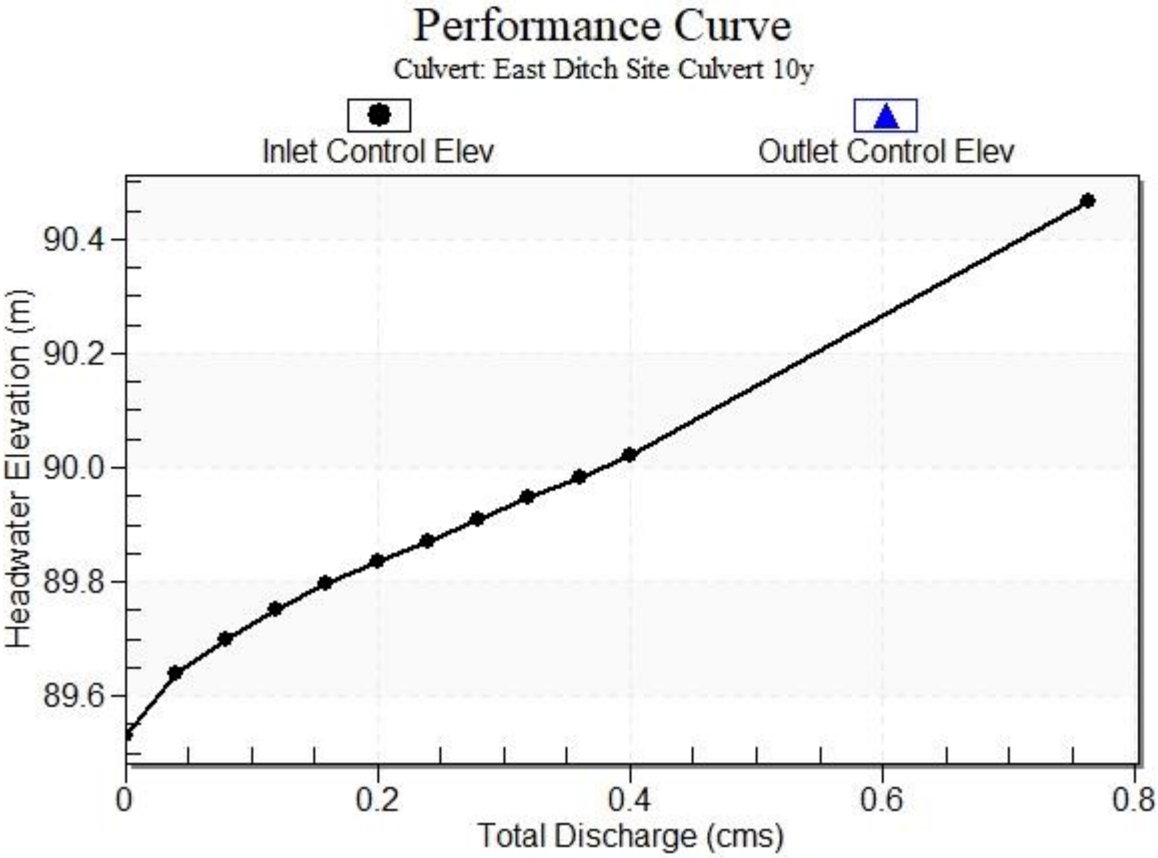
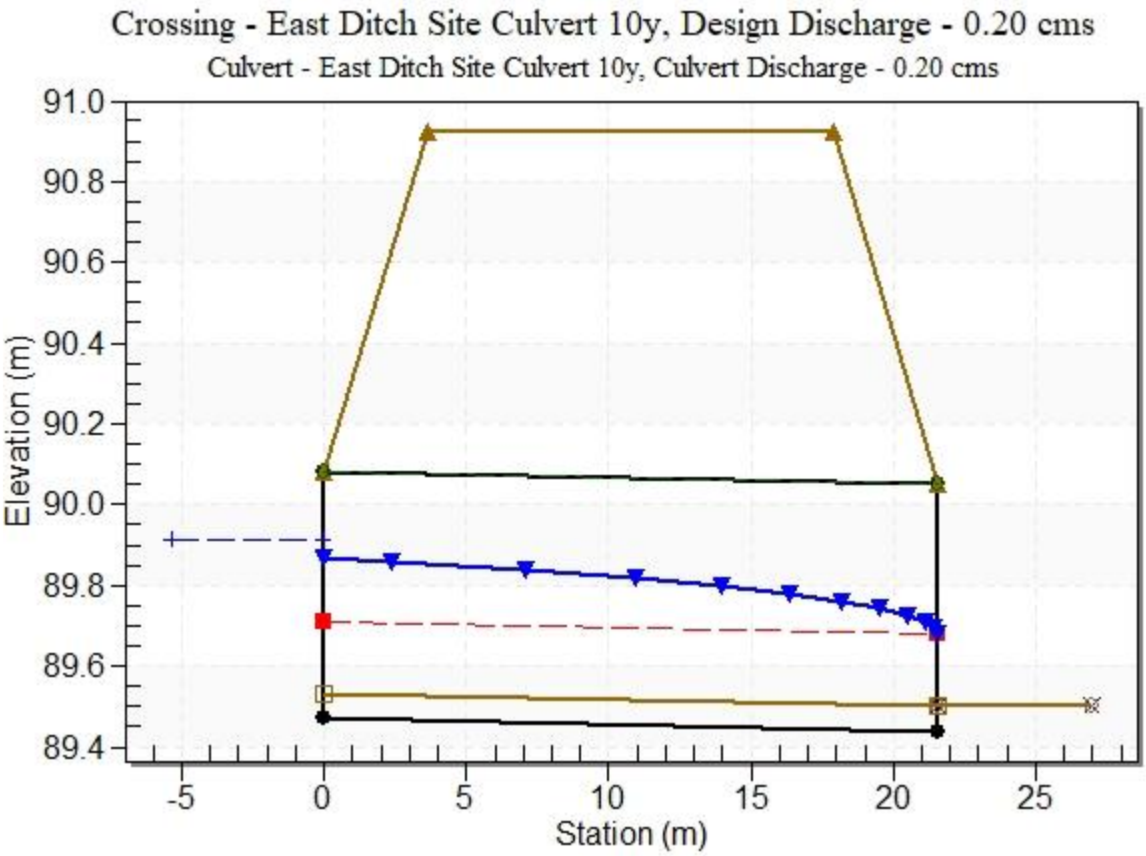
Culvert Performance Curve Plot: East Ditch Site Culvert 10y



Water Surface Profile Plot for Culvert: East Ditch Site Culvert 10y



Site Data - East Ditch Site Culvert 10y

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 89.47 m

Outlet Station: 21.55 m

Outlet Elevation: 89.44 m

Number of Barrels: 1

Culvert Data Summary - East Ditch Site Culvert 10y

Barrel Shape: Pipe Arch

Barrel Span: 889.00 mm

Barrel Rise: 609.60 mm

Barrel Material: Steel or Aluminum

Embedment: 60.00 mm

Barrel Manning's n: 0.0250 (top and sides)

Manning's n: 0.0300 (bottom)

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Table 6 - Downstream Channel Rating Curve (Crossing: East Ditch Site Culvert 10y)

Flow (cms)	Water Surface Elev (m)	Depth (m)
0.00	89.50	0.00
1.41	89.50	0.00
2.83	89.50	0.00
4.24	89.50	0.00
5.65	89.50	0.00
7.10	89.50	0.00
8.48	89.50	0.00
9.89	89.50	0.00
11.30	89.50	0.00
12.71	89.50	0.00
14.13	89.50	0.00

Tailwater Channel Data - East Ditch Site Culvert 10y

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 89.50 m

Roadway Data for Crossing: East Ditch Site Culvert 10y

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 25.00 m

Crest Elevation: 90.92 m

Roadway Surface: Paved

Roadway Top Width: 14.20 m

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 8.15769 cfs

Maximum Flow: 8.15769 cfs

Table 7 - Summary of Culvert Flows at Crossing: West Ditch Site Culvert 100y

Headwater Elevation (m)	Total Discharge (cms)	West Ditch Site Culvert 100y Discharge (cms)	Roadway Discharge (cms)	Iterations
89.88	0.00	0.00	0.00	1
89.88	0.02	0.02	0.00	1
89.89	0.05	0.05	0.00	1
89.91	0.07	0.07	0.00	1
89.93	0.09	0.09	0.00	1
89.95	0.12	0.12	0.00	1
89.97	0.14	0.14	0.00	1
90.00	0.16	0.16	0.00	1
90.03	0.18	0.18	0.00	1
90.06	0.21	0.21	0.00	1
90.09	0.23	0.23	0.00	1
91.00	0.56	0.56	0.00	Overtopping

Rating Curve Plot for Crossing: West Ditch Site Culvert 100y

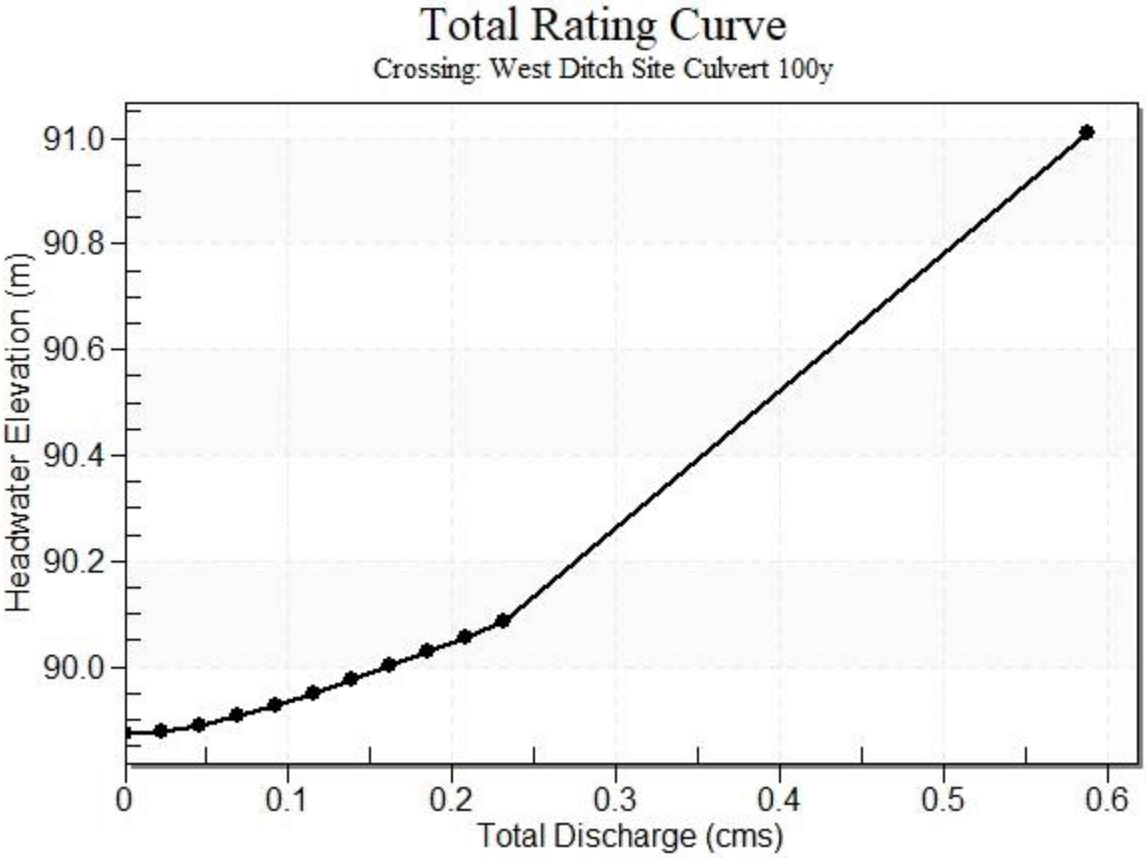


Table 8 - Culvert Summary Table: West Ditch Site Culvert 100y

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.88	0.000	0.282	0-NF	0.000	0.000	0.323	0.335	0.000	0.000
0.02	0.02	89.88	0.075	0.286	3-M1t	0.128	0.044	0.323	0.335	0.084	0.000
0.05	0.05	89.89	0.119	0.296	3-M1t	0.198	0.069	0.323	0.335	0.169	0.000
0.07	0.07	89.91	0.154	0.312	3-M1t	0.260	0.090	0.323	0.335	0.253	0.000
0.09	0.09	89.93	0.186	0.333	3-M1t	0.322	0.109	0.323	0.335	0.337	0.000
0.12	0.12	89.95	0.215	0.356	3-M2t	0.389	0.125	0.323	0.335	0.421	0.000
0.14	0.14	89.97	0.242	0.381	3-M2t	0.537	0.141	0.323	0.335	0.506	0.000
0.16	0.16	90.00	0.267	0.407	3-M2t	0.537	0.155	0.323	0.335	0.590	0.000
0.18	0.18	90.03	0.290	0.435	3-M2t	0.537	0.169	0.323	0.335	0.674	0.000
0.21	0.21	90.06	0.312	0.464	3-M2t	0.537	0.182	0.323	0.335	0.758	0.000
0.23	0.23	90.09	0.334	0.494	3-M2t	0.537	0.195	0.323	0.335	0.843	0.000

