Fastfrate

Site Servicing and Stormwater Management Report

Fastfrate Ottawa Warehouse and Distribution Facility

Client Project Number : GA18-0631-01

CIMA+ file number: A001083
August 13, 2021 – Revision 0

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Prepared by:

Julien Sauvé, P.Eng.
PEO membership number: 100200100

Prepared by:

Guillaume LeBlond, M.A.Sc., EIT
PEO membership number: 100530467

Verified by:

Christian Lavoie-Lebel, P.Eng.
PEO membership number: 100067842

240 Catherine Street, Suite 110, Ottawa, Ontario
Canada K2P 2G8

CIMA+ file number: A001083
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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.

Confidentiality and Ownership

Notice to the Reader

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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:

Name	Discipline
Kayla Schmidt, M.A.Sc., P.Eng. – (CIMA+)	Septic System Design
Uzoechina Ukeje – (GWAL)	Building Fire Protection / Mechanical
Robert Neck, M.Eng., P.Geo. (Limited) – (GHD)	Hydrogeology

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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 **Appendix F** 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 B – 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 (Refer to **Appendix C – GHD Hydrogeological Assessment Report 2021**).

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. (Refer to **Appendix D – GHD Septic Assessment Report 2021**).

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 L**.

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 L**.

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 L.**

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 L**.

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 L**.

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 K**.

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 K**).

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 **Appendix D** for GHD's report and 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 J** 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.

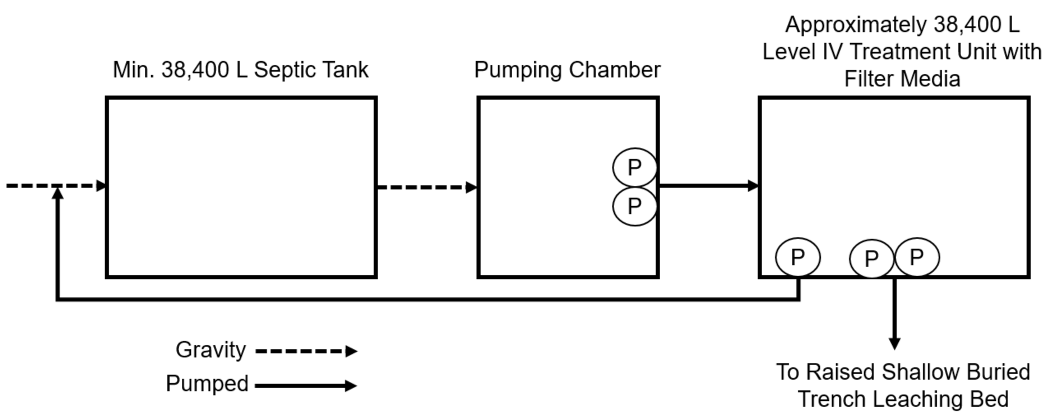


Figure 2-1: Septic System Process Flow Schematic

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 Hydrogeological Assessment in **Appendix C** 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:

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

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 I**).

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 I

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 (refer to drawings, **Appendix F**).

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 **Appendix C**.

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 (**Appendix C**) is capable of providing long-term quantities of groundwater at a pumping rate of 60 L/min based upon the pumping test completed. 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 B**), 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 B**).

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 G**.

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 H, 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 H.**

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 A**) 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 H** 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 H**.

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 H**.

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 G – 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

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

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 **Appendix K**, Sediment and Erosion Control Plan (C004) and Notes Plans (C005 and C006) for additional information.

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.

7. References

City of Ottawa. 2012, 2020. "Sewer Design Guidelines – as ammended by Technical Bulletins." Ottawa.

City of Ottawa. 2010, 2020. "Water Design Guidelines – as ammended by Technical Bulletins." Ottawa.

GHD. 2020. *Geotechnical Investigation Warehouse and Offices Intersection of Rideau Street and Somme Street, Ottawa, Ontario.* Ottawa, September 10.

GHD. 2021. *Hydrogeological Assessment Report – Proposed Commercial Development Rideau Road and Somme Street Gloucester Con 6 from Rideau River, Lot 26 Ottawa, Ontario .* Ottawa, January 19.

GHD. 2021. *Septic Assessment and Percolation Rate Evaluation – Proposed Commercial Development Rideau Road and Somme Street Gloucester Con 6 from Rideau River, Lot 26 Ottawa, Ontario.* Ottawa, April 12.

J.L. RIchards & Associates Ltd. 2009. *Stormwater Management Report – Hawthorne Industrial Park.* Ottawa, May.

Ministry of the Environment. 2003. "Stormwater Management Planning and Design Manual." Toronto.

2017. "Ontario Building Code, O Reg. 332/12."

Engineering for People

A

Appendix A -
Legal Survey – Fastfrate Warehouse Development

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.	PLAN 4R-33406
DATE SEPTEMBER 16, 2020	RECEIVED AND DEPOSITED
	DATE Dec. 22 / 2020
J.P. SHIPMAN	REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA–CARLETON (No.4)

PLAN OF SURVEY OF
PART OF LOT 26
CONCESSION 6 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER and
PART OF BLOCKS 5 AND 14
REGISTERED PLAN 4M–1388
CITY OF OTTAWA