****

Straight Culvert

Inlet Elevation (invert): 89.59 m,   Outlet Elevation (invert): 89.55 m

Culvert Length: 36.00 m,   Culvert Slope: 0.0011

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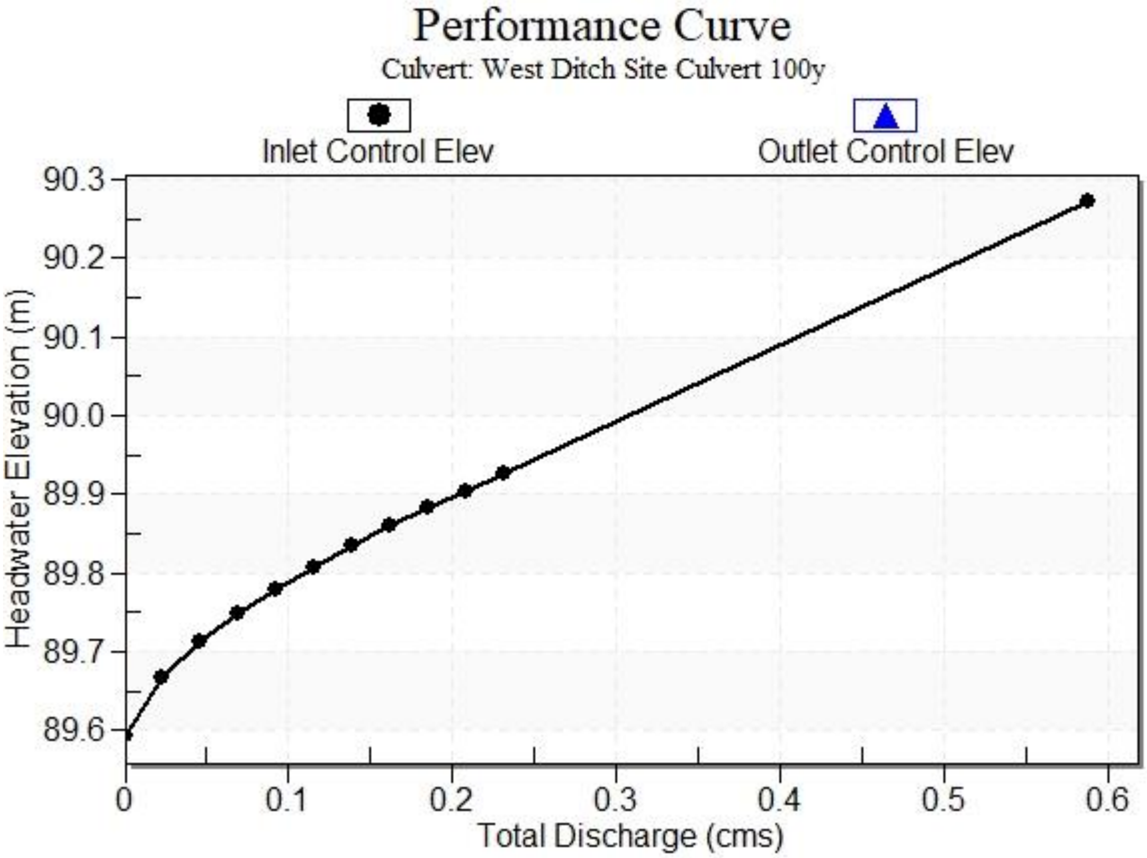
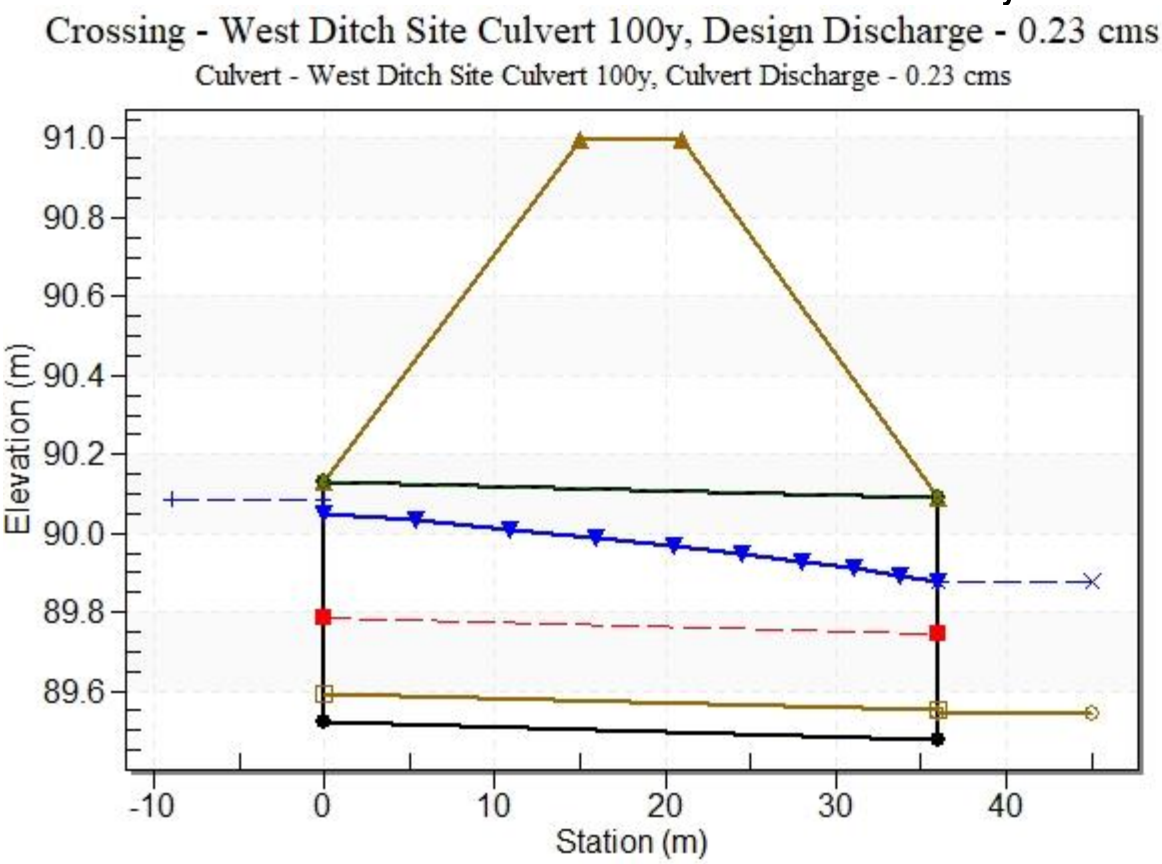
Culvert Performance Curve Plot: West Ditch Site Culvert 100y



Water Surface Profile Plot for Culvert: West Ditch Site Culvert 100y



Site Data - West Ditch Site Culvert 100y

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 89.52 m

Outlet Station: 36.00 m

Outlet Elevation: 89.48 m

Number of Barrels: 1

Culvert Data Summary - West Ditch Site Culvert 100y

Barrel Shape: Pipe Arch

Barrel Span: 889.00 mm

Barrel Rise: 609.60 mm

Barrel Material: Steel or Aluminum

Embedment: 73.00 mm

Barrel Manning's n: 0.0250 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Table 9 - Downstream Channel Rating Curve (Crossing: West Ditch Site Culvert 100y)

Flow (cms)	Water Surface Elev (m)	Depth (m)
0.00	89.88	0.34
0.82	89.88	0.34
1.63	89.88	0.34
2.45	89.88	0.34
3.26	89.88	0.34
4.08	89.88	0.34
4.89	89.88	0.34
5.71	89.88	0.34
6.53	89.88	0.34
7.34	89.88	0.34
8.16	89.88	0.34

Tailwater Channel Data - West Ditch Site Culvert 100y

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 89.88 m

Roadway Data for Crossing: West Ditch Site Culvert 100y

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 14.00 m

Crest Elevation: 91.00 m

Roadway Surface: Paved

Roadway Top Width: 6.00 m

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 14.3024 cfs

Maximum Flow: 14.3024 cfs

Table 10 - Summary of Culvert Flows at Crossing: East Ditch Site Culvert 100y

Headwater Elevation (m)	Total Discharge (cms)	East Ditch Site Culvert 100y Discharge (cms)	Roadway Discharge (cms)	Iterations
89.80	0.00	0.00	0.00	1
89.81	0.04	0.04	0.00	1
89.83	0.08	0.08	0.00	1
89.86	0.12	0.12	0.00	1
89.89	0.16	0.16	0.00	1
89.93	0.20	0.20	0.00	1
89.97	0.24	0.24	0.00	1
90.02	0.28	0.28	0.00	1
90.06	0.32	0.32	0.00	1
90.11	0.36	0.36	0.00	1
90.16	0.40	0.40	0.00	1
90.92	0.74	0.74	0.00	Overtopping

Rating Curve Plot for Crossing: East Ditch Site Culvert 100y

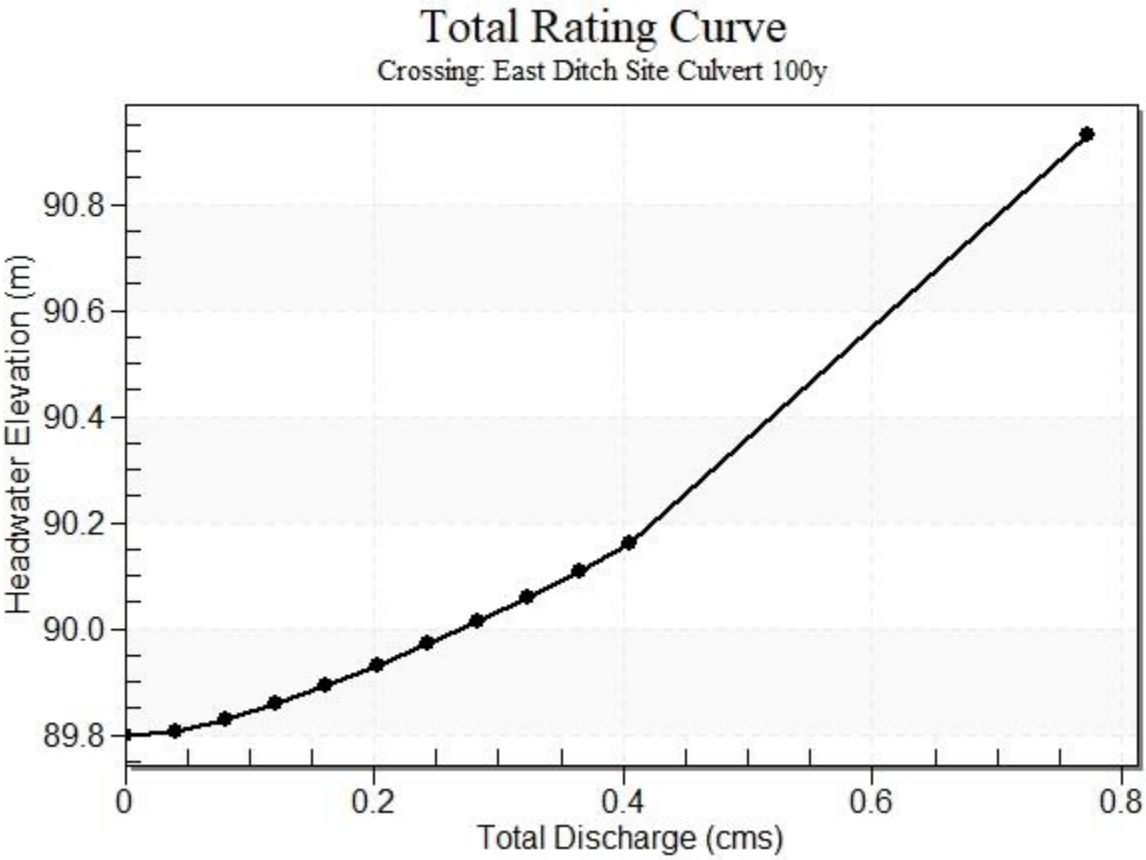


Table 11 - Culvert Summary Table: East Ditch Site Culvert 100y

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.80	0.000	0.270	0-NF	0.000	0.000	0.300	0.300	0.000	0.000
0.04	0.04	89.81	0.109	0.277	3-M1t	0.157	0.064	0.300	0.300	0.158	0.000
0.08	0.08	89.83	0.171	0.298	3-M1t	0.247	0.100	0.300	0.300	0.316	0.000
0.12	0.12	89.86	0.222	0.327	3-M2t	0.334	0.130	0.300	0.300	0.474	0.000
0.16	0.16	89.89	0.267	0.362	3-M2t	0.440	0.157	0.300	0.300	0.632	0.000
0.20	0.20	89.93	0.306	0.401	3-M2t	0.550	0.180	0.300	0.300	0.790	0.000
0.24	0.24	89.97	0.344	0.442	3-M2t	0.550	0.203	0.300	0.300	0.948	0.000
0.28	0.28	90.02	0.383	0.485	3-M2t	0.550	0.223	0.300	0.300	1.106	0.000
0.32	0.32	90.06	0.421	0.530	3-M2t	0.550	0.243	0.300	0.300	1.264	0.000
0.36	0.36	90.11	0.457	0.577	3-M2t	0.550	0.262	0.300	0.300	1.422	0.000
0.40	0.40	90.16	0.494	0.631	3-M2t	0.550	0.280	0.300	0.300	1.580	0.000

****

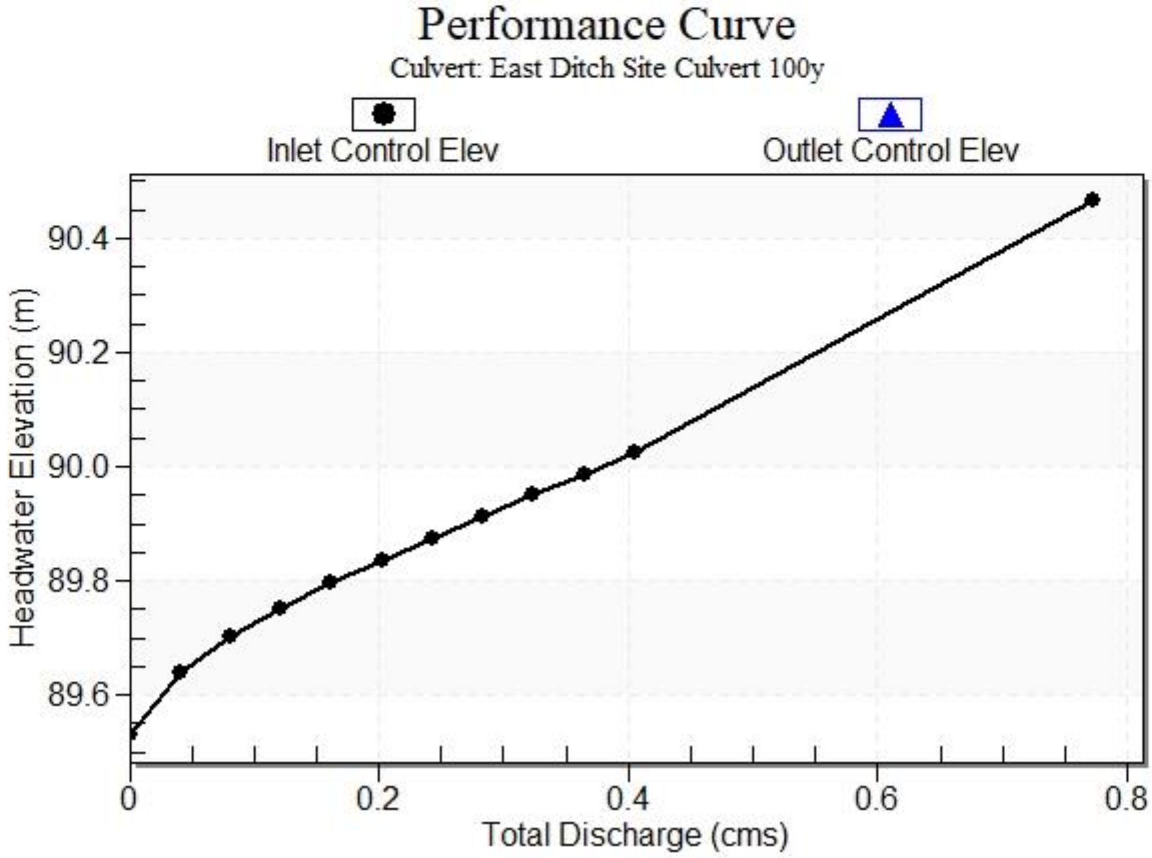
Straight Culvert

Inlet Elevation (invert): 89.53 m, Outlet Elevation (invert): 89.50 m

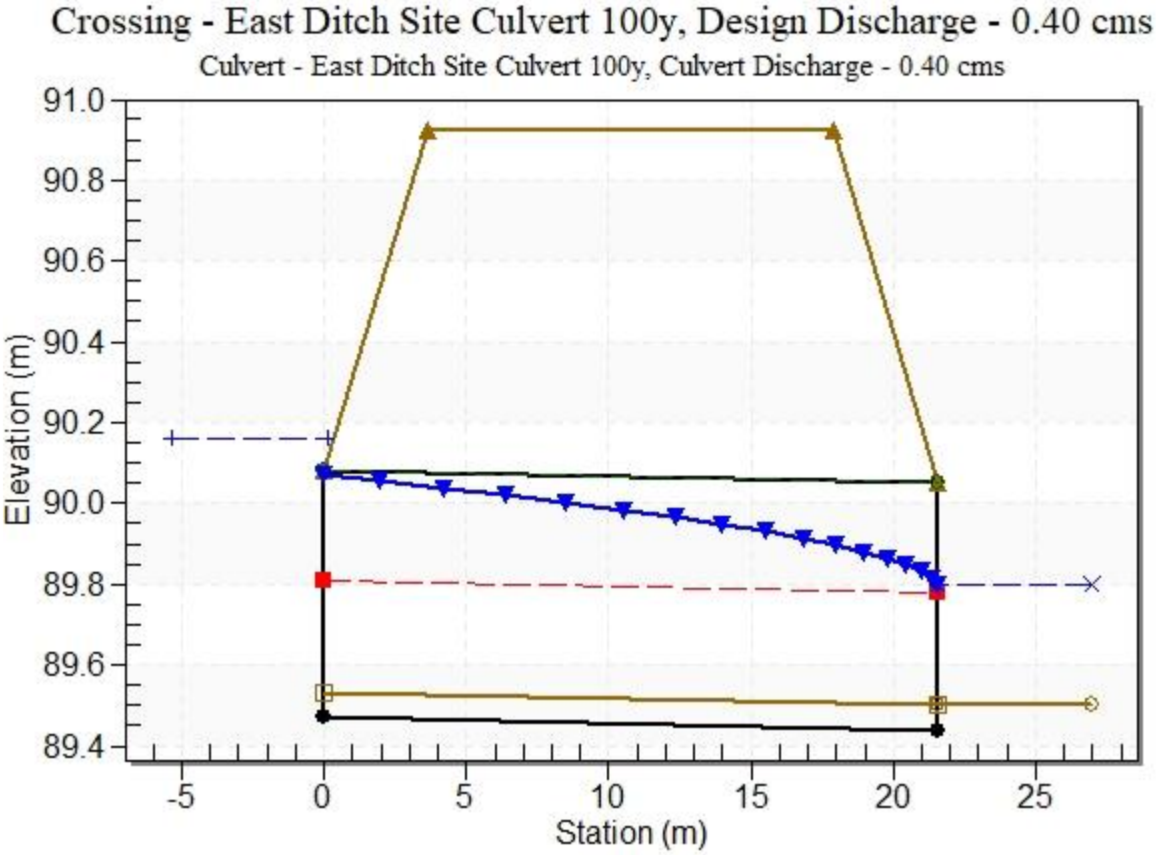
Culvert Length: 21.55 m, Culvert Slope: 0.0014

****

Culvert Performance Curve Plot: East Ditch Site Culvert 100y



Water Surface Profile Plot for Culvert: East Ditch Site Culvert 100y



Site Data - East Ditch Site Culvert 100y

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 89.47 m

Outlet Station: 21.55 m

Outlet Elevation: 89.44 m

Number of Barrels: 1

Culvert Data Summary - East Ditch Site Culvert 100y

Barrel Shape: Pipe Arch

Barrel Span: 889.00 mm

Barrel Rise: 609.60 mm

Barrel Material: Steel or Aluminum

Embedment: 60.00 mm

Barrel Manning's n: 0.0250 (top and sides)

Manning's n: 0.0300 (bottom)

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Table 12 - Downstream Channel Rating Curve (Crossing: East Ditch Site Culvert 100y)

Flow (cms)	Water Surface Elev (m)	Depth (m)
0.00	89.80	0.30
1.43	89.80	0.30
2.86	89.80	0.30
4.29	89.80	0.30
5.72	89.80	0.30
7.15	89.80	0.30
8.58	89.80	0.30
10.01	89.80	0.30
11.44	89.80	0.30
12.87	89.80	0.30
14.30	89.80	0.30

Tailwater Channel Data - East Ditch Site Culvert 100y

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 89.80 m

Roadway Data for Crossing: East Ditch Site Culvert 100y

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 25.00 m

Crest Elevation: 90.92 m

Roadway Surface: Paved

Roadway Top Width: 14.20 m

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 32.0304 cfs

Maximum Flow: 32.0304 cfs

Table 13 - Summary of Culvert Flows at Crossing: Transfer Culvert 100y

Headwater Elevation (m)	Total Discharge (cms)	Transfer Culvert 100y Discharge (cms)	Roadway Discharge (cms)	Iterations
89.50	0.00	0.00	0.00	1
89.51	0.09	0.09	0.00	1
89.53	0.18	0.18	0.00	1
89.56	0.27	0.27	0.00	1
89.60	0.36	0.36	0.00	1
89.63	0.45	0.45	0.00	1
89.67	0.54	0.54	0.00	1
89.71	0.63	0.63	0.00	1
89.74	0.73	0.73	0.00	1
89.78	0.82	0.82	0.00	1
89.82	0.91	0.91	0.00	1
90.43	2.01	2.01	0.00	Overtopping

Rating Curve Plot for Crossing: Transfer Culvert 100y

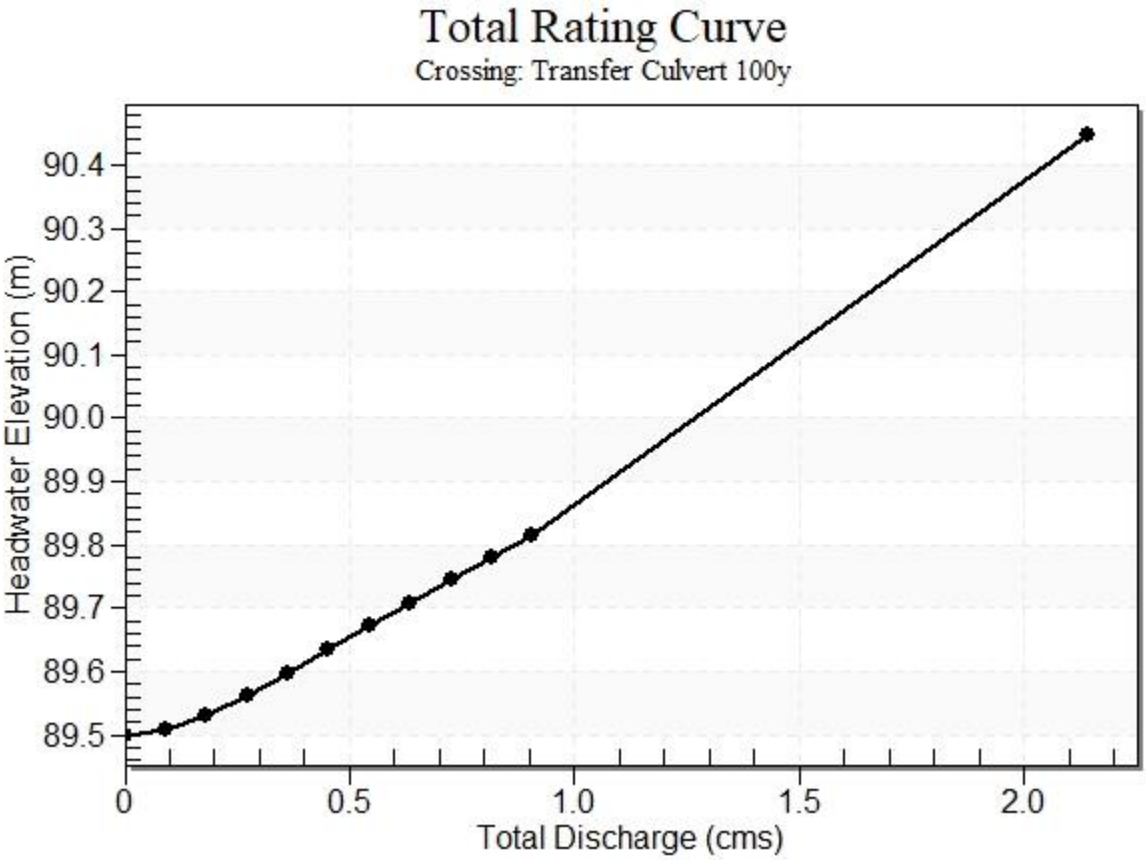


Table 14 - Culvert Summary Table: Transfer Culvert 100y

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.50	0.000	0.200	0-NF	0.000	0.000	0.325	0.325	0.000	0.000
0.09	0.09	89.51	0.105	0.208	3-M1t	0.096	0.061	0.325	0.325	0.135	0.000
0.18	0.18	89.53	0.165	0.231	3-M1t	0.148	0.096	0.325	0.325	0.271	0.000
0.27	0.27	89.56	0.214	0.262	3-M1t	0.191	0.125	0.325	0.325	0.406	0.000
0.36	0.36	89.60	0.258	0.297	3-M1t	0.229	0.151	0.325	0.325	0.541	0.000
0.45	0.45	89.63	0.298	0.334	3-M1t	0.266	0.174	0.325	0.325	0.676	0.000
0.54	0.54	89.67	0.336	0.371	3-M1t	0.301	0.195	0.325	0.325	0.812	0.000
0.63	0.63	89.71	0.368	0.407	3-M2t	0.336	0.215	0.325	0.325	0.947	0.000
0.73	0.73	89.74	0.400	0.444	3-M2t	0.371	0.234	0.325	0.325	1.082	0.000
0.82	0.82	89.78	0.432	0.479	3-M2t	0.407	0.253	0.325	0.325	1.218	0.000
0.91	0.91	89.82	0.465	0.515	3-M2t	0.446	0.270	0.325	0.325	1.353	0.000

****

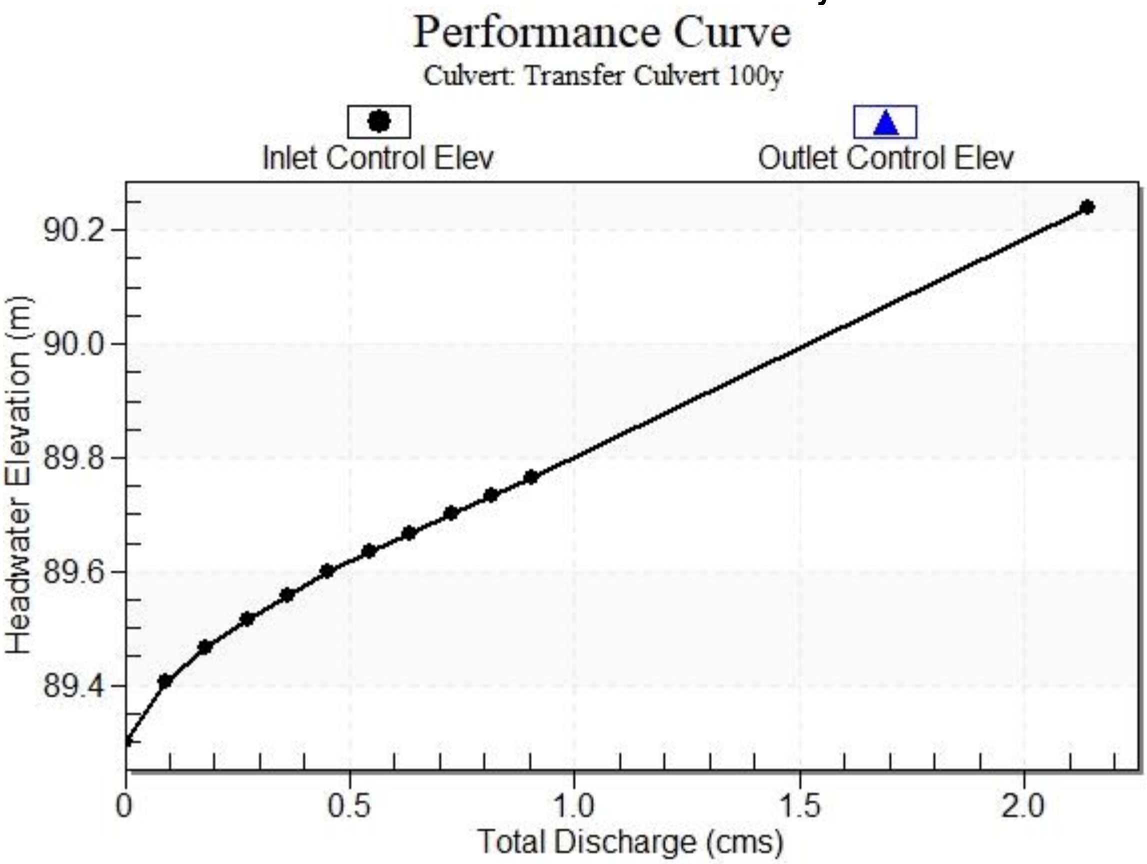
Straight Culvert

Inlet Elevation (invert): 89.30 m, Outlet Elevation (invert): 89.18 m

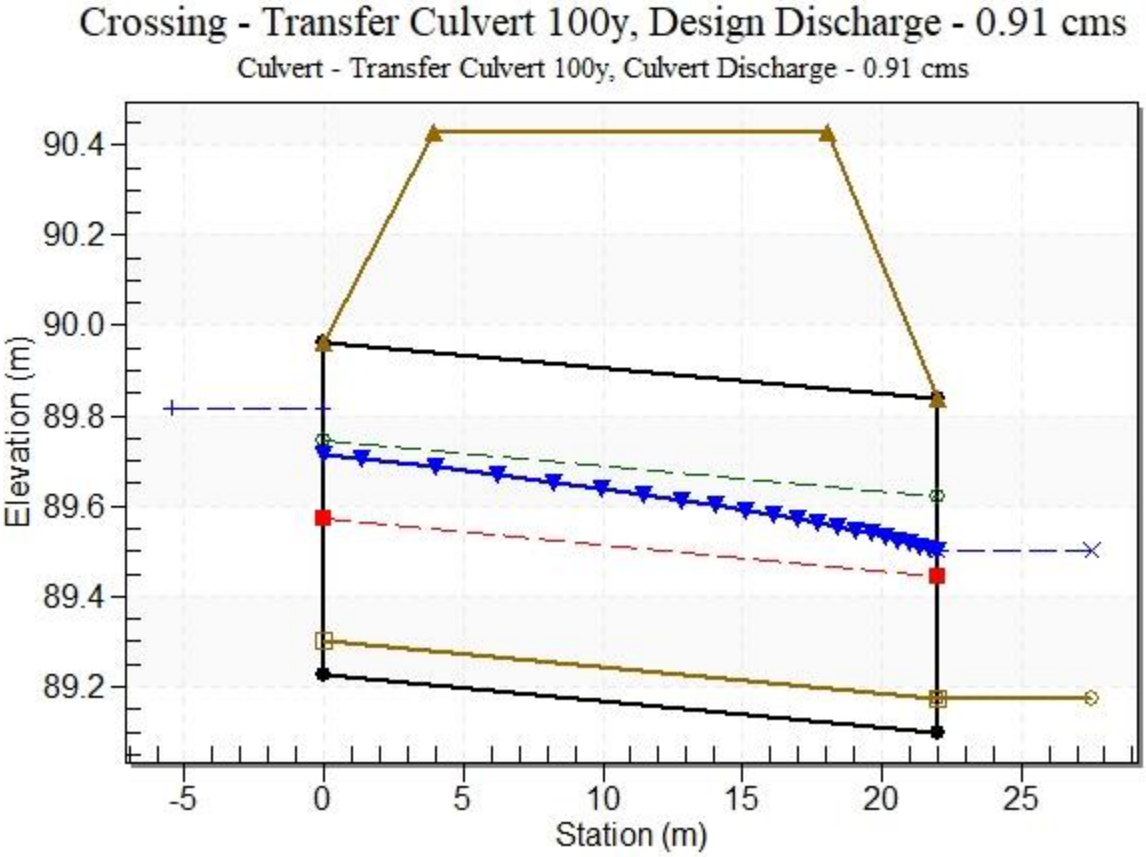
Culvert Length: 22.00 m, Culvert Slope: 0.0057