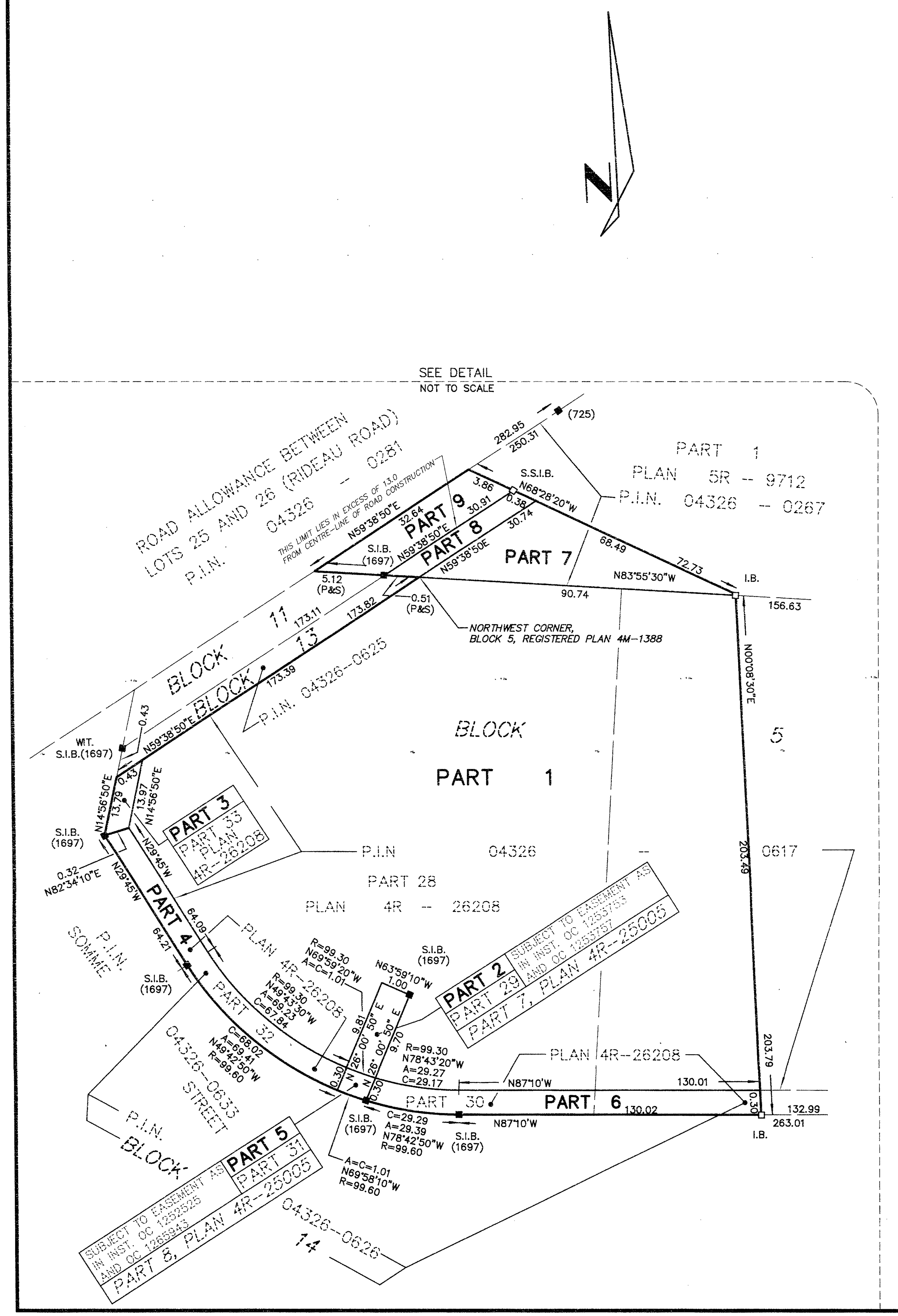
SCALE 1:1000

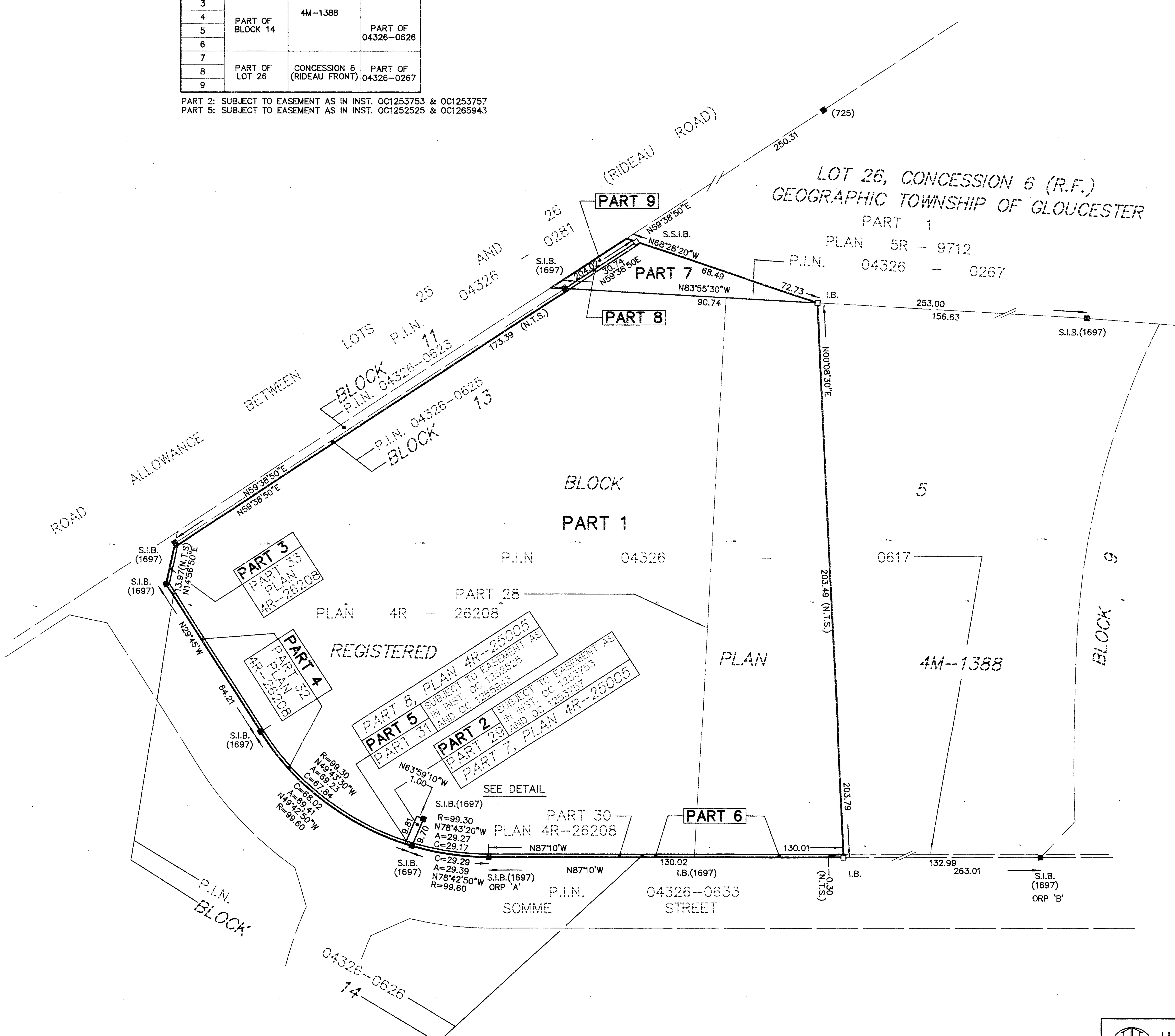
0 10 20 30 40 50 75 100
METRES

SCHEDULE

PART	LOT/BLOCK	PLAN/CON.	P.I.N.
1	PART OF BLOCK 5	4M–1388	PART OF 04326–0617
2			
3	PART OF BLOCK 14		PART OF 04326–0626
4			
5			
6			
7	PART OF LOT 26	CONCESSION 6 (RIDEAU FRONT)	PART OF 04326–0267
8			
9			

PART 2: SUBJECT TO EASEMENT AS IN INST. OC1253753 & OC1253757
PART 5: SUBJECT TO EASEMENT AS IN INST. OC1252525 & OC1265943





METRIC

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

NOTES

BEARINGS HEREON ARE GRID BEARINGS, DERIVED FROM ISCM 019871768 (N 5016745.786, E 379008.599) AND ISCM 019871769 (N 5016468.145, E 378560.015) AND ARE REFERRED TO THE CENTRAL MERIDIAN 76° 30'W LONGITUDE OF THE 3° M.T.M. ONTARIO CO–ORDINATE SYSTEM (NAD 83).

DISTANCES SHOWN ON THIS PLAN ARE HORIZONTAL GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999955

BEARINGS AND DISTANCES SHOWN ON THIS PLAN AGREE WITH UNDERLYING AND ABUTTING PLANS UNLESS OTHERWISE NOTED.

S.I.B.	DENOTES 0.025 SQ., 1.2 LONG, STANDARD IRON BAR
S.S.I.B.	DENOTES 0.025 SQ., 0.6 LONG, SHORT STANDARD IRON BAR
I.B.	DENOTES 0.016 SQ., 0.6 LONG, IRON BAR
■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
WIT.	DENOTES WITNESS
1697	DENOTES J.P. SHIPMAN, O.L.S.
725	DENOTES R.W. ARNETT, O.L.S.
U.P.L.	DENOTES UTILITIES POLE LINE
N.T.S.	DENOTES NOT TO SCALE
P	DENOTES PLAN 4M–1388

OBSERVED REFERENCE POINTS (ORP): MTM ZONE 9, NAD 83 (ORIGINAL)		
POINT IDENTIFICATION	NORTHING	EASTING
ORP A	5018947.5	378970.6
ORP B	5018934.5	379233.2

COORDINATES SHOWN TO RURAL ACCURACY IN ACCORDANCE WITH O.REG 216/10, SECTIONS 14, AND 31 TO 35 (BOTH INCLUSIVE).

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM;

(2) THE SURVEY WAS COMPLETED ON THE 10th DAY OF DECEMBER, 2020.

DECEMBER 14, 2020
DATE

J.P. SHIPMAN
ONTARIO LAND SURVEYOR

H.A.KEN SHIPMAN SURVEYING LTD.	REF No. : GL.–502
P.O. BOX 53, NORTH GOWER, ONT. K0A 2T0	FILE No. : 19–11756

B

Appendix B -
JL Richards Storm Water Management Plan

STORMWATER MANAGEMENT REPORT

HAWTHORNE INDUSTRIAL PARK

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

Prepared for:

R.W. TOMLINSON LIMITED
5597 Power Road
Ottawa, Ontario
K1G 3N4

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
Consulting Engineers, Architects & Planners
864 Lady Ellen Place
Ottawa, Ontario
K1Z 5M2

JLR 20983

STORMWATER MANAGEMENT REPORT

HAWTHORNE INDUSTRIAL PARK

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- LIST OF APPENDICES -

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).

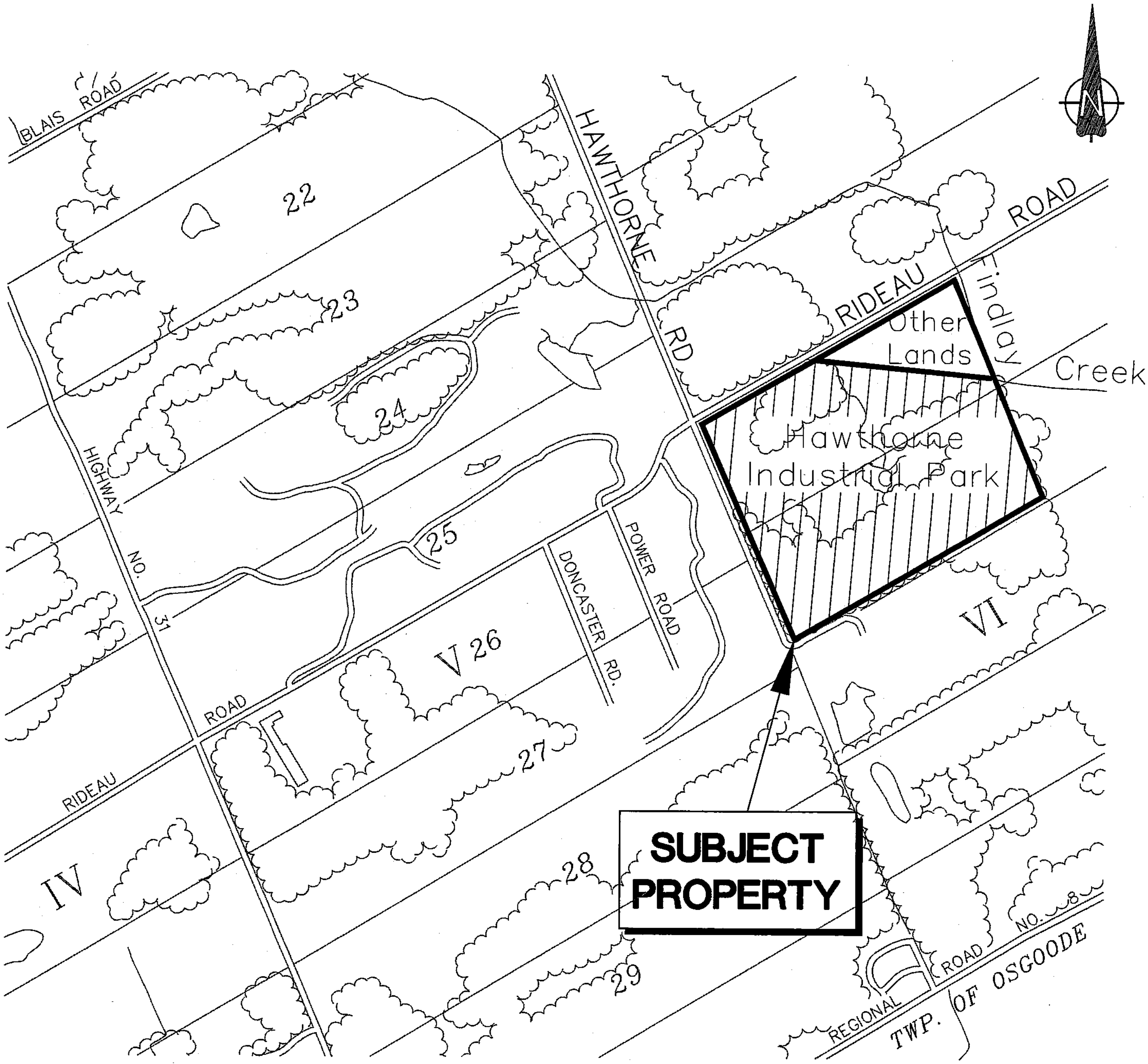
The current landowner, R.W. Tomlinson Limited (Tomlinson), now wishes to complete the development of the subject land, herein referred to as the Hawthorne Industrial Park (HIP).

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
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

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

Peak Flow	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.
Infiltration	Section 5.5 of the SCSS recommends that the quantity and quality of groundwater infiltration be maintained to pre-development rates.
Erosion	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).

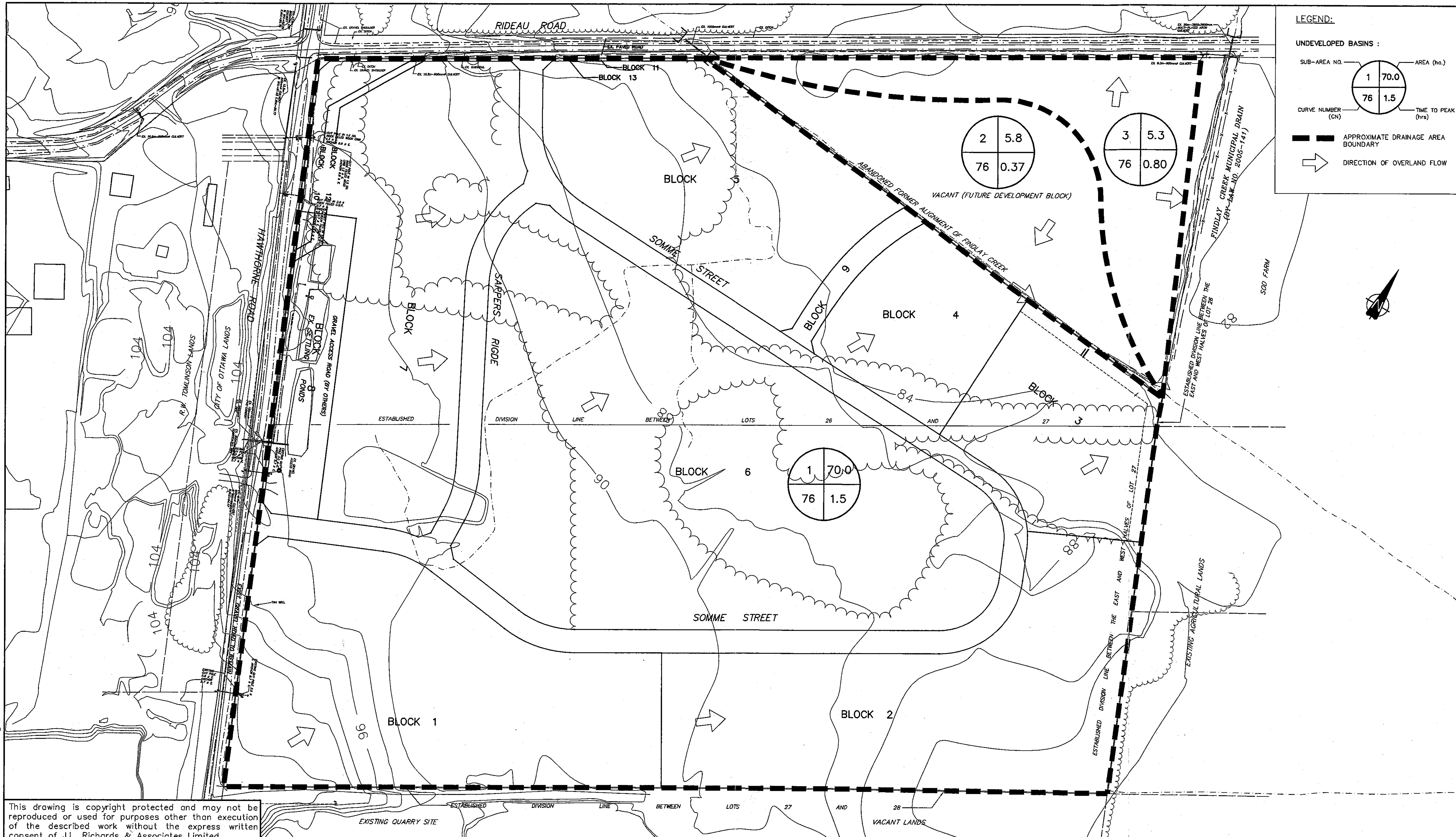
6.2 Synthetic Design Storm Simulation and Hydrological Parameters