****

Culvert Performance Curve Plot: Transfer Culvert 100y



Water Surface Profile Plot for Culvert: Transfer Culvert 100y



Site Data - Transfer Culvert 100y

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 89.23 m

Outlet Station: 22.00 m

Outlet Elevation: 89.10 m

Number of Barrels: 2

Culvert Data Summary - Transfer Culvert 100y

Barrel Shape: Pipe Arch

Barrel Span: 1066.80 mm

Barrel Rise: 736.60 mm

Barrel Material: Steel or Aluminum

Embedment: 75.00 mm

Barrel Manning's n: 0.0250 (top and sides)

Manning's n: 0.0300 (bottom)

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Table 15 - Downstream Channel Rating Curve (Crossing: Transfer Culvert 100y)

Flow (cms)	Water Surface Elev (m)	Depth (m)
0.00	89.50	0.33
3.20	89.50	0.33
6.41	89.50	0.33
9.61	89.50	0.33
12.81	89.50	0.33
16.02	89.50	0.33
19.22	89.50	0.33
22.42	89.50	0.33
25.62	89.50	0.33
28.83	89.50	0.33
32.03	89.50	0.33

Tailwater Channel Data - Transfer Culvert 100y

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 89.50 m

Roadway Data for Crossing: Transfer Culvert 100y

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 25.00 m

Crest Elevation: 90.43 m

Roadway Surface: Paved

Roadway Top Width: 14.20 m

Hydraulic Analysis Report

Project Data

Project Title: A001103 - Fastfrate Swales

Designer:

Project Date: Wednesday, June 2, 2021

Project Units: SI Units (Metric)

Notes:

Channel Analysis: Channel West_100y

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.5000 m/m

Side Slope 2 (Z2): 3.0000 m/m

Channel Width: 1.0000 m

Longitudinal Slope: 0.0010 m/m

Manning's n: 0.0300

Flow: 0.2310 cms

Result Parameters

Depth: 0.3050 m

Area of Flow: 0.6537 m^2

Wetted Perimeter: 3.3702 m

Hydraulic Radius: 0.1940 m

Average Velocity: 0.3534 m/s

Top Width: 3.2872 m

Froude Number: 0.2529

Critical Depth: 0.1455 m

Critical Velocity: 1.0269 m/s

Critical Slope: 0.0190 m/m

Critical Top Width: 2.09 m

Calculated Max Shear Stress: 2.9893 N/m^2

Calculated Avg Shear Stress: 1.9013 N/m^2

Channel Analysis: Channel West_10y

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.5000 m/m

Side Slope 2 (Z2): 3.0000 m/m

Channel Width: 1.0000 m

Longitudinal Slope: 0.0010 m/m

Manning's n: 0.0300

Flow: 0.1140 cms

Result Parameters

Depth: 0.2158 m

Area of Flow: 0.3904 m^2

Wetted Perimeter: 2.6770 m

Hydraulic Radius: 0.1458 m

Average Velocity: 0.2920 m/s

Top Width: 2.6183 m

Froude Number: 0.2414

Critical Depth: 0.0967 m

Critical Velocity: 0.8655 m/s

Critical Slope: 0.0212 m/m

Critical Top Width: 1.73 m

Calculated Max Shear Stress: 2.1151 N/m^2

Calculated Avg Shear Stress: 1.4294 N/m^2

Channel Analysis: Channel East_100y

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 m/m

Side Slope 2 (Z2): 3.0000 m/m

Channel Width: 1.0000 m

Longitudinal Slope: 0.0010 m/m

Manning's n: 0.0300

Flow: 0.4000 cms

Result Parameters

Depth: 0.4165 m

Area of Flow: 0.9368 m^2

Wetted Perimeter: 3.6340 m

Hydraulic Radius: 0.2578 m

Average Velocity: 0.4270 m/s

Top Width: 3.4988 m

Froude Number: 0.2634

Critical Depth: 0.2052 m

Critical Velocity: 1.2066 m/s

Critical Slope: 0.0173 m/m

Critical Top Width: 2.23 m

Calculated Max Shear Stress: 4.0823 N/m^2

Calculated Avg Shear Stress: 2.5269 N/m^2

Channel Analysis: Channel East_10y

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 m/m

Side Slope 2 (Z2): 3.0000 m/m

Channel Width: 1.0000 m

Longitudinal Slope: 0.0010 m/m

Manning's n: 0.0300

Flow: 0.2010 cms

Result Parameters

Depth: 0.2984 m

Area of Flow: 0.5656 m^2

Wetted Perimeter: 2.8874 m

Hydraulic Radius: 0.1959 m

Average Velocity: 0.3554 m/s

Top Width: 2.7906 m

Froude Number: 0.2520

Critical Depth: 0.1386 m

Critical Velocity: 1.0247 m/s

Critical Slope: 0.0192 m/m

Critical Top Width: 1.83 m

Calculated Max Shear Stress: 2.9253 N/m^2

Calculated Avg Shear Stress: 1.9201 N/m^2

Channel Analysis: Channel West_B_100y

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.5000 m/m

Side Slope 2 (Z2): 3.0000 m/m

Channel Width: 1.0000 m

Longitudinal Slope: 0.0010 m/m

Manning's n: 0.0300

Flow: 0.2750 cms

Result Parameters

Depth: 0.3314 m

Area of Flow: 0.7433 m^2

Wetted Perimeter: 3.5758 m

Hydraulic Radius: 0.2079 m

Average Velocity: 0.3700 m/s

Top Width: 3.4856 m

Froude Number: 0.2557

Critical Depth: 0.1605 m

Critical Velocity: 1.0695 m/s

Critical Slope: 0.0185 m/m

Critical Top Width: 2.20 m

Calculated Max Shear Stress: 3.2486 N/m^2

Calculated Avg Shear Stress: 2.0376 N/m^2

Channel Analysis: Channel West_B_10y

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.5000 m/m

Side Slope 2 (Z2): 3.0000 m/m

Channel Width: 1.0000 m

Longitudinal Slope: 0.0010 m/m

Manning's n: 0.0300

Flow: 0.1390 cms

Result Parameters

Depth: 0.2382 m

Area of Flow: 0.4511 m^2

Wetted Perimeter: 2.8516 m

Hydraulic Radius: 0.1582 m

Average Velocity: 0.3081 m/s

Top Width: 2.7868 m

Froude Number: 0.2445

Critical Depth: 0.1086 m

Critical Velocity: 0.9091 m/s

Critical Slope: 0.0206 m/m

Critical Top Width: 1.81 m

Calculated Max Shear Stress: 2.3353 N/m^2

Calculated Avg Shear Stress: 1.5506 N/m^2

PROJECT NAME: Warehouse Development
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS: 90 % Design (Site Plan Approval)

July 25, 2021

HYDRAULIC CALCULATIONS FOR STORM SEWERS

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012
2. City of Ottawa Technical Bulletins up to and including ISTB-2018-01

DESIGN BASIS:

Manning Coefficient : 0.013
Maximum permitted velocity : 3.00 **m/s**
Minimum permitted velocity : 0.80 **m/s**

Section	Dia. mm	Length m	Slope %	Invert upstream m	Invert downstream m	Capacity (full) m³/s	Velocity (full) m/s	Flow m³/s	Velocity (actual) m/s	% Full
Building Service Connection / STM 1	600	29.3	1.00%	89.750	89.460	0.614	2.17	0.213	1.96	35%
STM 2	600	21.9	0.50%	89.430	89.320	0.435	1.54	0.283	1.64	65%
STM 3	600	13.2	0.50%	87.765	87.700	0.435	1.54	0.283	1.64	65%
Outlet				87.700						

Remarks

The data in green has been calculated or modified by the designer
The data in blue has been calculated using formulas inserted by the designer

Notes :

1. Storm Sewer Peak Flow Determined per Roof Restricted flow of 213 L/s; and uncontrolled flow from Catchements A4 of 35.792 L/s and from Catchment A5 of 34.458 L/s.

Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: 2021-07-25
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng.   Date: 2021-07-25
PEO No.: 1E+08

D

Appendix D -
Potable Water & Fire Protection Calculations

CIMA+

PROJECT NAME: Fastfrate Warehouse Development

CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS: 90 % Design (Site Plan Approval)

WATER CONSUMPTION CALCULATIONS

APPLICABLE DESIGN GUIDELINES:

1. Ottawa Design Guidelines - Water Distribution (2010)
2. City of Ottawa Technical Bulletin ISTB-2018-02, ISDTB-2014-02 and ISD-2010-02
3. MOE Design Guidelines for Drinking-Water Systems

RESIDENTIAL AND COMMERCIAL WATER DEMANDS:

RESIDENTIAL DESIGN CRITERIA:

Residential Average Day Demand:	350	L/c/day
Maximum Day Peaking Factor:	3.9	x Average Daily Demand
Maximum (Peak Hour) Peaking Factor:	5.8	x Average Daily Demand

Per Unit Populations:

Table 4.1 Per Unit Populations

Unit Type	Persons Per Unit
Single Family	3.4
Semi-detached	2.7
Duplex	2.3
Townhouse (row)	2.7
Apartments:	
Bachelor	1.4
1 Bedroom	1.4
2 Bedroom	2.1
3 Bedroom	3.1
Average Apt.	1.8

EQUIVALENT POPULATION :

Unit Type	Number of Units	Persons Per Unit	Population
Studio Apartments	0	1.4	0
1 Bedroom Apartments	0	1.4	0
1 Bedroom + Den Apartments	0	1.4	0
2 Bedroom Apartments	0	2.1	0
Total	**0**		**0**

COMMERCIAL DESIGN CRITERIA:

Contributing Commercial Area:	0.711	gross ha (including amenity areas, party room and gym)
Commercial Average Day Demand:	28,000	L/gross ha/d
Maximum Day Peaking Factor:	1.5	x Average Daily Demand
Maximum (Peak Hour) Peaking Factor:	1.8	x Maximum Daily Demand

WATER DEMANDS:

Demand Type	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Maximum (Peak) Hour Demand (L/s)
Residential	0.00	0.00	0.00
Commercial	0.23	0.35	0.62
Total	**0.23**	**0.35**	**0.62**

NOTES:

1. Maximum Day and Maximum Hour residential peaking factors determined using Table 3-3 of the MOE Design Guidelines for Drinking-Water System for 0 to 500 persons.

2. Given basic day demand greater than 50 m3/day (0.57 L/s), two connections, separated by an isolation valve required. Furthermore given location on corner lot, City will not support the addition of an isolation valve on the main line, thus one connection to Richmond Rd and one connection to Roosevelt Ave. required.

Prepared by: Guillaume LeBlond, M.A.Sc., E   Date: 2021-07-26
PEO# 100530467

Verified by: Christian Lavoie-Lebel, P.Eng.   Date: 2021-07-26
PEO# 100173201

\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\03-Watermain\[210725_Water Supply & Fire Flow.xlsx]Water Demands_OSDG

CIMA+	**PROJECT NAME:**	Fastfrate Warehouse Development
	CIMA+ PROJECT NUMBER:	A001083
	CLIENT:	Fastfrate (Ottawa) Holdings Inc.
	PROJECT STATUS:	90 % Design (Site Plan Approval)

FIRE FLOW ASSESSMENT

APPLICABLE DESIGN GUIDELINES:

1. Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999
2. Ottawa Design Guidelines - Water Distribution (2010) including Appendix H per ISTB-2018-02
3. City of Ottawa Technical Bulletin ISTB-2018-02
4. MOE Design Guidelines for Drinking-Water Systems

STEP A - DETERMINE THE TYPE OF CONSTRUCTION

Type of Construction	Coefficient (C)	Value Selected (C)
Fire-resistive Construction (> 3 hours)	**0.6**	**0.6**
Non-combustible Construction	0.8	
Ordinary Construction	1	
Wood Frame Construction	1.5	

STEP B - DETERMINE THE FLOOR AREA

Floor/Level	Floor Area Per Level (sq. ft.)	Floor Area Per Level (m2)	Fire Resistive Building	Protected Openings (one hour rating)	Area of Structure Considered (m2)
Gross Floor Area (GFA) Ground Level:	92,376	8,582	YES	YES	8,582
TOTAL FLOOR AREA (A):	**92,376**	**8,582**			**8,582**

STEP C - DETERMINE THE HEIGHT IN STOREYS

Floor/Level	Number of Storeys	Percent of Floor Area Considered
Ground Level:	1	100%
HEIGHT IN STOREYS:	**1**	

STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

$$F = 220C\sqrt{A}$$

Where:

F is the required fire flow in L/min

C is the coefficient related to the type of construction, and;

A is the total floor area of the building in m^2

Coefficient Related to Type of Construction (C) = **0.6**

Floor Area Considered (A) = **8,582 m^2**

REQUIRED (BASE) FIRE FLOW (F) =	**12000**	**L/min** (Rounded to Nearest 1,000 L/min)

STEP E - DETERMINE THE INCREASE OR DECREASE FOR OCCUPANCY AND APPLY TO STEP D (STEP D x STEP E, DO NOT ROUND)

Occupancy Class	Occupancy Factor	Value Selected (C)
Non-combustible	0.75	
Limited combustible	0.85	
Combustible	**1.00**	**1.00**
Free burning	1.15	
Rapid burning	1.25	

REQUIRED (BASE) FIRE FLOW (F) =	**12000**	**L/min** (Not rounded)

PROJECT NAME:	Fastfrate Warehouse Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS:	90 % Design (Site Plan Approval)

FIRE FLOW ASSESSMENT

STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Sprinkler System Design	Sprinkler Design Charge	Value Selected (C)	Total Charge
Automatic sprinkler system conforming to NFPA standards	-30%	Yes	-30%
Standard water supply	-10%	No	0%
Fully supervised system	-10%	No	0%
TOTAL CHARGE FOR SPRINKLER SYSTEM			**-30%**

DECREASE FOR SPRINKLER PROTECTION =	**-3600**	**L/min** (Not rounded)

STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Façade	Separation Distance (m)	Length-height Factor of Exposed Wall (m-storeys)	Assumed Construction of Exposed Wall of Adjacent	Total Charge
North Façade	>45	N/A	N/A	0%
East Façade (fire/party wall)	>45	N/A	N/A	0%
South Façade	>45	N/A	N/A	0%
West Façade	>45	N/A	N/A	0%
TOTAL CHARGE FOR EXPOSURES				**0%**

INCREASE FOR EXPOSURES =	**0**	**L/min** (Not rounded)

STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP F + STEP G, ROUND TO NEAREST 1,000 L/min)

TOTAL REQUIRED FIRE FLOW (RFF) =	**8000**	**L/min** (Rounded to Nearest 1,000 L/min)
	133.3333333	**L/s**
	2113	**USGPM**

PROJECT NAME:	Fastfrate Warehouse Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS:	90 % Design (Site Plan Approval)

FIRE FLOW ASSESSMENT

NOTES/COMMENTS:

STEP A - DETERMINE THE TYPE OF CONSTRUCTION

1. No notes or comments

STEP B - DETERMINE THE FLOOR AREA

1. Assumed vertical openings and exterior vertical communications are properly protected (one hour rating), thus only the area of the largest floor plus 25% of each of the two immediately adjoining floors accounted for per Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999
2. Per the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999, Note E: Fire Walls - In determining floor areas, a fire wall that meets or exceeds the requirements of the current edition of the National Building Code of Canada (provided this necessitates a fire resistance rating of 2 or more hours) may be deemed to subdivide the building into more than one area or may, as a party wall, separate the building from an adjoining building. It is assumed that the party wall to the east will have a fire-resistance rating of at least two hours.