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 & 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

J.L.Richards
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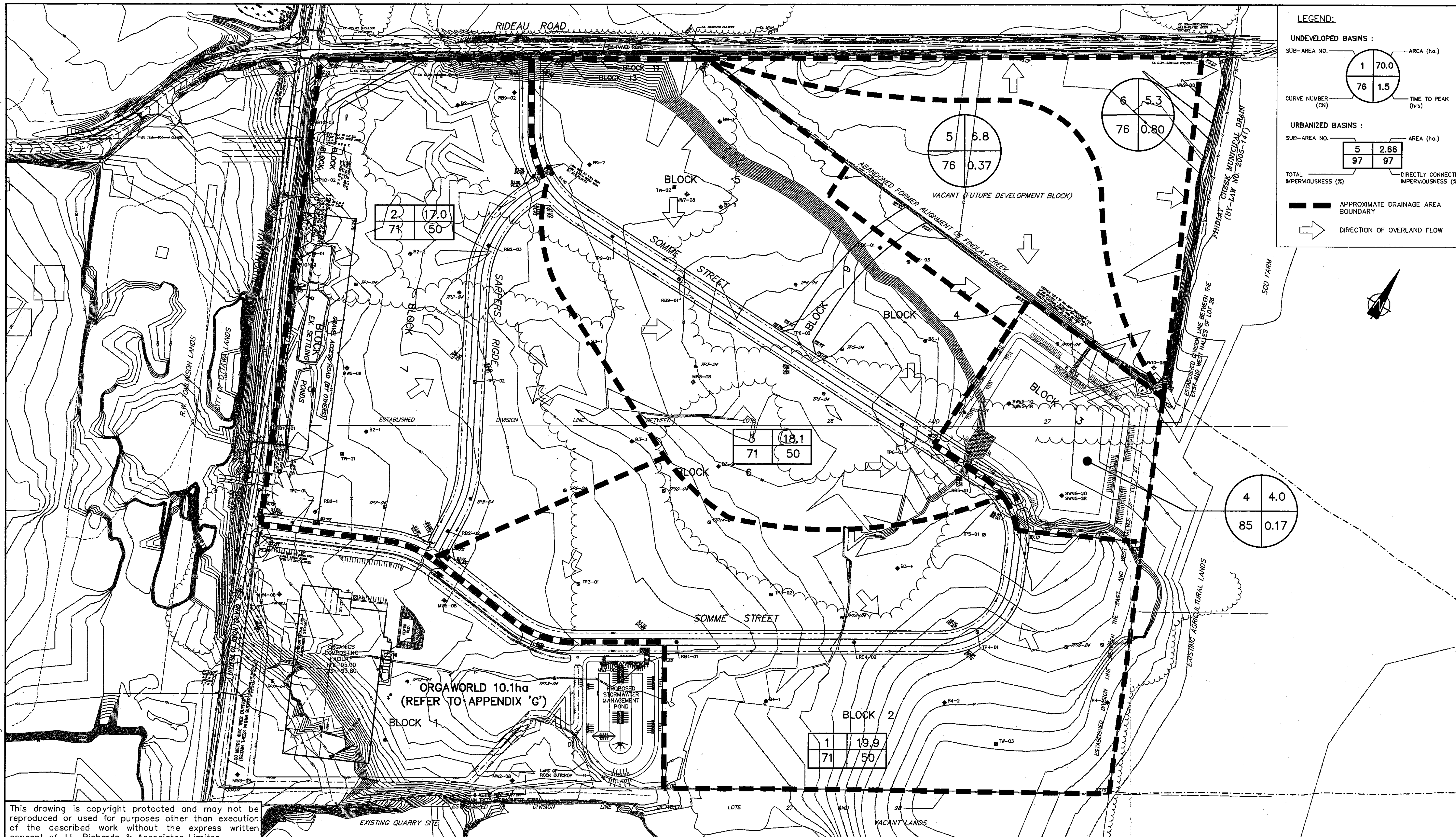
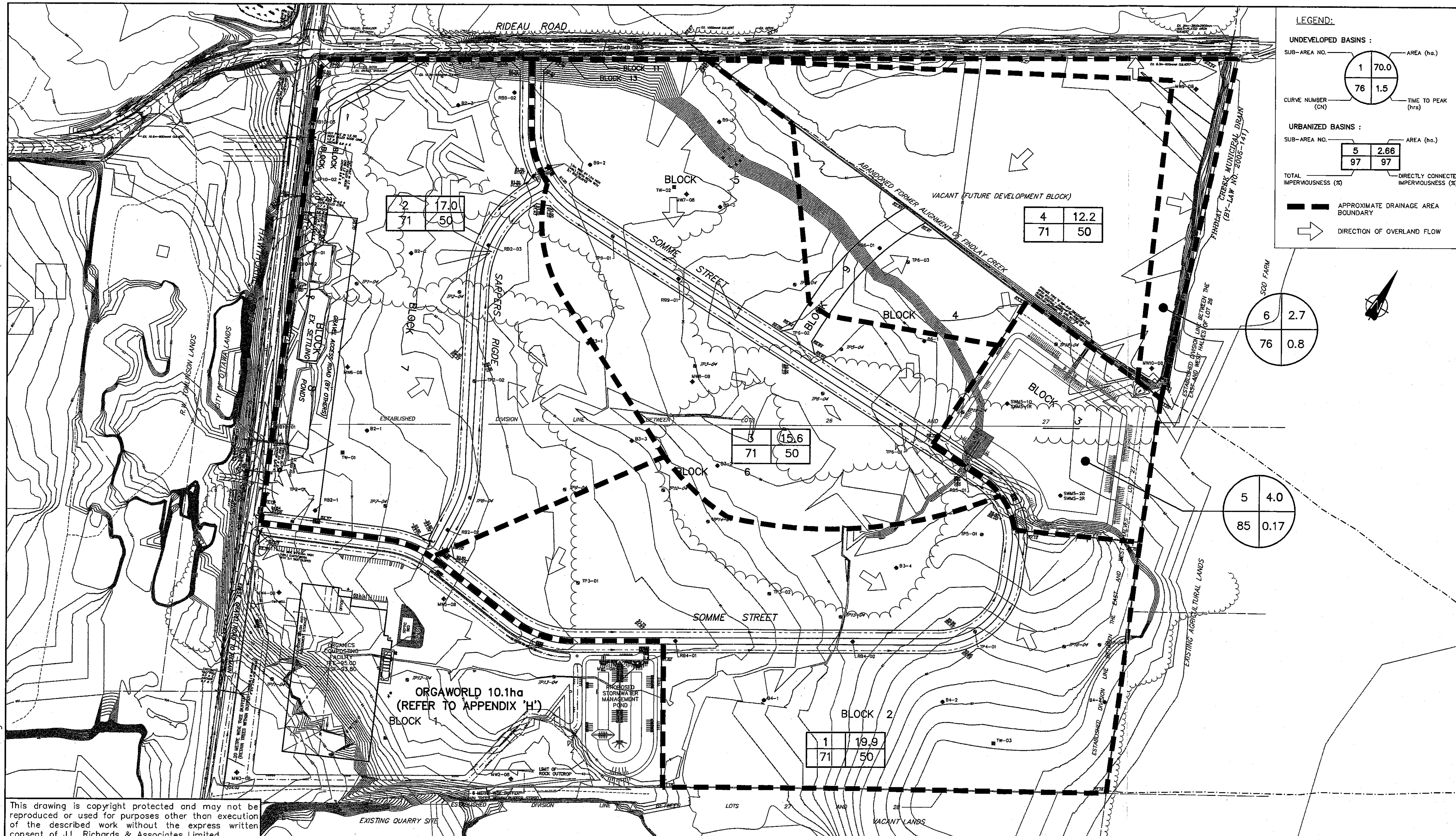


PROJECT: HAWTHORNE INDUSTRIAL PARK	DRAWING: POST DEVELOPMENT – PHASE 1 STORM DRAINAGE AREA PLAN	J.L.Richards ENGINEERS·ARCHITECTS·PLANNERS — J.L. Richards & Associates Limited, 864 Lady Ellen Place, Ottawa, ON Canada K1Z 5M2, Tel: 613 728 3571, Fax: 613 728 6012	DESIGN: M.B. DRAWN: ARM CHECKED: G.F.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



PROJECT:	DRAWING:				DRAWING NO.:
HAWTHORNE INDUSTRIAL PARK	POST DEVELOPMENT – PHASE 2 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 4 JLR NO: 20983

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

Mark Buchanan, E.I.T.