STEP C - DETERMINE THE HEIGHT IN STOREYS

1. Two levels of underground parking not considered as they are at least 50% below grade (note F of Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999)

STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

1. No notes or comments.

STEP E - DETERMINE THE INCREASE OR DECREASE FOR OCCUPANCY AND APPLY TO STEP D (STEP D x STEP E, DO NOT ROUND)

1. Occupancy selected assuming commercial establishment will fall under C-3 occupancy type.

STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

1. Assumes sprinkler system will not be fully supervised.

STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

1. Assumes adjoining wall to east is an unpierced party wall considered to form a boundary when determining floor areas warranting a 10% exposure charge per Note E of the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999

STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP F + STEP G, ROUND TO NEAREST 1,000 L/min)

1. No notes or comments.

Prepared by: Julien Sauvé, P.Eng.
PEO# 100200100
Date: 2020-07-26

Verified by: Christian Lavoie-Lebel, P.Eng.
PEO# 100067842
Date: 2020-07-26

PROJECT NAME:	Warehouse Development	July 25, 2021
CIMA+ PROJECT NUMBER:	A001083	
CLIENT:	Fastfrate (Ottawa) Holdings Inc.	
PROJECT STATUS:	90 % Design (Site Plan Approval)	

HYDRAULIC CALCULATIONS FOR GRAVITY FIRE PROTECTION WATERMAIN

APPLICABLE DESIGN GUIDELINES:

NFPA 13

DESIGN BASIS:

Manning Coefficient : 0.013

Maximum permitted velocity : 3.00 **m/s**

Minimum permitted velocity : 0.60 **m/s**

Section	Dia. mm	Length m	Slope %	Invert upstream m	Invert downstream m	Capacity (full) m^3/s	Velocity (full) m/s	Flow m^3/s	Velocity (actual) m/s	% Full	F.S.
Fire Protection WM	300	60.1	0.10%	86.485	86.425	0.030	0.43	0.015800	0.43	53%	1.90

Remarks

The data in green has been calculated or modified by the designer

The data in blue has been calculated using formulas inserted by the designer

Notes :

1. Slope of 3.00% has been assumed for all building connections.

Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: 2021-07-25

PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng.   Date: 2021-07-25

PEO No.: 100067842

PROJECT NAME:	Fastfrate (Ottawa) Warehouse Development
NUMBER:	A001083
CLIENT:	Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS:	90 % Design (Site Plan Approval)

$$AFDD = \sum_{day=1}^{n} FDD_{day}$$

AFDD 785 °C.day

$$Thickness\ (cm) = \alpha\sqrt{AFDD}$$

α	2.4	
T (cm)	67.24	cm
T (ft)	2.21	ft
T (ft, in)	2'3"	

α	1.7	
T (cm)	47.63	cm
T (ft)	1.56	ft
T (ft, in)	1'7"	

α	2.7	
T (cm)	75.65	cm
T (ft)	2.48	ft
T (ft, in)	2'6"	

Freezing Degree Days (FDD) are computed with this simple formula:
FDD = 0°C – $T_{(\text{daily mean})}$

AFDD is the sum of daily FDD over the season
– used to estimate river ice thickness

Thickness (cm) $= \alpha\sqrt{AFDD}$

Ice Cover Condition	α
Windy lake, no snow	2.7
Average lake with snow	1.7-2.4
Average river with snow	0.4-0.5
Sheltered small river	0.7-1.4

Only temperatures from winter (Dec 21 – March 21) are used for calculation.

Prepared b Jaymeson Adams, EIT Date: 2020-11-25

Verified by Christian Lavoie-Lebel, P.Eng. Date: 2020-11-25

E

Appendix E -
Septic System Detailed Calculations

Project:	Fastfrate Warehouse
Task:	Saniatry Sewage Flows per OBC
Project Number:	A0001083
Created By:	Kayla Schmidt
Date:	19-Jul-21
Notes:	Hazen Williams was used to calculate the TDH. There are 6 pumps total (2 for the Pumping Chamber, 2 for the Level IV treatment, and 1 for the recycle line).

Table 1: Dosing Criteria

Parameter	Value	Unit
Daily Design Flow Rate	12,800	L/d
Required Dosing per day	24	times
Time for each dosing	15	minutes
Hourly Design Flow Rate	533.3	L/hr
Design Flow Rate	8.9	L/min
Design Flow Rate	0.15	L/s
Assumed Pump Chamber Volume	17,578	L

Where a pump or siphon is required, the pump or siphon shall be designed to discharge a dose of at least 75% of the internal volume of the *distribution pipe* within a time period not exceeding fifteen minutes.

Table 2: Dosing Requirements			
Parameter	**Value**	**Unit**	**Notes**
Length of Each Distibution Pipe	25	m	
Number of Distribution Pi	7		
Total Length	175	m	
Diameter	0.025	m	
Cross Sectional Area	0.000490874	m2	
Total Volume of Distribution Pipe	0.085902924	m3	
Total Volume of Distribution Pipe	85.90	L	
75% of Volume of Distibution Pipe	64.43	L	
Max time	15	minutes	
Flow Rate Required	4.30	L/min	
Flow Rate Required	0.07	L/s	
Daily Volume for Flow Rate	2061.67	L/d	
Minimum Required Flow Rate per hour	533.33	L/hr	
Flow Rate require for 15 minute time frame	35.56	L/min (per 15 minutes)	
Flow Rate require for 15 minute time frame	0.59	L/s (per 15 minutes)	
Check	**12800**	**L/d**	
Pump Design Flow Rate	**1**	**L/s**	
Daily Flow Rate	**21600**	**L/d**	

Pumping Chamber Pumps (to Waterloo Biofilter)

Parameter	Value	Unit	Notes
Low Water Level	86.712	mASL	
Top of Pipe	89.212	mASL	
Static Head	2.5	m	
Pipe Diameter	0.05	m	
Pipe Area	0.001963495	m2	
Pipe Length	5	m	
Pressure at end	10	m	

Fittings	K Value	Qty	Total
90 degree elbows	0.81	3	2.43
Tees	1.62	1	1.62
		Subtotal	4.05
		Safety Factor	1.2
		Total	**5.25**

Flow		Velocity	Fitting Loss (K*V^2/2*g)	Pipe Friction Losses Friction Coefficient (C) in m			Static Head	Pressure to be dosed	Total Dynamic Head Loss (m)		
L/s	m3/s	m/s	m	140	150	160	m	m	140	150	160
0	0.0000	0.0E+00	0.0E+00	0.00	0.00	0.00	2.5	10	12.50	12.50	12.50
0.5	0.0005	9.8E-07	2.6E-13	0.01	0.01	0.01	2.5	10	12.51	12.51	12.51
1	0.0010	2.0E-06	1.0E-12	0.03	0.03	0.03	2.5	10	12.53	12.53	12.53
1.5	0.0015	2.9E-06	2.3E-12	0.07	0.06	0.06	2.5	10	12.57	12.56	12.56
2	0.0020	3.9E-06	4.1E-12	0.12	0.11	0.10	2.5	10	12.62	12.61	12.60
2.5	0.0025	4.9E-06	6.4E-12	0.19	0.16	0.15	2.5	10	12.69	12.66	12.65
3	0.0030	5.9E-06	9.3E-12	0.26	0.23	0.20	2.5	10	12.76	12.73	12.70
3.5	0.0035	6.9E-06	1.3E-11	0.35	0.31	0.27	2.5	10	12.85	12.81	12.77
4	0.0040	7.9E-06	1.7E-11	0.45	0.39	0.35	2.5	10	12.95	12.89	12.85
4.5	0.0045	8.8E-06	2.1E-11	0.55	0.49	0.43	2.5	10	13.05	12.99	12.93
5	0.0050	9.8E-06	2.6E-11	0.67	0.59	0.53	2.5	10	13.17	13.09	13.03
5.5	0.0055	1.1E-05	3.1E-11	0.80	0.71	0.63	2.5	10	13.30	13.21	13.13

Level IV Treatment Unit Discharge Pumps (to SBT Leaching Bed)

Parameter	Value	Unit	Notes
Low Water Level	86.712	mASL	
Top of Pipe	89.212	mASL	
Static Head	2.5	m	
Pipe Diameter	0.05	m	
Pipe Area	0.001963495	m2	
Pipe Length	18	m	
Pipe Diameter	0.025	m	
Pipe Area	0.000490874	m2	
Pipe Length	26	m	
Pressure at end	0.6	m	per OOWA best practices

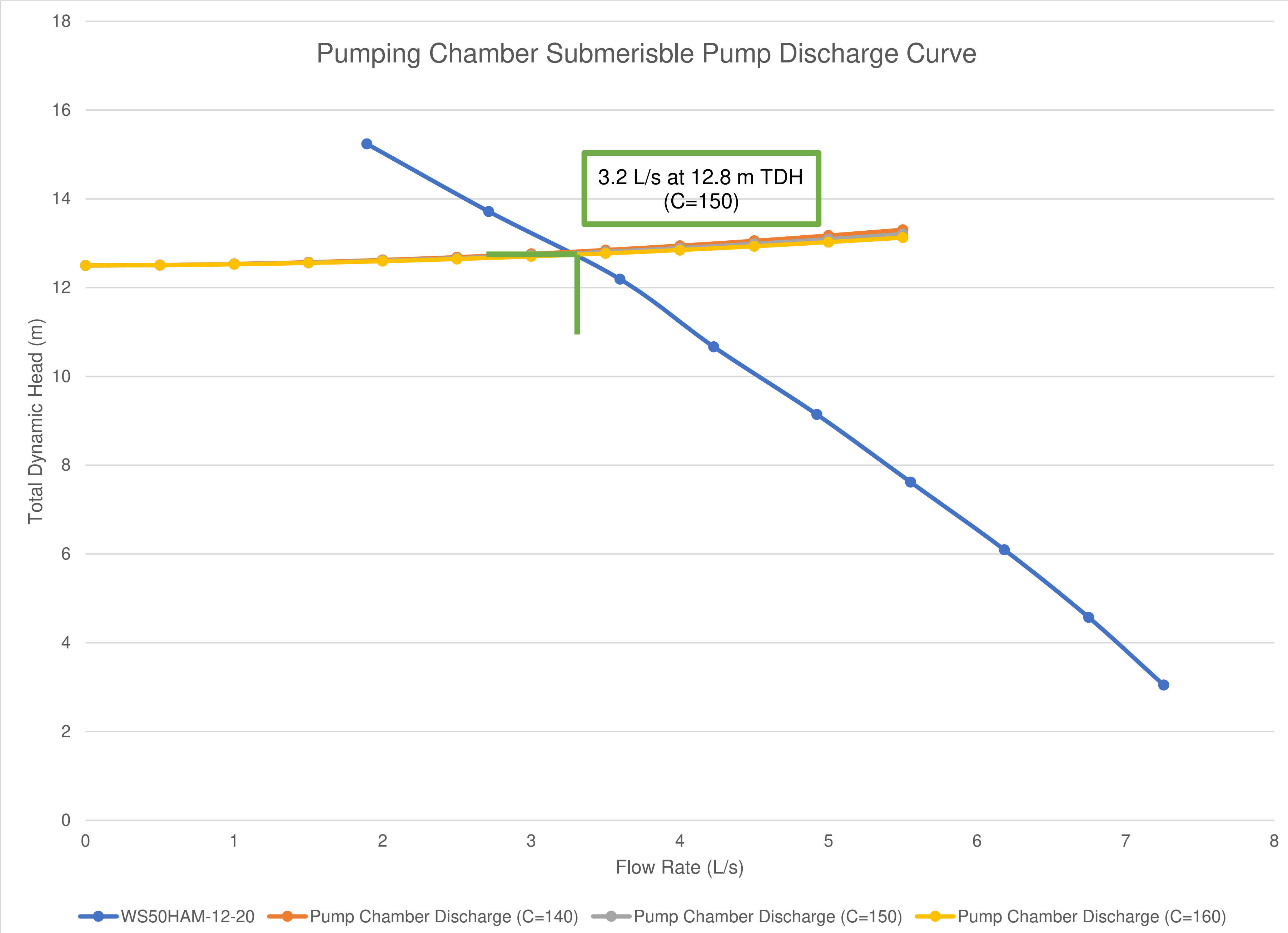
Fittings	K Value	Qty	Total
90 degree elbows	0.81	3	2.43
Tees	1.62	1	1.62
Reducer (50 to 25 mm)	0.02	1	0.02
Check Valve	10.8	1	10.8
Ball Valve	0.08	1	0.08
		Subtotal	14.95
		Safety Factor	1.2
		Total	**16.15**