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

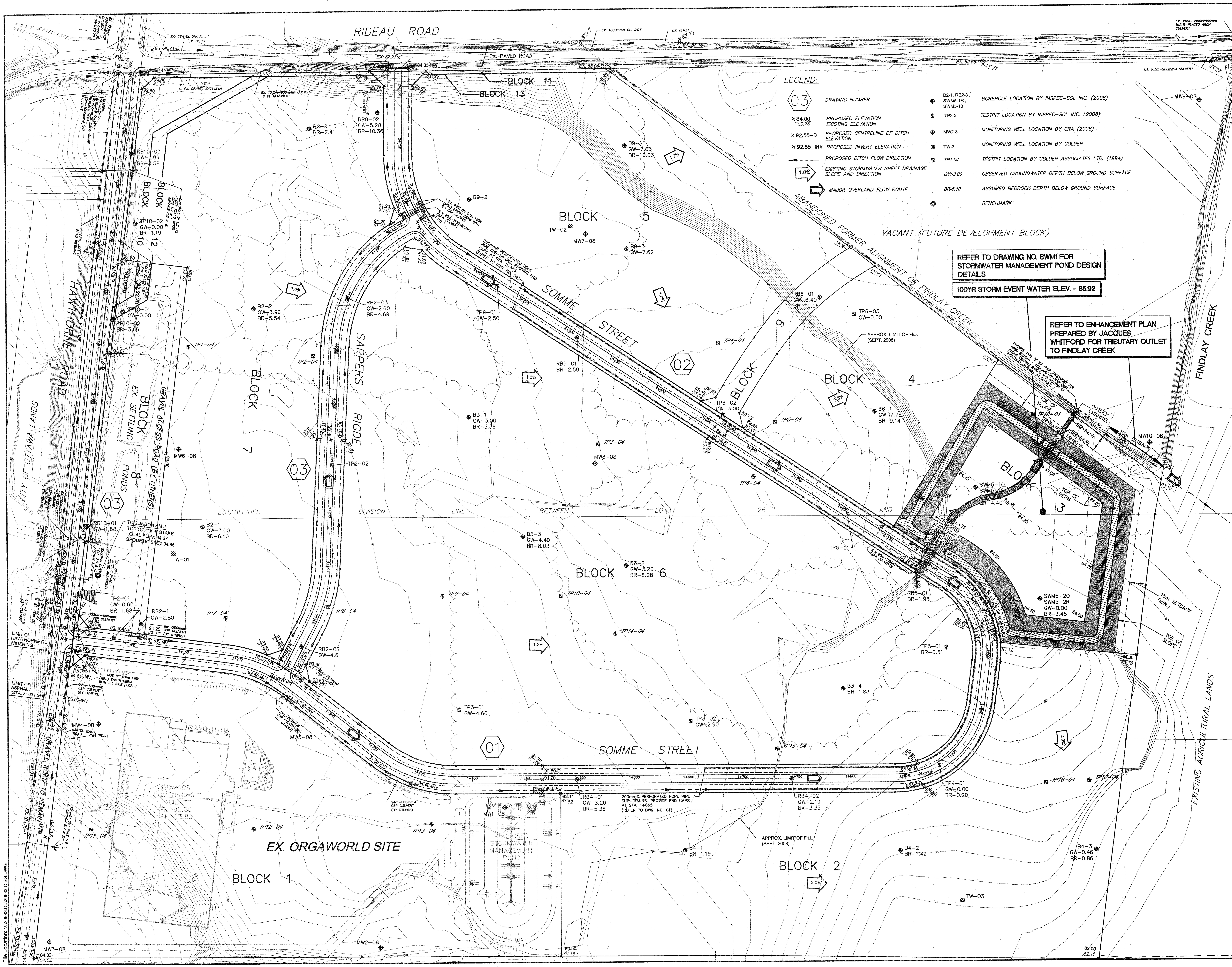
Reviewed by:

J.S. Guy Forget, P.Eng.

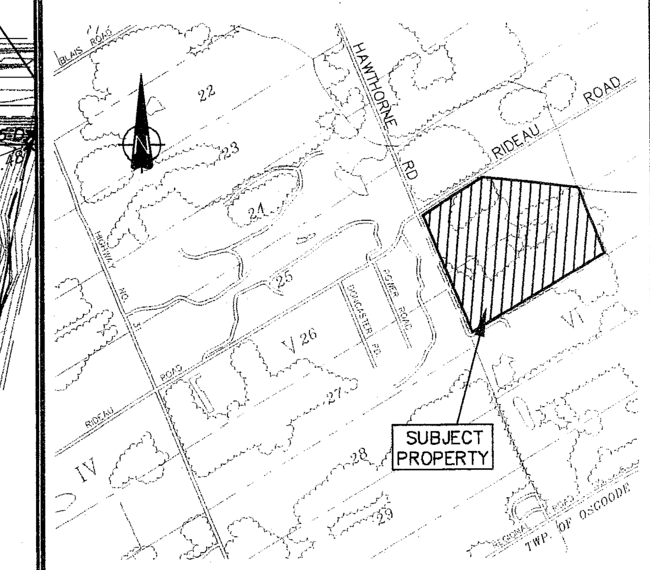
LICENSED PROFESSIONAL ENGINEER
D. P. UPTON
May 29/09
PROVINCE OF ONTARIO

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
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SCALE: 1:1500

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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

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

PROJECT NORTH

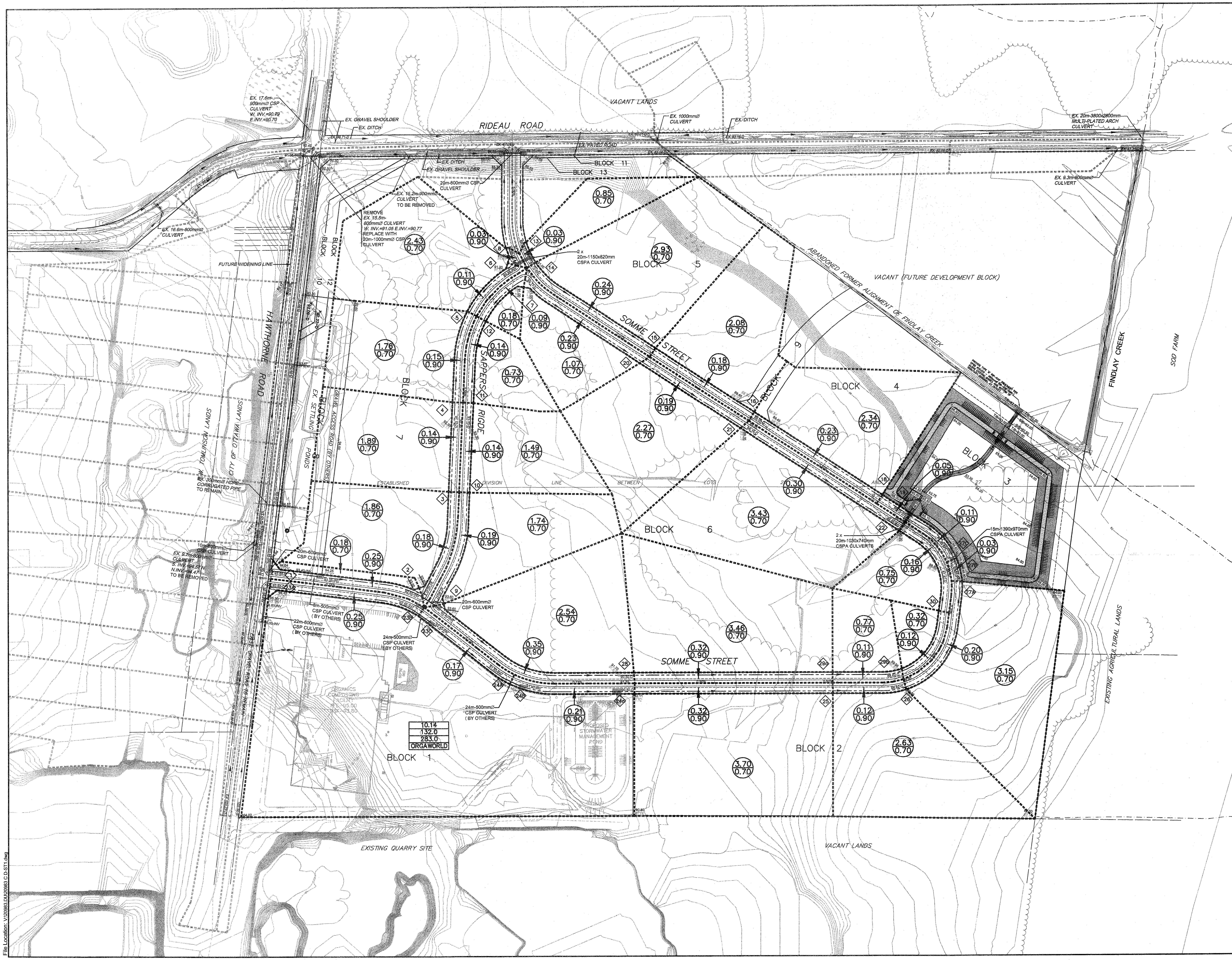
PROJECT:

HAWTHORNE INDUSTRIAL PARK

DRAWING:

SITE SERVICING AND GRADING

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



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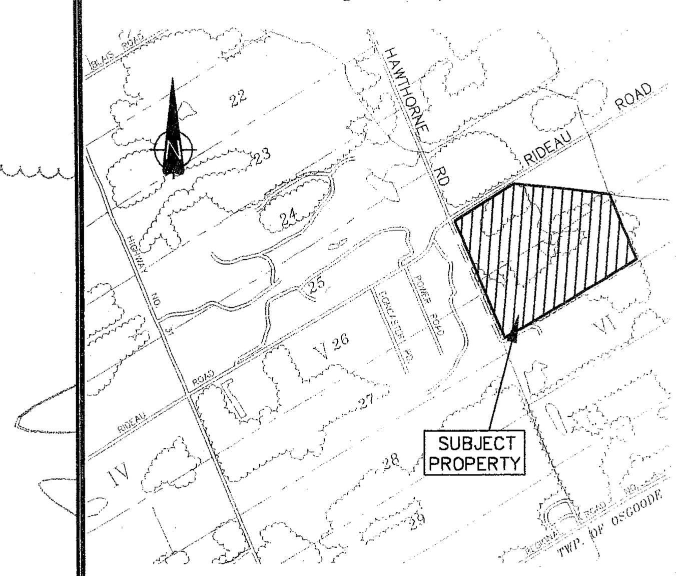

NOT TO SCALE

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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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	

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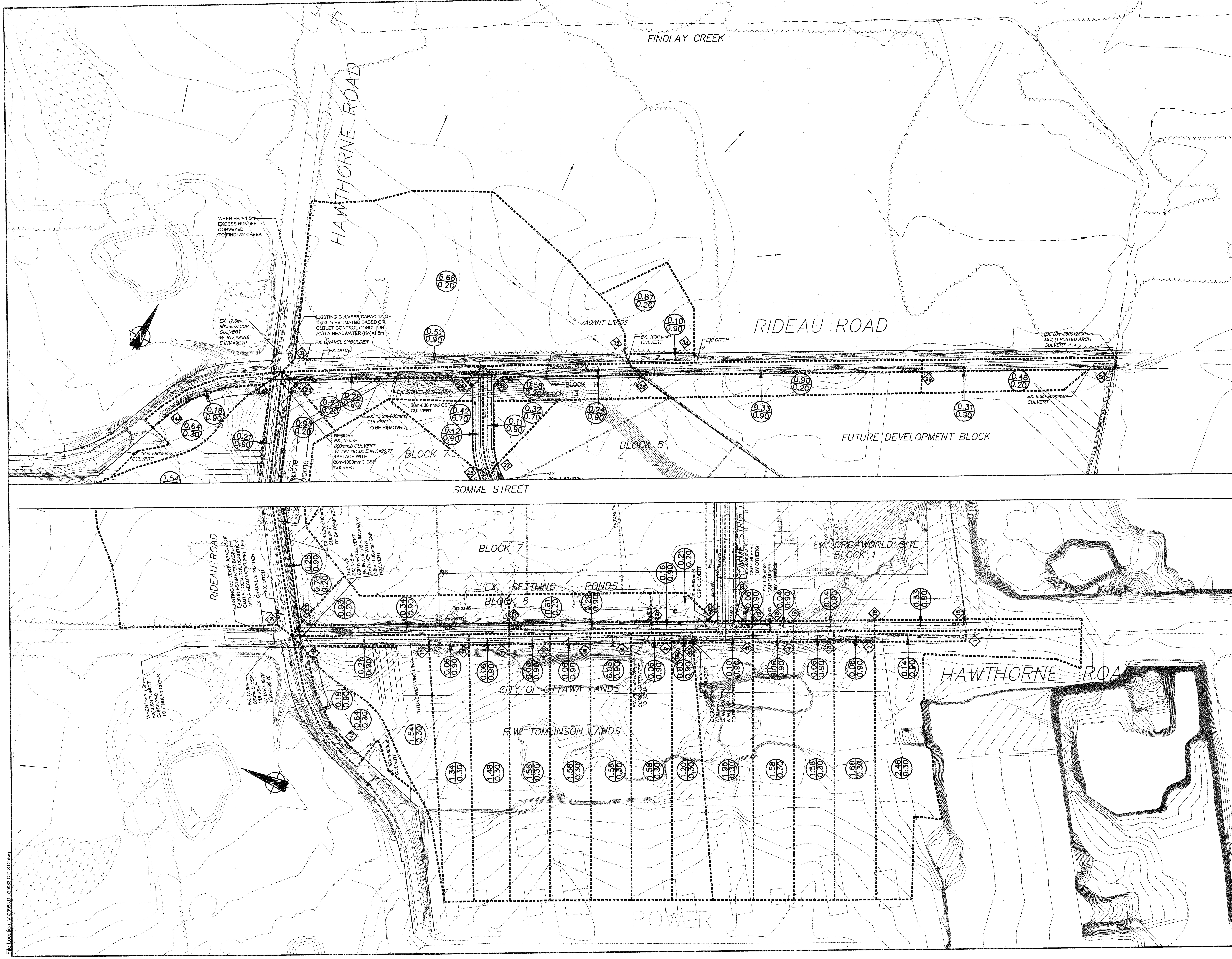