Flow		Velocity	Fitting Loss (K*V^2/2*g)	Pipe Friction Losses Friction Coefficient (C) in m 50 mm Forcemain & Manifold			Pipe Friction Losses Friction Coefficient (C) in m 25 mm Forcemain & Manifold			Static Head	Pressure to be dosed	Total Dynamic Head Loss (m)		
L/s	m3/s	m/s	m	140	150	160	140	150	160	m	m	140	150	160
0	0.0000	0.0E+00	0.0E+00	0.00	0.00	0.00	0.00	0.00	0.00	2.5	0.6	3.10	3.10	3.10
0.5	0.0005	9.8E-07	7.9E-13	0.03	0.03	0.03	1.44	1.27	1.12	2.5	0.6	4.57	4.40	4.25
1	0.0010	2.0E-06	3.2E-12	0.12	0.11	0.10	5.20	4.57	4.06	2.5	0.6	8.42	7.78	7.25
1.5	0.0015	2.9E-06	7.1E-12	0.26	0.23	0.20	11.01	9.69	8.60	2.5	0.6	14.37	13.02	11.90
2	0.0020	3.9E-06	1.3E-11	0.44	0.39	0.35	18.76	16.51	14.65	2.5	0.6	22.31	20.00	18.10
2.5	0.0025	4.9E-06	2.0E-11	0.67	0.59	0.52	28.36	24.96	22.15	2.5	0.6	32.13	28.65	25.77
3	0.0030	5.9E-06	2.9E-11	0.94	0.83	0.73	39.75	34.99	31.04	2.5	0.6	43.80	38.91	34.88
3.5	0.0035	6.9E-06	3.9E-11	1.25	1.10	0.98	52.89	46.55	41.30	2.5	0.6	57.24	50.75	45.38
4	0.0040	7.9E-06	5.1E-11	1.60	1.41	1.25	67.73	59.61	52.89	2.5	0.6	72.43	64.12	57.24
4.5	0.0045	8.8E-06	6.4E-11	1.99	1.76	1.56	84.24	74.13	65.78	2.5	0.6	89.33	78.99	70.44
5	0.0050	9.8E-06	7.9E-11	2.42	2.13	1.89	102.39	90.11	79.96	2.5	0.6	107.91	95.34	84.95
5.5	0.0055	1.1E-05	9.6E-11	2.89	2.55	2.26	122.16	107.50	95.39	2.5	0.6	128.15	113.15	100.75

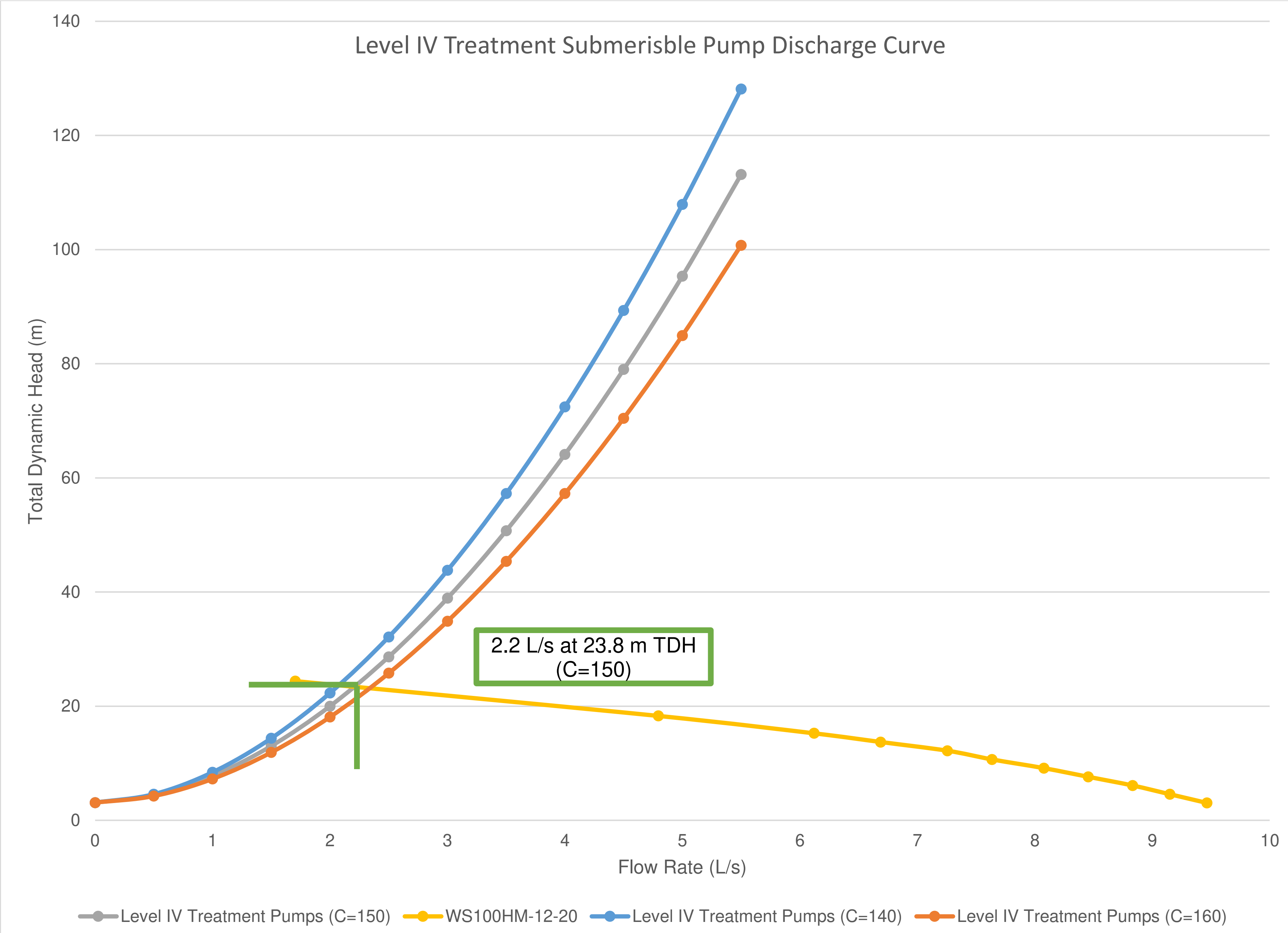
Recycle Line Pump (from Level IV Treatment to Upstream of the Septic System)

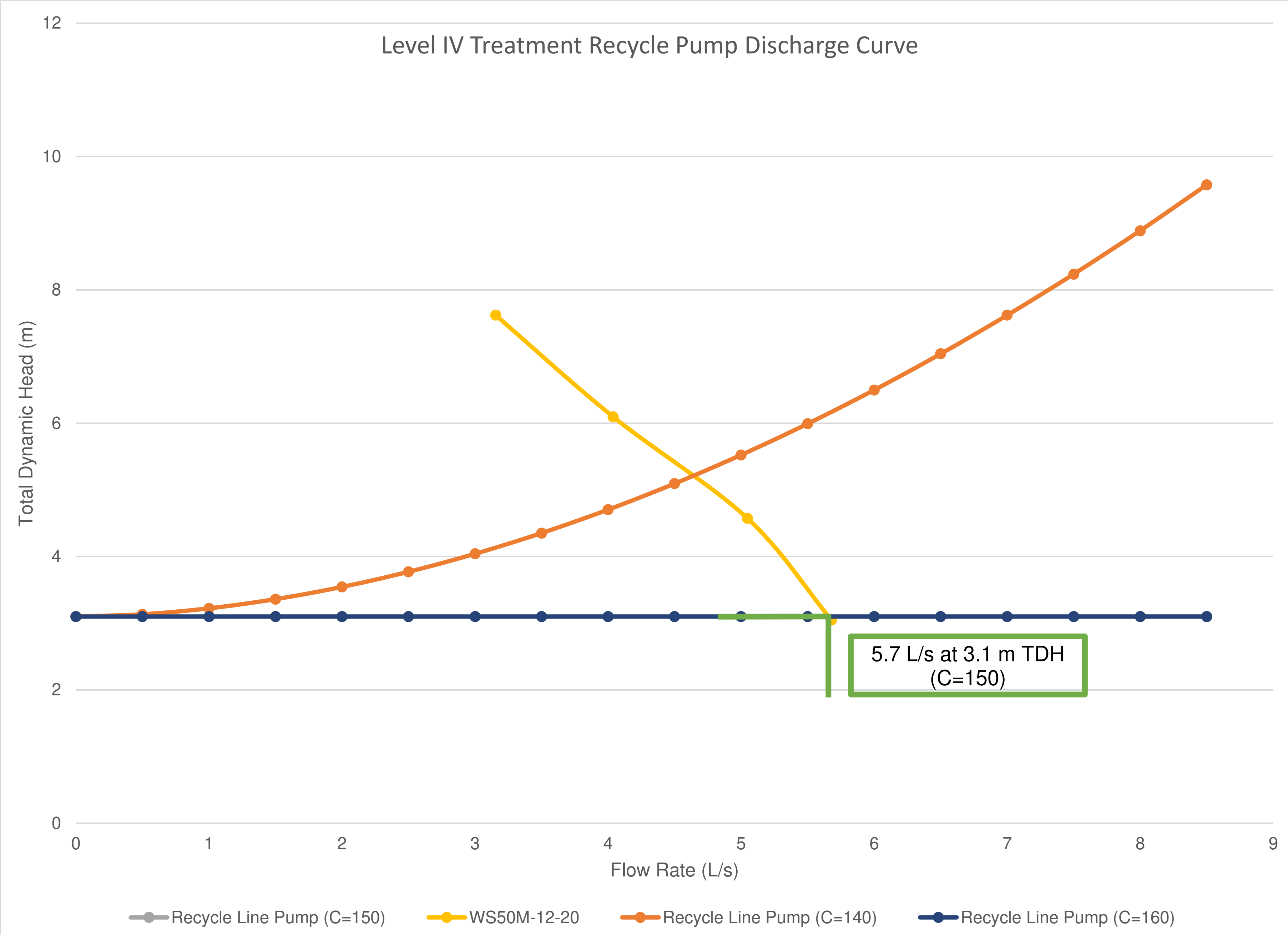
Parameter	Value	Unit	Notes
Low Water Level	86.712	mASL	
Top of Pipe	89.212	mASL	
Static Head	2.5	m	
Pipe Diameter	0.05	m	
Pipe Area	0.001963495	m2	
Pipe Length	18	m	
Pressure at end	0.6	m	
Fittings	**K Value**	**Qty**	**Total**
90 degree elbows	0.81	3	2.43
Check Valve	10.8	1	10.8
Ball Valve	0.08	1	0.08
		Subtotal	13.31
		Safety Factor	1.2
		Total	**14.51**

Flow		Velocity	Fitting Loss (K*V^2/2*g)	Pipe Friction Losses Friction Coefficient (C) in m			Static Head	Pressure to be dosed	Total Dynamic Head Loss (m)		
L/s	m3/s	m/s	m	140	150	160	m	m	140	150	160
0	0.0000	0.0E+00	0.0E+00	0.00	0.00	0.00	2.5	0.6	3.10	3.10	3.10
0.5	0.0005	9.8E-07	7.1E-13	0.03	0.00	0.00	2.5	0.6	3.13	3.10	3.10
1	0.0010	2.0E-06	2.9E-12	0.12	0.00	0.00	2.5	0.6	3.22	3.10	3.10
1.5	0.0015	2.9E-06	6.4E-12	0.26	0.00	0.00	2.5	0.6	3.36	3.10	3.10
2	0.0020	3.9E-06	1.1E-11	0.44	0.00	0.00	2.5	0.6	3.54	3.10	3.10
2.5	0.0025	4.9E-06	1.8E-11	0.67	0.00	0.00	2.5	0.6	3.77	3.10	3.10
3	0.0030	5.9E-06	2.6E-11	0.94	0.00	0.00	2.5	0.6	4.04	3.10	3.10
3.5	0.0035	6.9E-06	3.5E-11	1.25	0.00	0.00	2.5	0.6	4.35	3.10	3.10
4	0.0040	7.9E-06	4.6E-11	1.60	0.00	0.00	2.5	0.6	4.70	3.10	3.10
4.5	0.0045	8.8E-06	5.8E-11	1.99	0.00	0.00	2.5	0.6	5.09	3.10	3.10
5	0.0050	9.8E-06	7.1E-11	2.42	0.00	0.00	2.5	0.6	5.52	3.10	3.10
5.5	0.0055	1.1E-05	8.6E-11	2.89	0.00	0.00	2.5	0.6	5.99	3.10	3.10
6	0.0060	1.2E-05	1.0E-10	3.40	0.00	0.00	2.5	0.6	6.50	3.10	3.10
6.5	0.0065	1.3E-05	1.2E-10	3.94	0.00	0.00	2.5	0.6	7.04	3.10	3.10
7	0.0070	1.4E-05	1.4E-10	4.52	0.00	0.00	2.5	0.6	7.62	3.10	3.10
7.5	0.0075	1.5E-05	1.6E-10	5.14	0.00	0.00	2.5	0.6	8.24	3.10	3.10
8	0.0080	1.6E-05	1.8E-10	5.79	0.00	0.00	2.5	0.6	8.89	3.10	3.10
8.5	0.0085	1.7E-05	2.1E-10	6.48	0.00	0.00	2.5	0.6	9.58	3.10	3.10



Pumping Chamber Submerisble Pump Discharge Curve
3.2 L/s at 12.8 m TDH
(C=150)
Total Dynamic Head (m)
Flow Rate (L/s)
0
2
4
6
8
10
12
14
16
18
0
1
2
3
4
5
6
7
8
WS50HAM-12-20
Pump Chamber Discharge (C=140)
Pump Chamber Discharge (C=150)
Pump Chamber Discharge (C=160)


Level IV Treatment Submerisble Pump Discharge Curve
Total Dynamic Head (m)
Flow Rate (L/s)
2.2 L/s at 23.8 m TDH
(C=150)
0
20
40
60
80
100
120
140
0
1
2
3
4
5
6
7
8
9
10
Level IV Treatment Pumps (C=150)
WS100HM-12-20
Level IV Treatment Pumps (C=140)
Level IV Treatment Pumps (C=160)


Level IV Treatment Recycle Pump Discharge Curve
12
10
8
6
4
2
0
Total Dynamic Head (m)
0
1
2
3
4
5
6
7
8
9
Flow Rate (L/s)
5.7 L/s at 3.1 m TDH
(C=150)
Recycle Line Pump (C=150)
WS50M-12-20
Recycle Line Pump (C=140)
Recycle Line Pump (C=160)

F

Appendix F -
Sanitary Servicing Calculations

PROJECT NAME:	Fastfrate (Ottawa)
CIMA+ PROJECT	A001083
CLIENT:	Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS:	90 % Design (Site plan Approval)

WASTEWATER PEAK FLOW DETERMINATION - COMMERCIAL & INSTITUTIONAL

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012
2. City of Ottawa Technical Bulletin ISTB-2018-01

DOMESTIC CONTRIBUTIONS:
COMMERCIAL & INSTITUTIONAL DESIGN CRITERIA:

Base Flow:	2.8	$L/m^2/d$
Peaking factor:	1.5	unitless
Extreneous Flows + Infiltration:	0.33	L/s/ha
OBC Baseflow:	12800	L/d
	0.148	L/s

Commercial and Institutional Average Design Flow = 28,000 L/gross ha/day

Commercial Peak factor:	1.5 if commercial contribution >20%[1], otherwise use 1.0
Institutional Peak factor:	1.5 if institutional contribution >20%[1], otherwise use 1.0
Industrial Peak Factor:	Per Figure in Appendix 4-B

AVERAGE FLOW - DOMESTIC:

Buildings	Building Area ft^2	Building Area m^2	Proportional Area ha	Average Base Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Extraneous Flow (L/s)	Maximum Flow (L/s)
Warehouse - Ottawa Sewer Desgin Guidelines	76503	7107	0.003	0.23	1.50	0.35	0.00	0.35
~~Warehouse - Ontario Building Code~~	~~76503~~	~~7107~~	~~0.003~~	~~0.15~~	~~1.50~~	~~0.22~~	~~0.00~~	~~0.22~~
Note: the value obtained from the City of Ottawa Sewer Design Guidelines for maximum flow was used since it is more conservative.								
Total	76503	7107				Qmax - Total (L/s) =		**0.35**

[1] If the commercial or institutional area is less than 20% of the total area, then a factor of 1.0 can be used.