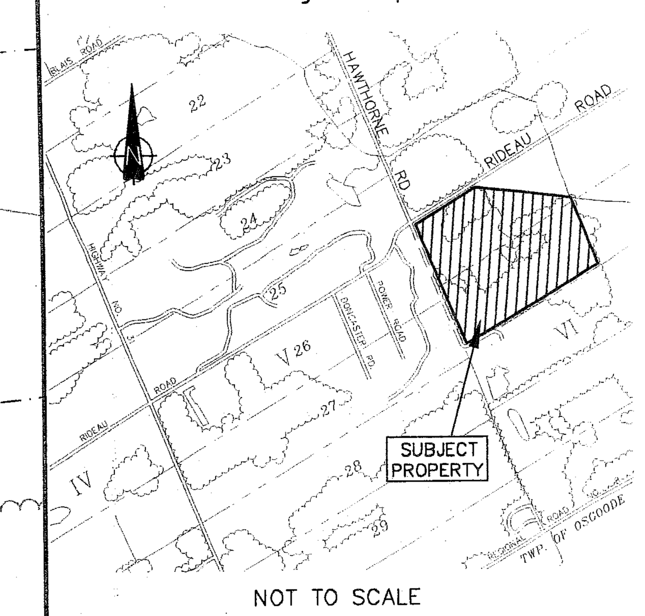

LEGEND

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

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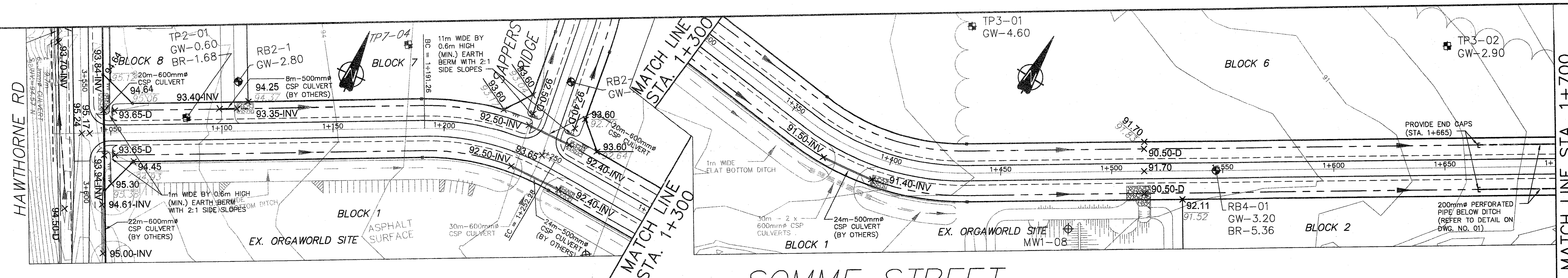