- Infiltration Allowance (Dry weather): 0.05 L/s/effective gross ha (for all areas)
- Infiltration Allowance (Wet weather): 0.28 L/s/effective gross ha (for all areas)
- Infiltration Allowance (Total I/I): 0.33 L/s/effective gross ha (for all areas)

EXTRANEOUS FLOWS (Typical values for Partially Separated Sewers):
Local Street Level Analysis (less than or equal to 10 ha):
Wet Weather Extraneous Flow: 5.0 L/s/gross ha (rare event)
Annual event to be determined at design

Neighborhood Level Analysis (between 10 ha and 100 ha):
Wet Weather Extraneous Flow: 3.0 L/s/gross ha (rare event)
Annual event to be determined at design

Large Drainage area – Collector Level Analysis (greater than 100 ha):
Wet Weather Extraneous Flow: 2.0 L/s/gross ha (rare event)
Annual event to be determined at design

Ottawa
Sewer Design Guidelines
Second Edition, October 2012
SDG002

Prepared by: Guillaume LeBlond, M.A.Sc., EIT. Date: July 20 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 20 2021
PEO No.: 100067842

\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\02-Sanitary Sewer\[210720_CIMA+ Sanitary Sewer Flow - Commercial.xlsx]SANITARY FLOWS

CIMA+

PROJECT NAME: Warehouse Development
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS: 90 % Design (Site Plan Approval)

July 25, 2021

HYDRAULIC CALCULATIONS FOR SANITARY SEWERS

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012
2. City of Ottawa Technical Bulletin ISTB-2018-01

DESIGN BASIS:

Manning Coefficient : 0.013
Maximum permitted velocity : 3.00 **m/s**
Minimum permitted velocity : 0.60 **m/s**

Section	Dia. mm	Length m	Slope %	Invert upstream m	Invert downstream m	Capacity (full) m³/s	Velocity (full) m/s	Flow m³/s	Velocity (actual) m/s	% Full
Building to SAN #1	200	9.2	3.00%	89.850	89.574	0.057	1.81	0.000350	0.50	1%
SAN #1 to Septic tank	200	18.1	1.46%	89.564	89.300	0.040	1.26	0.000350	0.39	1%
Outlet				89.300						

Remarks

The data in green has been calculated or modified by the designer
The data in blue has been calculated using formulas inserted by the designer

Notes :

1. Slope of 3.00% has been assumed for all building connections.

Prepared by: Guillaume LeBlond, M.A.Sc., EIT — Date: 2021-07-20
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. — Date: 2021-07-20
PEO No.: 100067842

G

Appendix G - Correspondence

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.
A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	5	1. Site Servicing Plan	2. Assessment of Adequacy of Servicing	**S**	5
S	5	3. Grade Control and Drainage Plan	4. Geotechnical Study	**S**	5
		5. Composite Utility Plan	6. Groundwater Impact Study		
		7. Servicing Options Report	8. Wellhead Protection Study		
S	5	9. Transportation Impact Study	10.Erosion and Sediment Control Plan	**S**	5
S	5	11.Storm water Management Plan	12.Hydrogeological and Terrain Analysis	**S**	5
		13.Hydraulic Water main Analysis	14.Noise / Vibration Study	**S**	5
		15.Roadway Modification Design Plan	16.Confederation Line Proximity Study		

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
		17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage		
		19.Draft Plan of Condominium	20.Planning Rationale	**S**	3
S	5	21.Site Plan *(can be combined with Landscape Plan)*	22.Minimum Distance Separation (MDS)		
		23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study		
		25.Concept Plan Showing Ultimate Use of Land	26.Cultural Heritage Impact Statement		
S	5	27.Landscape Plan *(can be combined with Site Plan)*	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		
S	3	29.Survey Plan	30.Shadow Analysis		
S	5	31.Architectural Building Elevation Drawings (dimensioned) - Concept	32.Design Brief (*should be a part of the Planning Rationale)	**S**	*
		33.Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
		34.Phase 1 Environmental Site Assessment	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		
		36.Phase 2 Environmental Site Assessment	37.Assessment of Landform Features		
		38.Record of Site Condition	39.Mineral Resource Impact Assessment		
S	3	40.Tree Conservation Report *(Include in EIS)*	41.Environmental Impact Statement *(please contact the SNC)*	**S**	3
		42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)		

Meeting Date: December 17, 2020

Application Type: Site Plan Control, Complex

File Lead (Assigned Planner): Krishon Walker

Infrastructure Approvals Project Manager: Harry Alvey

Site Address (Municipal Address): 301 Somme Street

*Preliminary Assessment: 1☐ 2☐ 3☐ 4☐ 5☐

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that proposal appears to meet the City's key land use policies and guidelines. **This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the Planning, Infrastructure and Economic Development Department *will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the* Planning, Infrastructure and Economic Development Department.

Pre-Application Consultation

Site Plan Control (Complex)

301 Somme Street

Applicant:	Douglas Rancier, Civitas Group	**Owner:**	Rod Pierce, R. W. Tomlinson Limited
Ward	20 - Osgoode	**Councillor**	George Darouze

Proposal Summary: Development of a 4,645.15 square metre (*50,000 sq. ft.*) warehouse on the western portion of the subject site, an 1,858.06 square metre (*20,000 sq. ft.*) cross deck that would connect to the warehouse, and a 278.71 square metre (3*,000 sq. ft.*) office space.

Attendees: Krishon Walker, Planner, PIEDD, City of Ottawa
Harry Alvey, Infrastructure Project Manager, PIEDD, City of Ottawa

Regrets: Mike Giampa, Transportation Project Manager, PIEDD, City of Ottawa
Matthew Hayley, Environmental Planner, PIEDD, City of Ottawa
Michel Kearney, Project Manager, Hydrogeologist, PIEDD, City of Ottawa
James Holland, Watershed Planner, South Nation Conservation Authority

Meeting Notes

Planning Comments (Provided by Krishon Walker, Planner)

- As per Schedule A of the Official Plan, the site is designated Rural Employment Area. The Rural Employment Area is intended to support and encourage clustering of primarily industrial uses not suitable in the Urban Area or General Rural Area. Uses permitted in this designation includes but is not limited to new; heavy and light industrial uses, transportation uses, and warehouse and storage operations. The prosed use is consistent with the policies of the Official Plan.

  Development within the Rural Employment Area triggers Site Plan Control. Particular attention will be given to the physical design of the building(s) and site, including signage, buffering, landscaping and fencing.

- As per the City's Zoning By-law, the site is zoned as Rural Heavy Industrial Zone (RH).

  The Zoning By-law defines a warehouse as "*a building used for the storage and distribution of goods and equipment including self-storage units and mini-warehouses and may include one accessory dwelling unit for a facility manager*".

  Please ensure that your proposal complies with all applicable provisions of the Zoning By-law.

  Additionally, please ensure that the proposed parking complies with the provisions of Part 4 of the Zoning By-law. Parking areas should be screened from the street.

  If any aspect of the proposal does not comply with the zoning provisions of the applicable zone, a Minor Variance may be required through the Committee of Adjustment. If a Minor Variance is required, please note approval from the Committee of Adjustment would be required before a decision is made on the Site Plan Control application.

- Cash-in-Lieu of Parkland was be collected through the Plan of Subdivision (*15-94-0505*) application. As the proposed site development is the same as anticipated in the subdivision agreement, we would not request any additional CIL or land at this time.

- There is a 30cm reserve along the frontage of the property. A lifting of a reserve application will also be required. The reserve was put in place during the establishment of the subdivision and, as per clause 18 of Schedule F, Section D, of the Subdivision Agreement, can only be lifted:

  '*when certification of the proposed on-site well has been provided by a Professional Engineer or professional geoscientist licensed in the Province of Ontario that the well construction is in accordance with Ontario Regulation 903 and the recommendations contained in the report titled "Hydrogeological Investigation, Terrain Analysis & Impact Assessment, Proposed Industrial Subdivision" prepared by Golder Associates; Dated December 2008; Project No. 08-1122-0215 and the supporting letter "Tomlinson Industrial Subdivision – City of Ottawa File Number D07-16-15-94-0505; response to South nation Conservation Authority"; Golder Associates; Dated April 17, 2009; Project No. 08-1122-0215. This certification must be to the satisfaction of the General Manager, Planning and Growth Management.*'
- As the property is located within 500 metres of a Bedrock Resource Area, the Planning Rationale must speak to this designation and provide a discussion on how the proposal will impact (*if at all*) the Bedrock Resource Area.
- Please note that, as per Table 221 of the RH zone, any proposed outdoor storage is not permitted within the front yard and must be screened from the public street by an opaque screen at least 1.8 metres in height from finished grade.
- Please contact the South Nation Conservation Authority (SNC), amongst other federal and provincial departments/agencies, to identify all the necessary permits and approvals required to facilitate the development. Responsibility rests with the developer and their consultant for obtaining all external agency approvals. The address shall be in good standing with all approval agencies. Copies of confirmation of correspondence will be required by the City of Ottawa from all approval agencies that a form of assent is given. No construction shall commence until after a commence work notification is given.
- Please ensure that the Site Plan shows the full extent of the property and that a complete zoning table is provided. The Site Plan should also clearly show the dimensions of all proposed buildings, roads, radii of turns, overhead clearances, parking areas with defined parking spaces, steps, terraces, fences, walks, aisles and private approaches.
- Please show the location for snow storage on both the Site Plan and Landscape Plan. Storage shall not interfere with approved grading and drainage patterns or servicing. If snow is to be removed from the site, then please make a note of that on the Site Plan and include where the snow will be placed in the interim. Temporary snow storage areas should not conflict with utility box, landscaping, required parking, and site circulation.
- Be sure to follow the City's guide to preparing plans and studies (*see link below*) to ensure a high quality of your submission.

  Feel free to contact Krishon Walker at Krishon.Walker@ottawa.ca, for follow-up questions.

<u>Engineering Comments (Provided by Harry Alvey, Infrastructure Project Manager)</u>

- This site is part of the Hawthorne Industrial Park that was approved in 2009. A stormwater management pond was constructed as part as the development of this park. This stormwater management pond provides stormwater management for 75% of Hawthorne Industrial Park and includes the proposed development in that service area. The pond was designed to provide 70% TSS removal. The current requirement is to provide 80% TSS removal, which will require this proposed development to meet the new enhanced requirement. It is suggested that the consultant procure a copy of the stormwater management report for Hawthorne

Industrial Park for coordination. The stormwater management report was prepared by J.L. Richards & Associates Limited (J*.L.R. Project #: JLR 20983; City Index #: R-2973; City Old Tag #: W09-04-1713*) Revision date May 2009.

- The site appears to cover two adjacent drainage areas. There should be a comprehensive discussion of how the SWM will be handled in each of the drainage areas.
- Provide Pre- and Post-Drainage Area Maps with Pre- based on existing site conditions.
- The conceptual plan provided indicated there would possibly be several stormwater management ponds provided on site. These stormwater management facilities could be used to achieve the required 80% TSS removal now required. During the pre-consultation meeting, the design team indicated that the ponds along with underground water tanks will be needed to provide the required fire protection and sprinkler system for the proposed warehouse and truck docks. Information will need to be provided during the design process discussing how both the stormwater management objectives and the fire flow conditions will be meet jointly form these ponds.
- Information will need to be provide for fire siamese connections to the building for the sprinklers. These will need to be accessible from fire lanes for fire trucks.
- Provide fire flow computations based on FSU method and information on interior fire sprinkler system.
- This site has been filled with uncontrolled fill. The geotechnical report will should provide an analysis of these soils and their ability to provide adequate bearing capacity for the traffic and proposed structures on site.
- The geotechnical report will need to include a section on slope stability for the slopes along Rideau Road and Somme Street.
- Percolations tests should be provided to indicate that an appropriate infiltration rate can be achieved for the needed septic discharge. This should be provided in the hydrogeological report.
- Truck traffic maneuvers for the proposed trucks, fire trucks and garbage trucks should be modeled in AutoTurn for onsite to show there is adequate access/space for these vehicles to maneuver safely. This analysis should also show proposed location of proposed well if it is in or adjacent to the pavement.
- For onsite design of pavement provide the ESAL's expected for the site, the CBR or Mr of the subgrade soils, frost heave potential and proposed pavement design.
- The stormwater management will require a direct submission of the ECA to the MECP. The current turnaround times for these ECA applications are approximately 11 to 12 months.

  Feel free to contact Harry Alvey at Harry.Alvey@ottawa.ca, for follow-up questions.

Transportation Comments (Provided by Mike Giampa, Transportation Project Manager)

- A Transportation Impact Assessment (TIA) is warranted, please proceed to scoping.
- The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (*if applicable*) and/or monitoring report (*if applicable*).
- Although a full review of the TIA Strategy report (*Step 4*) is not required prior to an application, it is strongly recommended.

- Right-of-way protection on Rideau is 26 metres and the sight triangle at Somme/Rideau: 5 metre x 5 metres
- A Road Noise Impact Study is required for the proposed office use.

  Feel free to contact Mike Giampa at Mike.Giampa@ottawa.ca, for follow-up questions.

Enviromental Comments (Provided by Matthew Hayley, Environmental Planner)

- The lot was created as part of a subdivision (15-94-0505) and in 2008 a "Tree Preservation and Protection Plan, Proposed Industrial Subdivision (Excluding Orgawolrd site)…" was prepared by Golder Associates; dated October 15, 2008 as part of the final approval of the subdivision. This document will need to be followed.
- The site plan will need to have a Tree Conservation Report (TCR) to implement the previously approved tree preservation and protection plan. The TCR will also need to reflect current requirements regarding butternuts and other Official Plan policies. The proposal to add parking within the wooded area will not be supported if this area is identified from preservation in the approved tree preservation and protection plan.
- Please note that a watercourse is mapped along Rideau Road and the South Nation Conservation Authority should consulted as the proposed parking lot may be within 30 m of this mapped feature. You will need to support this location for the parking lot as per the Official Plan and the Shields Creek Subwatershed study.

  Feel free to contact Matthew Hayley at Matthew.Hayley@ottawa.ca, for follow-up questions.