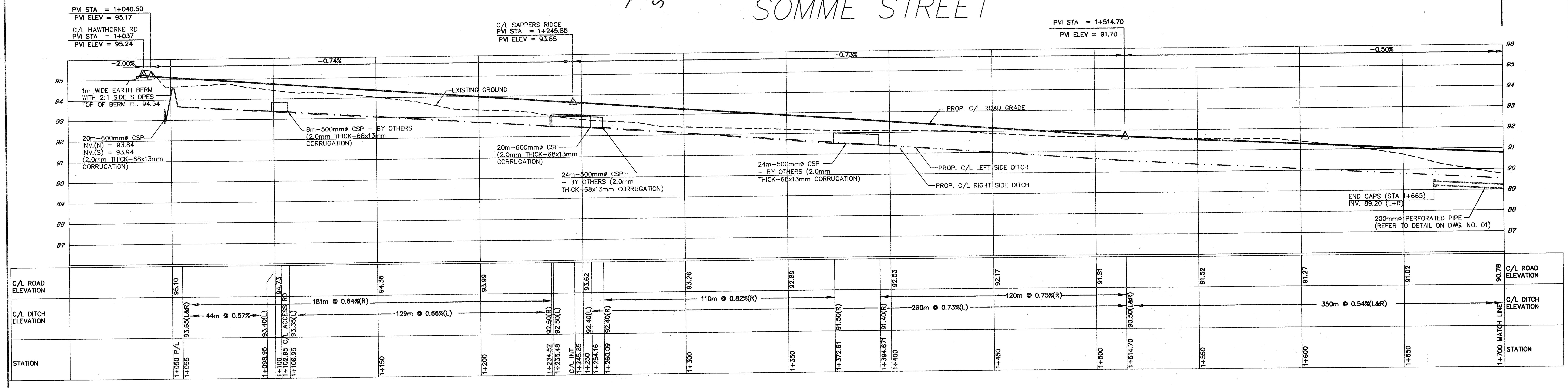

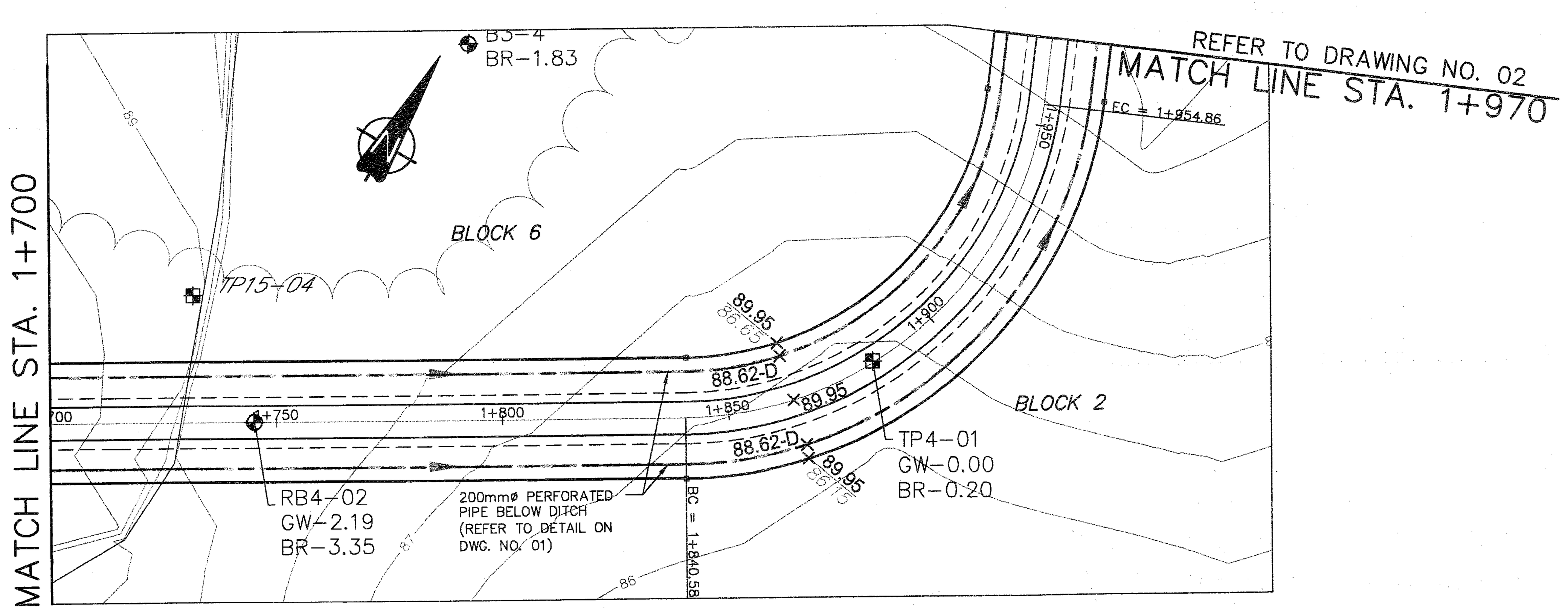

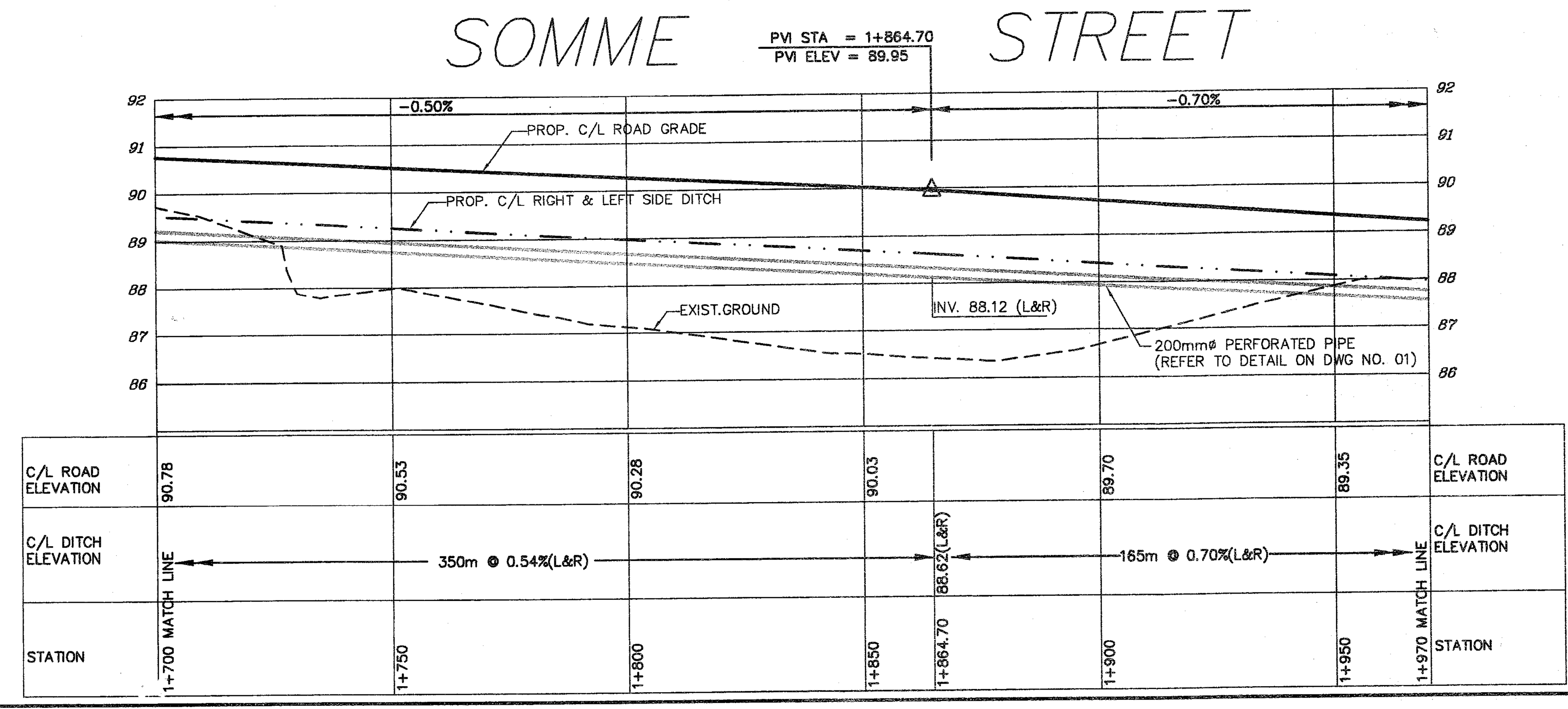

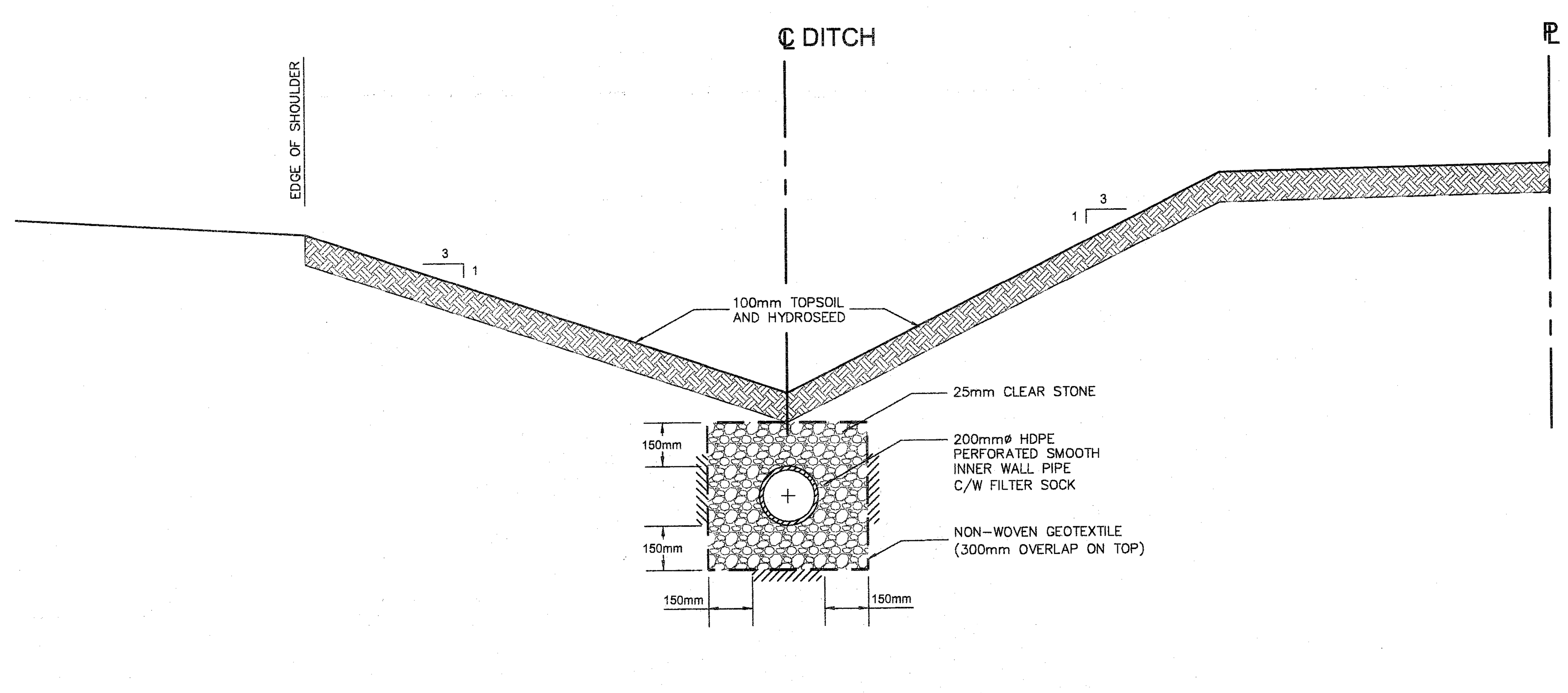

ROADSIDE DITCH PERFORATED PIPE INSTALLATION (TYPICAL)

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

NO.	ISSUE	DATE
3	ISSUED FOR M.O.E. APPROVAL	28/05/09
2	REVISED PER CITY COMMENTS	30/04/09
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SCALE:
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1:100 (VERT.) 0 1 2 5

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

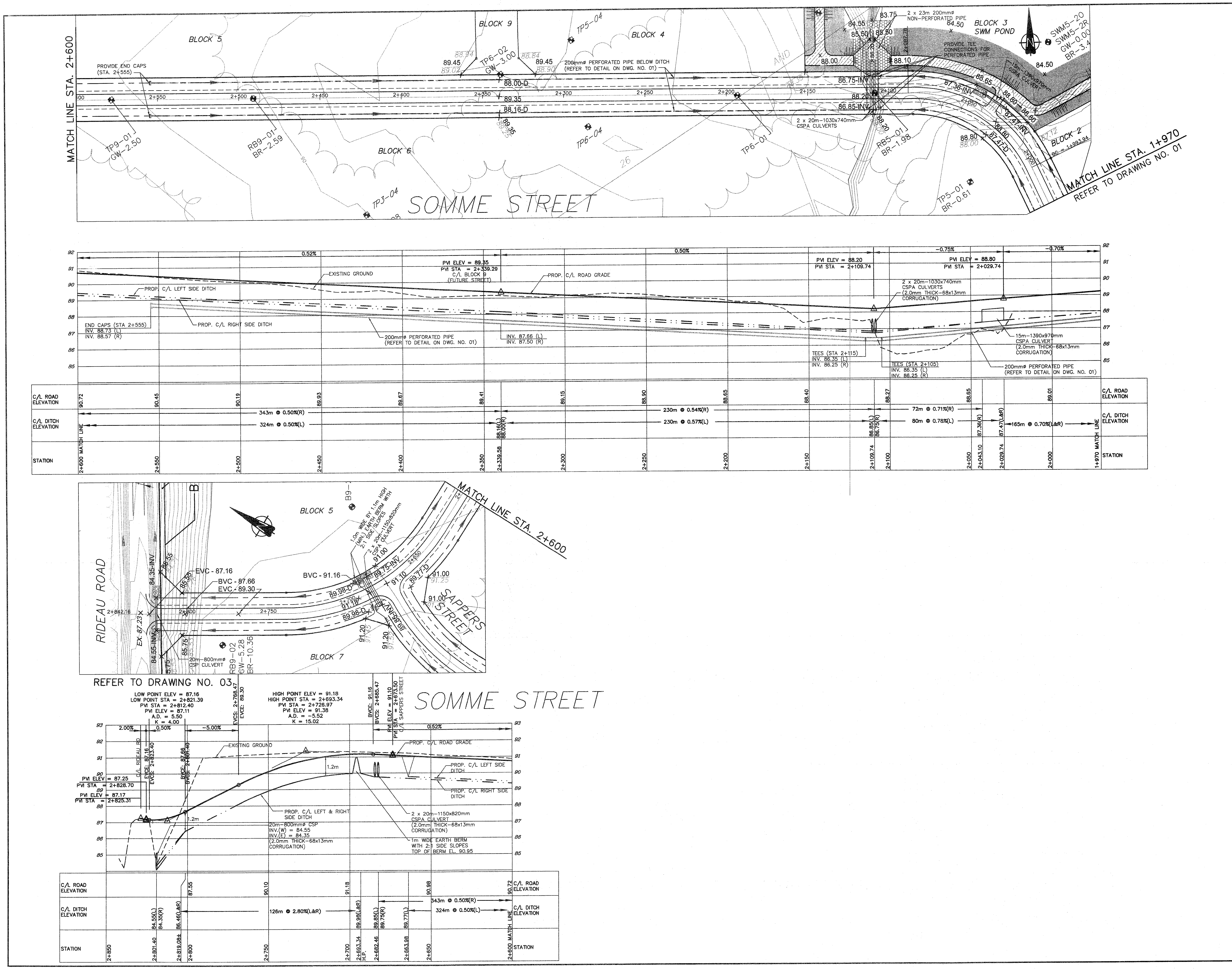
PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER D. P. UPTON PROVINCE OF ONTARIO

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:

(symbol)	PROPOSED DITCH AND FLOW DIRECTION
(symbol)	PROPOSED CULVERT
(symbol)	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
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SCALE:
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1:100 (VERT.) 0 1 2 5

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

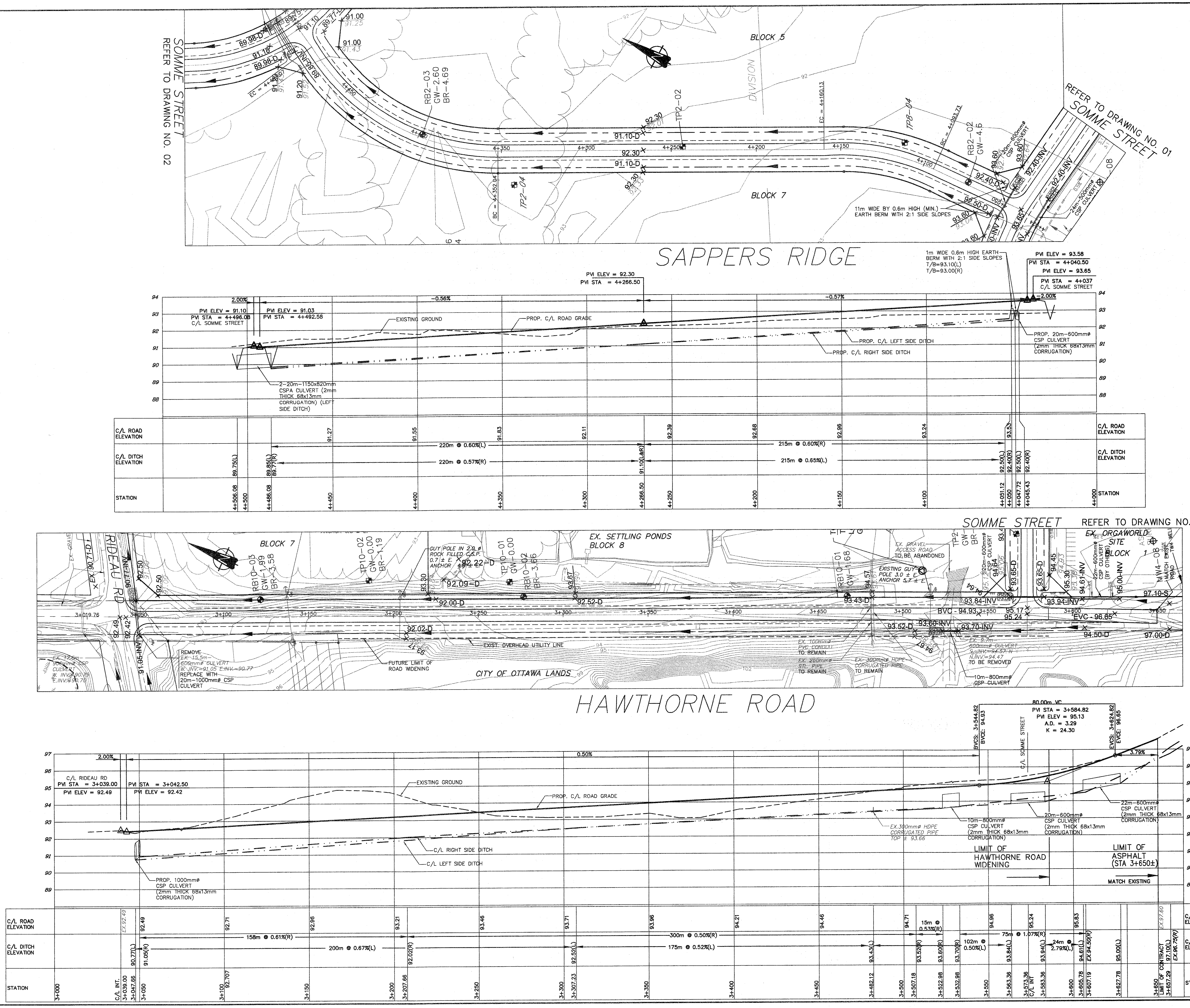
PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER D. P. UPTON PROVINCE OF ONTARIO

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	



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

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

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

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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: 20983
PLOTTED: May 28, 2009	

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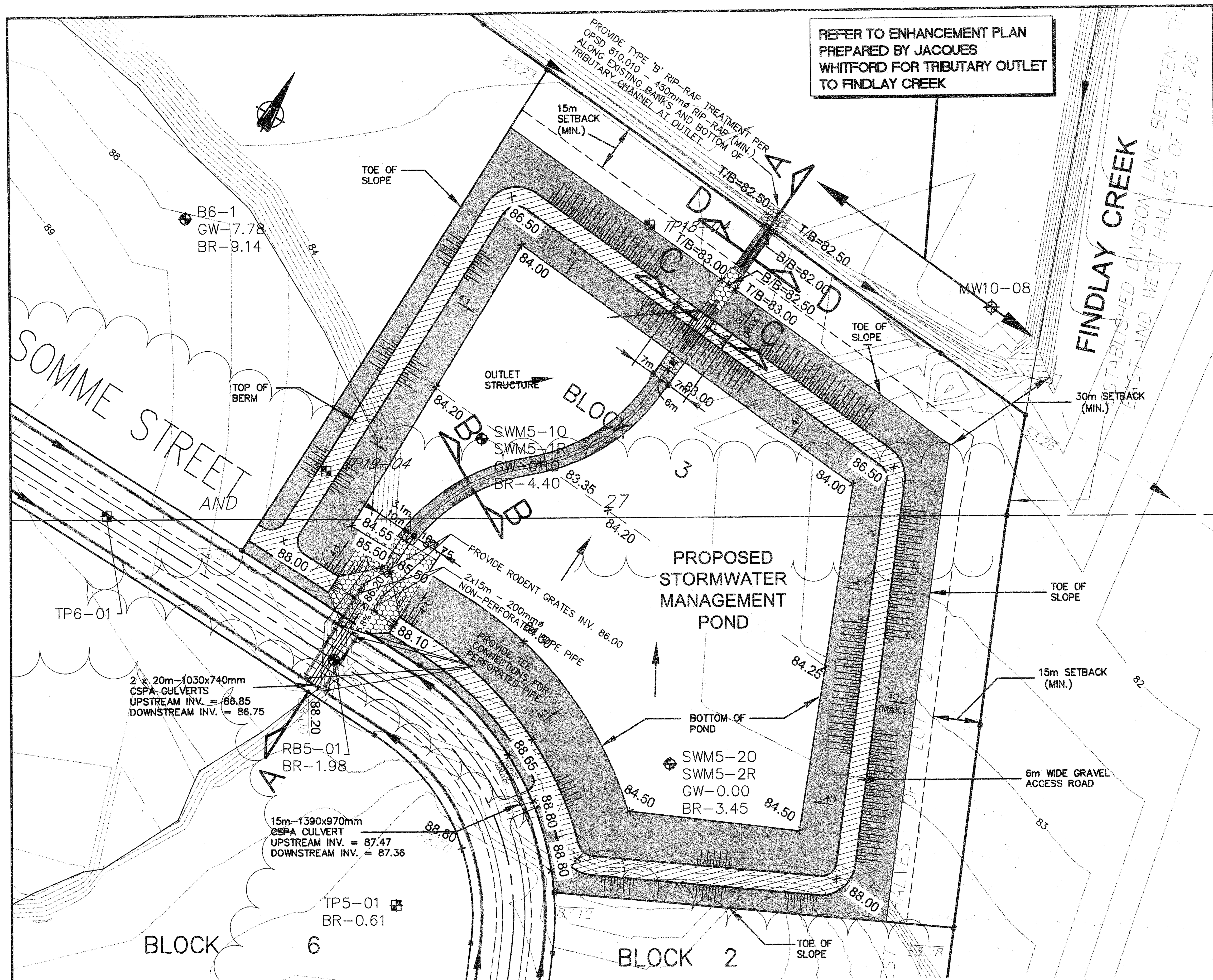
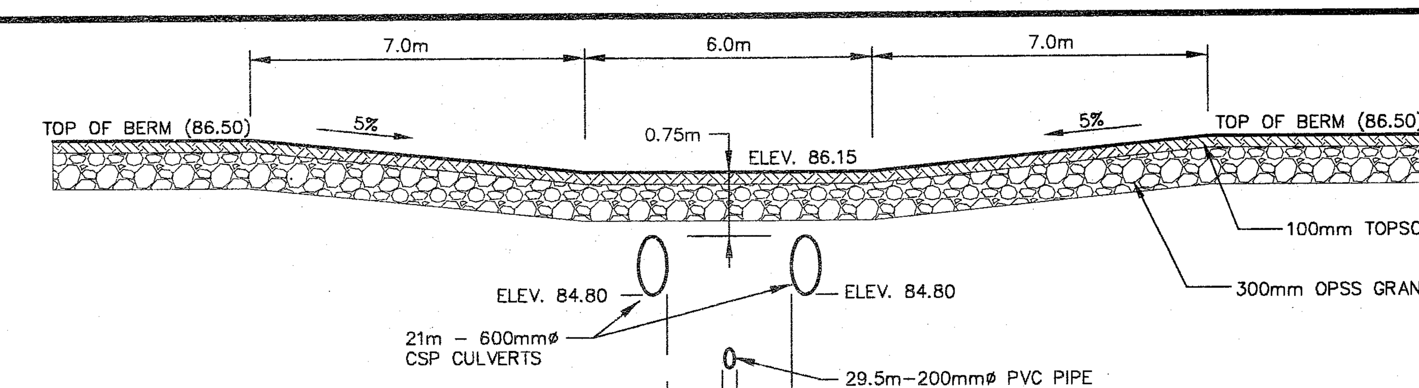


POND PLAN

1:1000

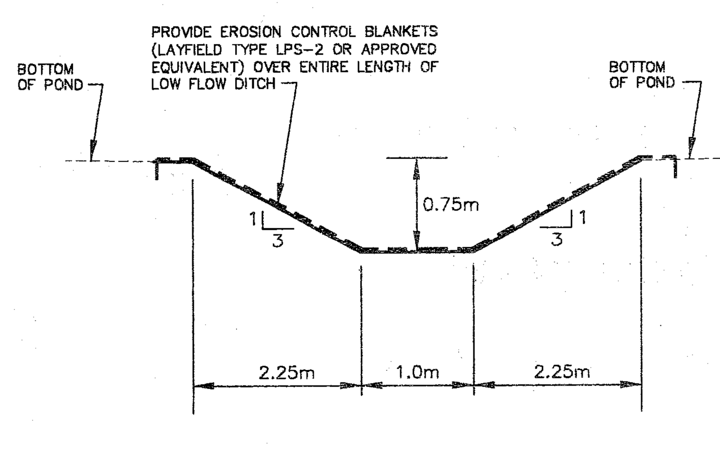
LEGEND

x 91.70	PROPOSED ELEVATION
	PROPOSED CULVERT
	PROPOSED DITCH AND FLOW DIRECTION
	PROPOSED TERRACING
	PROPOSED POND ACCESS ROAD – 100mm TOPSOIL AND SEED – 300mm OPSS GRANULAR 'B'
	EROSION CONTROL BLANKET
	PROPOSED CABLE CONCRETE MATS
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
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



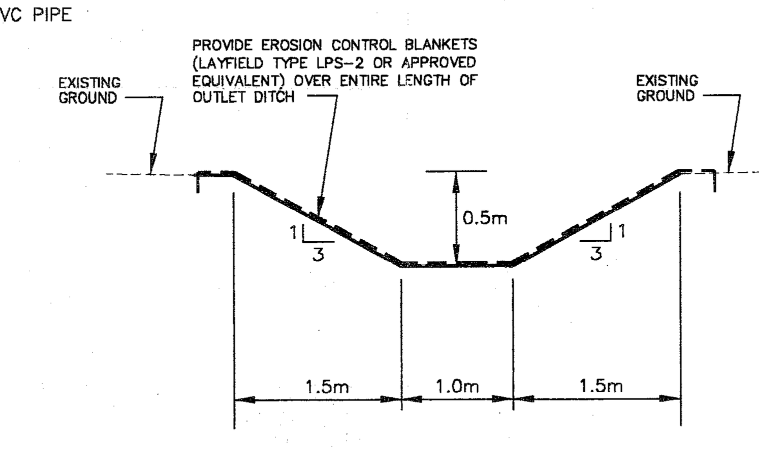
SECTION 'C–C'

N.T.S.



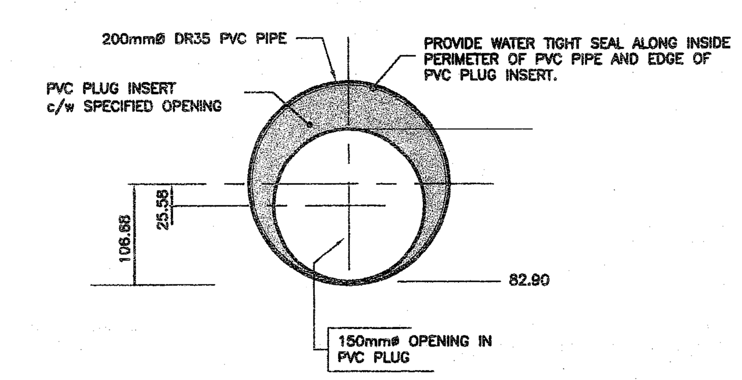
SECTION 'B–B'

N.T.S.