Hydrogeological Comments (Provided by Michel Kearney, Hydrogeologist)

- A Hydrogeological and Terrain Analysis report is required, in accordance with Procedures D-5-4 and D-5-5 of the Ministry of the Environment, Conservation and Parks. This will include the siting, drilling and testing of the production well (*i.e. not just a test well*).
- It appears that there are thin soils (*defined as 2 m or less*) on the subject site. Enough test pits and boreholes are to be put down in the area of the leaching bed and in the surrounding area to assess the risk to the onsite well and any existing or future offsite wells. The report is to document the fieldwork and provide an opinion on the level of risk.
- Depending on the findings of the fieldwork, mitigation measures may be required in order to reduce the risk to the water supply. These may include a longer casing length for the well, a deeper aquifer source, an advanced (*Level 4 or beyond*) sewage treatment system and ensuring the well is upgradient from the sewage system. Discussion with the City's technical reviewers is encouraged, as the study progresses.
- The well must be located in a landscaped area, away from traffic and potential sources of contamination, a minimum distance of 3 m from property lines and buildings, as well as the minimum distance to the sewage system as prescribed in the Ontario Building Code. Grades are to be provided on the Grading Plan for the top of casing, the ground at the well and 3 m away from the well, to demonstrate drainage away from the well in accordance with the Regulation (O.Reg. 903).

  Feel free to contact Michel Kearney at Michel.Kearney@ottawa.ca, for follow-up questions.

Conservation Authority Comments (Provided by James Holland, Watershed Planner, SNC)

Natural Heritage

- A watercourse flows along Rideau Road towards the Findlay Creek Municipal Drain, approximately 70m downstream. Findlay Creek is a permanent feature watercourse known to contain sensitive aquatic species.
- To prevent soil erosion and impacts to surface water, development and site alteration should be set back 30 metres from the high water mark of the watercourse, or 15 metres from the existing top of bank, whichever is greater. This is consistent with Section 4.7.3 of the City of Ottawa's Official Plan and Section 69 of the Zoning By-law.
- For any development within the setback area, an EIS should be completed demonstrating that the development will have no negative impacts on the feature or its functions.

Stormwater Management

- Stormwater management must conform to the design for the Hawthorn Industrial Park and meet the current standards.
- Water quality should be managed so that post-runoff equals pre runoff volumes for the 1 or 5 and the 100 year event.
- Water quality should achieve 80% TSS removal.
- The stormwater design should include, at a minimum, a grading and drainage plan, sediment and erosion control plan and a supporting report with calculations demonstrating how the standards have been met.

Conservation Authority Regulations

- Any interference with a watercourse, including a roadside ditch, may require a permit under O. Regulation 170/06, and restrictions may apply.

Private Servicing

- The applicant should contact the Ottawa Septic Service Office for input on the design of private servicing.

Feel free to contact Planner, James Holland, at jholland@nation.on.ca, for follow-up questions.

Application Submission Information

Applications Type**: Site Plan Control, Complex**.
Application processing timeline generally depends on the quality of the submission. For more information on standard processing timelines, please visit: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/development-application-forms#site-plan-control

Prior to submitting a formal application, it is recommended that you pre-consult with the Ward Councillor.

For information on application fees, please visit: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/fees-and-funding-programs/development-application-fees

To request City of Ottawa plan(s) or report information please contact the City of Ottawa Information Centre: InformationCentre@ottawa.ca or (613) 580-2424 ext. 44455

Application Submission Requirements

For information on the preparation of Studies and Plans and the City's requirements, please visit: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

Please provide hard copies and electronic copy (PDF) of all plans and studies required.

All plans and drawings must be produced on A1-sized paper and folded to 21.6 cm x 27.9 cm (8½"x 11").

Note that many of the plans and studies collected with this application must be signed, sealed and dated by a qualified engineer, architect, surveyor, planner or designated specialist.

Julien Sauvé

From: Julien Sauvé
Sent: Wednesday, May 19, 2021 9:19 AM
To: Alvey, Harry; Brown, Adam
Cc: Christian Lavoie-Lebel; Tim Kennedy
Subject: 301 Somme Street. Fastfrate Meeting Minutes

Hi Harry,

Thanks a lot again for meeting with us. The following is a brief summary of our discussion.

Date of Meeting: May 18, 2021
Attendees: Harry Alvey – City of Ottawa
Adam Brown – City of Ottawa
Julien Sauve – CIMA+
Tim Kennedy – CIMA+

Notes:

1. City will look to see if it can provide to CIMA+ a copy of the Appendices for the SWM Report by J.L. Richards. CIMA+ will refer to this report in the design development and append it to their report.
2. CIMA+ will refer to the SWM Report prepared by J.L. Richards for allowable release rate to the existing pond which accounts for a release of the entire site even though the site appears to cover two adjacent drainage areas. Any uncontrolled area will be accounted for in this allowable release rate. Pre and post development drainage maps would no longer be applicable in this instance.
3. CIMA+ discussed how on site pond and grassed swales would provide for quality control (80% TSS) and quantity control would be available in the existing downstream pond per J.L. Richards SWM Report.
    a. On-site pond would also provide quantity for sprinklers and firefighting.
4. City recommended having a free standing Siamese connection closer to the Fire Route (within 3-6 m and perpendicular to adjacent parked fire truck).
5. City noted that dry Fire Hydrants need to be 3-6m from fire route and cannot be behind a parking stall.
6. CIMA+ to show Autoturn simulation for fire trucks positioned at hydrants and Siamese.
7. City provided the contact for Fire Service Allan Evans and noted he would be the best reference for questions regarding dry hydrant flow and firefighting requirements, etc.
8. City noted the retaining wall would require design by a structural engineer prior to approval. The design must include a cross section and the highest point of the wall as well as a force diagram and a load diagram as it is over 1m in height.
9. City noted that minimum slope of swale without subdrains is 0.5%. However, they are open to looking at the possibility of having low slope swale of 0.1% assuming CIMA+ can provide justification. CIMA+ to demonstrate adequate percolation (prior to and after vegetation) of water during frequent (smaller) storms and confirm it can still convey the larger storms at a reasonable velocity.
10. City noted that septic system to be design in accordance with DS55 and DS54.
11. City noted OSSO (Ottawa Septic System Office) would govern septic design where flows are less than 10 000 L, while the MECP would govern for over 10 000L. Correspondence is to be provide in the Servicing Report by CIMA+.
    a. City confirmed OSSO operates out of RVCA's offices.
12. CIMA+ and City briefly discussed potential for Limited Commence Work Order given current long turnaround times for ECA approvals of 11-12 months. City confirmed this can be further discussed closer to the time of Site Plan Approval.
    a. City confirmed they will <u>not</u> have ToR for the Industrial use ECA or the septic ECA.

Please let us know if there is anything we have missed or misrepresented in this summary.

Regards,

JULIEN SAUVÉ, P.Eng.
Engineer / Infrastructure
Ingénieur / Infrastructure

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110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

Julien Sauvé

From: James Holland <jholland@nation.on.ca>
Sent: Tuesday, May 4, 2021 11:35 AM
To: Julien Sauvé
Subject: FW: Fastfrate Site Water Quality Requirements
Attachments: FW_ South Nation Conservation Property Inquiry Letters _ (Roll_ 061460008029995.msg; 200608 2009 05 Hawthorne Industrial Park-SWM REPORT FEB09.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

EXTERNAL EMAIL

Hi Julien,

Thanks for confirming with the Conservation Authority; this question has come up for every property in the subdivision. The current standard is 80% TSS removal.

The pre-constitution for the site plan focussed on the adjacent watercourse and encroachment into the 30m setback. Our review will look to confirm that the stormwater management design implements the recommendations of an environmental impact statement that addresses this issue. We have not received a study so I cannot provide any additional information.

Feel free to contact me if there are any other questions about the site plan application.
Regards,
James

From: Julien Sauvé <Julien.Sauve@cima.ca>
Sent: May 3, 2021 3:33 PM
To: Laura Crites <lcrites@nation.on.ca>
Cc: Christian Lavoie-Lebel <Christian.Lavoie-Lebel@cima.ca>; Douglas Rancier <drancier@civitasgroup.ca>
Subject: Fastfrate Site Water Quality Requirements

External email - if you don't know or can't confirm the identity of the sender, please exercise caution and do not open links or attachments.

Hi Laura,

My name is Julien and I am working with Fastfrate to help design their new facility at the intersection of Rideau road and Somme Street. Refer to attached email for previous correspondence about the subject site.

The reason we are contacting you is to get confirmation on the water quality requirements. The attached SWM report 2009 for the Hawthorne Industrial site (see attached) states that individual site will need to fulfil the normal level of protection (TSS 70% removal). Can you confirm if this requirement is still valid? Refer to section 5 p. 14 of 30.

Please advise us on the water quality requirement and let us know if you have any questions.

Regards,

JULIEN SAUVÉ, P.Eng.
Engineer / Infrastructure
Ingénieur / Infrastructure

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From: Uzoechina Ukeje <uukeje@gwal.com>
Sent: July 8, 2021 1:23 PM
To: Guillaume LeBlond
Cc: Christian Lavoie-Lebel; Peter Chan; Tim Kennedy; Julien Sauvé
Subject: RE: [EXTERNAL]RE: A001083 - CBRE Fastfrate - Building Stormwater Management

EXTERNAL EMAIL

Hi Guillaume,
The architectural drawings we have on hand do not show any roof drain positions.
However, if we are to assume a horizontal roof with no adjacent walls, the **tota**l release rate will be **173.45L/s.**

1) With a 6in capacity Rain Water Leader, a total of 13 Roof drains will be required (each having a release rate of 14L/s)
2) With an 8in capacity Rain Water Leader, a total of 6 Roof drains will be required (each having a release rate of 30L/s)

Let me know if you have further questions.

Thank you

From: Guillaume LeBlond <Guillaume.LeBlond@cima.ca>
Sent: July-08-21 11:53 AM
To: Uzoechina Ukeje <uukeje@gwal.com>
Cc: Christian Lavoie-Lebel <Christian.Lavoie-Lebel@cima.ca>; Peter Chan <pchan@gwal.com>; Tim Kennedy <Tim.Kennedy@cima.ca>; Julien Sauvé <Julien.Sauve@cima.ca>
Subject: [EXTERNAL]RE: A001083 - CBRE Fastfrate - Building Stormwater Management

Hi Uzo,

Just to clarify what I need from my last email:
I need the number of roof drains as well as the flowrate per drain .
Hope this clears up any confusion.

Thanks,

GUILLAUME LEBLOND, M.A.Sc., EIT
EIT / Infrastructures
EIT / Infrastructure

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110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

Avis pour nos clients sur la COVID-19

CIMA+ L'humain au centre de l'ingénierie 30 ANS KINCENTRIC Employeur CANADA 2019

From: Guillaume LeBlond
Sent: July 8, 2021 10:44 AM
To: Uzoechina Ukeje <uukeje@gwal.com>
Cc: Christian Lavoie-Lebel <Christian.Lavoie-Lebel@cima.ca>; pchan@gwal.com; Tim Kennedy <Tim.Kennedy@cima.ca>; Julien Sauvé <Julien.Sauve@cima.ca>
Subject: A001083 - CBRE Fastfrate - Building Stormwater Management

Good morning Uzo,

I work with Julien Sauvé and Christian Lavoie-Lebel on the Fastfrate project and we are currently finalizing the stormwater management design for the site.
Could you please provide us with the release rates of the building roof drains? We are looking for both the 10 year and 100 year rainfall.

Thank you,

GUILLAUME LEBLOND, M.A.Sc., EIT
EIT / Infrastructures
EIT / Infrastructure

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110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

Avis pour nos clients sur la COVID-19

L'**humain** au centre de l'ingénierie

Servicing Study Guidelines for Development Applications

4. Development Servicing Study Checklist

4.1 General Content

	Required Content	Reference Location
☐	Executive Summary (for larger reports only).	N/A
☑	Date and revision number of the report.	Cover Sheet
☑	Location map and plan showing municipal address, boundary, and layout of proposed development.	Report Figures, Appendix
☑	Plan showing the site and location of all existing services.	Project Drawings - Under separate cover
☑	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.1
☑	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.4, Appendix L
☑	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Section 1.3 & 4.3.2
☑	Statement of objectives and servicing criteria.	Section 1 , 2.2.1, 3.2 & 4.2
☑	Identification of existing and proposed infrastructure available in the immediate area.	Section 1.2 & Appendix B
☐	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Section 1.1
☐	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Project Drawings - Under separate cover
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	Geotechnical, Hydrogeological, and septic assessment - Under separate cover
☐	Proposed phasing of the development, if applicable.	N/A
☐	Reference to geotechnical studies and recommendations concerning servicing.	Section 7. References
☐	All preliminary and formal site plan submissions should have the following information: - Metric scale; - North Arrow (including construction North); - Key Plan; - Name and contact information of applicant and property owner; - Property limits including bearings and dimensions; - Existing and proposed structures and parking areas; - Easements, road widening and rights-of-way; - Adjacent street names.	Project Drawings - Under separate cover

4.2 Development Servicing Report: Water

	Required Content	Reference Location
☐	Confirm consistency with Master Servicing Study, if available	N/A
☑	Availability of public infrastructure to service proposed development	Section 1.2 & 3.1
☑	Identification of system constraints	
☑	Identify boundary conditions	Geotechnical, Hydrogeological, and septic assessment - Under separate cover
☑	Confirmation of adequate domestic supply and pressure	Section 3.2 & 3.3
☑	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 3.2.2
☐	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	N/A
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☑	Address reliability requirements such as appropriate location of shut-off valves	Project Drawings - Under separate cover

Servicing Study Guidelines for Development Applications

☐	Check on the necessity of a pressure zone boundary modification.	N/A
☑	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Section 3.3 & Geotechnical, Hydrogeological, and septic assessment - Under separate cover
☐	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	N/A
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☑	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2, Appendix D
☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Required Content		Reference Location
☑	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 2.2
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☑	Description of existing sanitary sewer available for discharge of wastewater from proposed development	N/A
☑	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	N/A
☑	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 2.2 & Appendix F
☑	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 2.2
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Required Content		Reference Location
☑	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 4.1
☑	Analysis of available capacity in existing public infrastructure.	Section 4.1, 4.3
☑	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Appendix A, B
☑	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 4.2
☑	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 4.2
☑	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 4.3, 4.4 & Appendix C
☐	Set-back from private sewage disposal systems.	Project Drawings - Under separate cover

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☐	Watercourse and hazard lands setbacks.	Project Drawings - Under separate cover
☑	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Section 1.4 & Appendix G
☐	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Section 4
☑	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 4.3 & Project Drawings - Under separate cover
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Section 4
☑	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 4.1 & 4.3
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	Section 4.2, Appendix B
☐	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Project Drawings - Under separate cover
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.	N/A
☐	Identification of potential impacts to receiving watercourses	Section 1.3.4
☐	Identification of municipal drains and related approval requirements.	N/A
☑	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 4.3 and 4.4
☐	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Project Drawings - Under separate cover
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	Appendix C
☐	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 5
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

Required Content		Reference Location
☐	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	N/A
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Required Content		Reference Location
☑	Clearly stated conclusions and recommendations	Section 6
☐	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	