SECTION 'D–D'

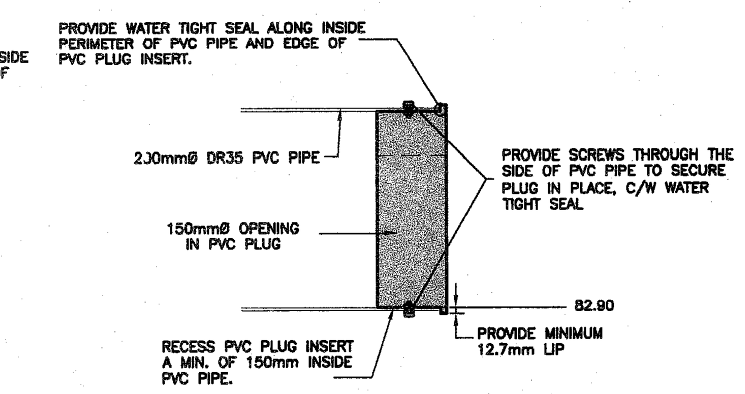
N.T.S.



150mm CIRCULAR FLOW RESTRICTOR

NOT TO SCALE

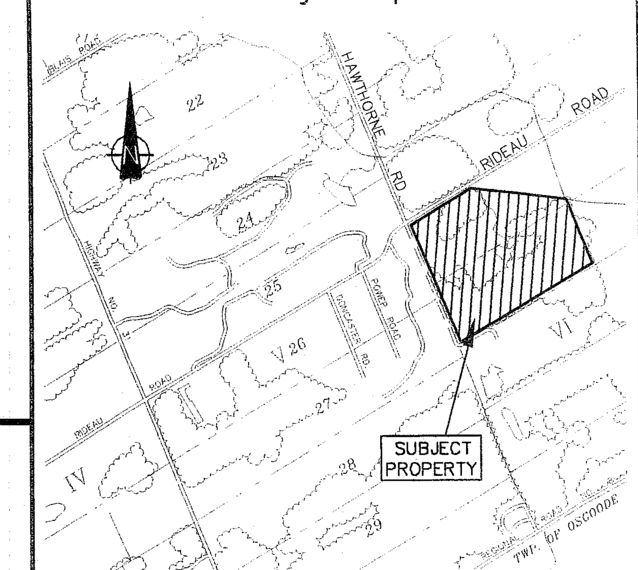
NOTE : PVC PLUG TO BE INSTALLED ON INLET FRONT FACE OF 200mmø PVC PIPE



TYPICAL MOUNTING DETAIL OF PVC PLUG TO FRONT FACE OF PVC PIPE

NOT TO SCALE

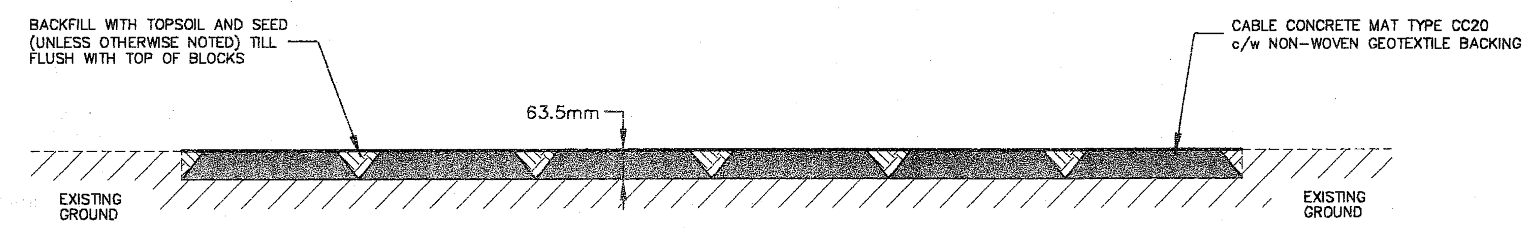
Key Map



NOT TO SCALE

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

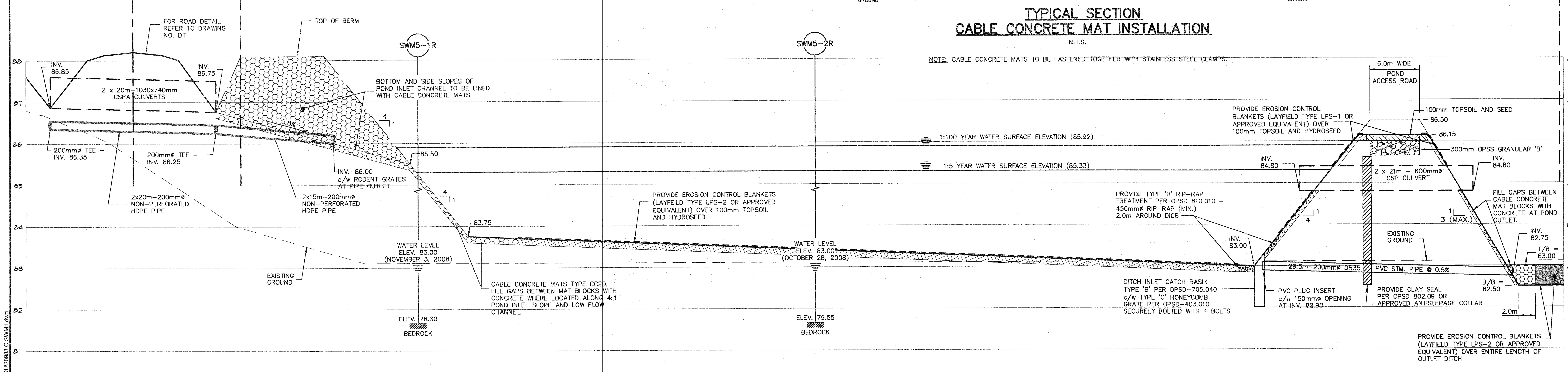
SCALE: AS SHOWN



TYPICAL SECTION CABLE CONCRETE MAT INSTALLATION

N.T.S.

NOTE: CABLE CONCRETE MATS TO BE FASTENED TOGETHER WITH STAINLESS STEEL CLAMPS.



SECTION 'A–A' THROUGH POND

1:250 (HORIZ.)

1:50 (VERT.)

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

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		

File Location: V:\20983.DU\20983 C SWM1.dwg

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).

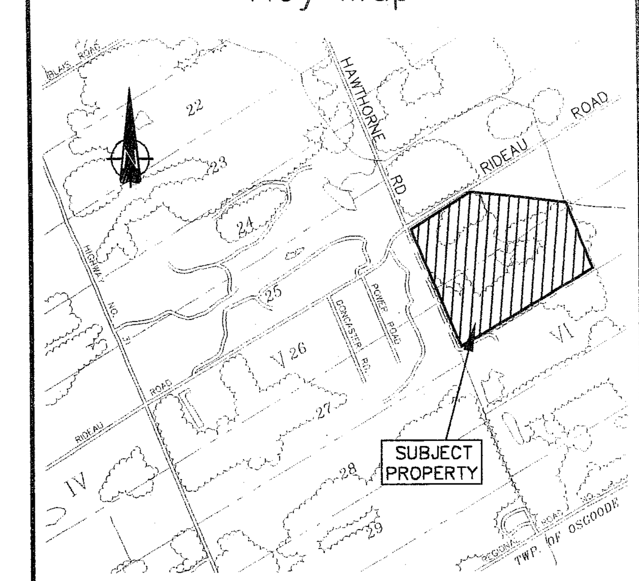
2. ALL SILT CONTROL MEASURES ARE TO BE INSPECTED ONCE PER MONTH AND AFTER EACH SIGNIFICANT RAINFALL EVENT TOTALLING 10mm OR GREATER. GENERAL CONTRACTOR TO REPAIR AS REQUIRED.

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

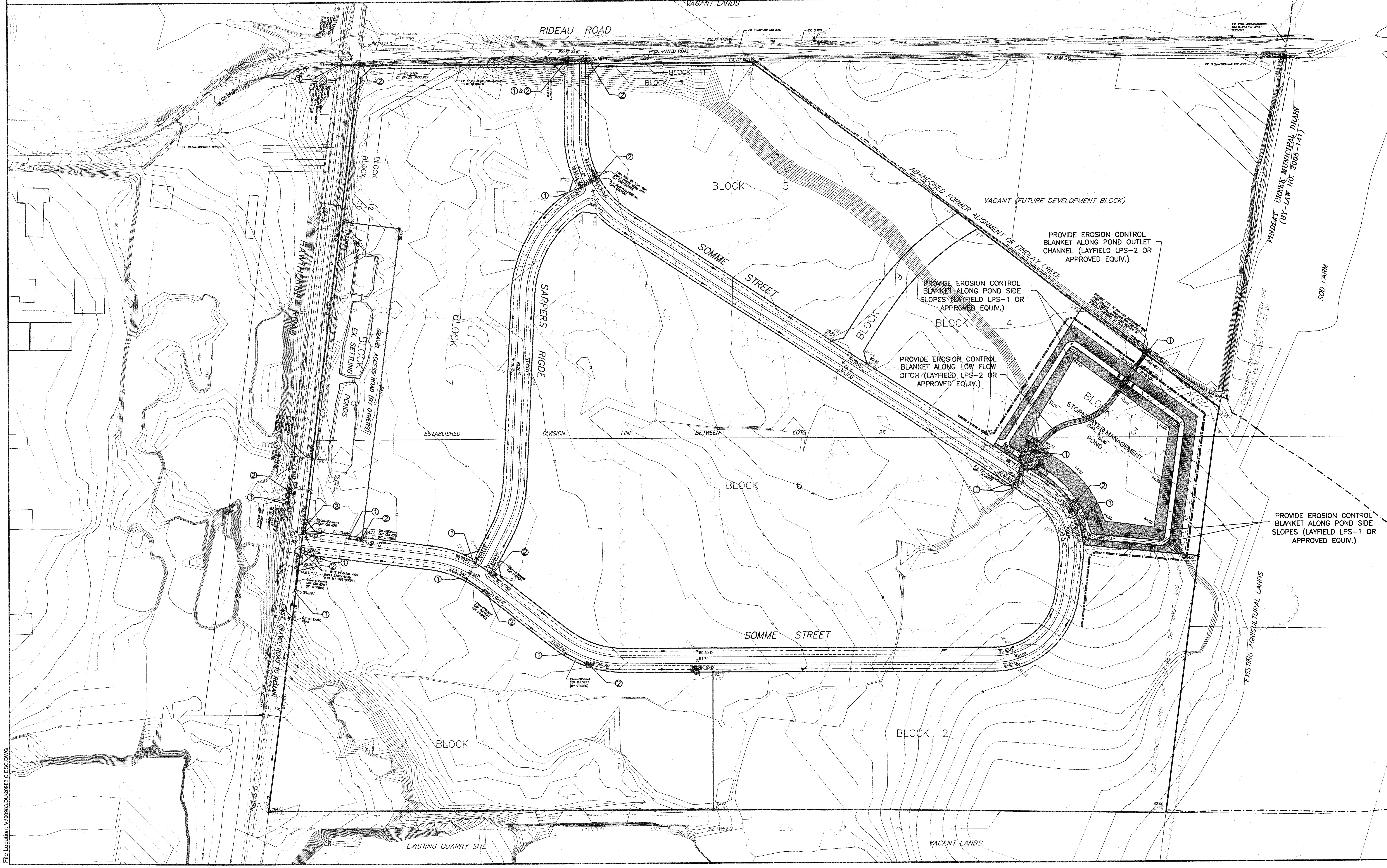
4. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION OF THE RECEIVING WATERCOURSE DURING ALL PHASES OF CONSTRUCTION.

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



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
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:

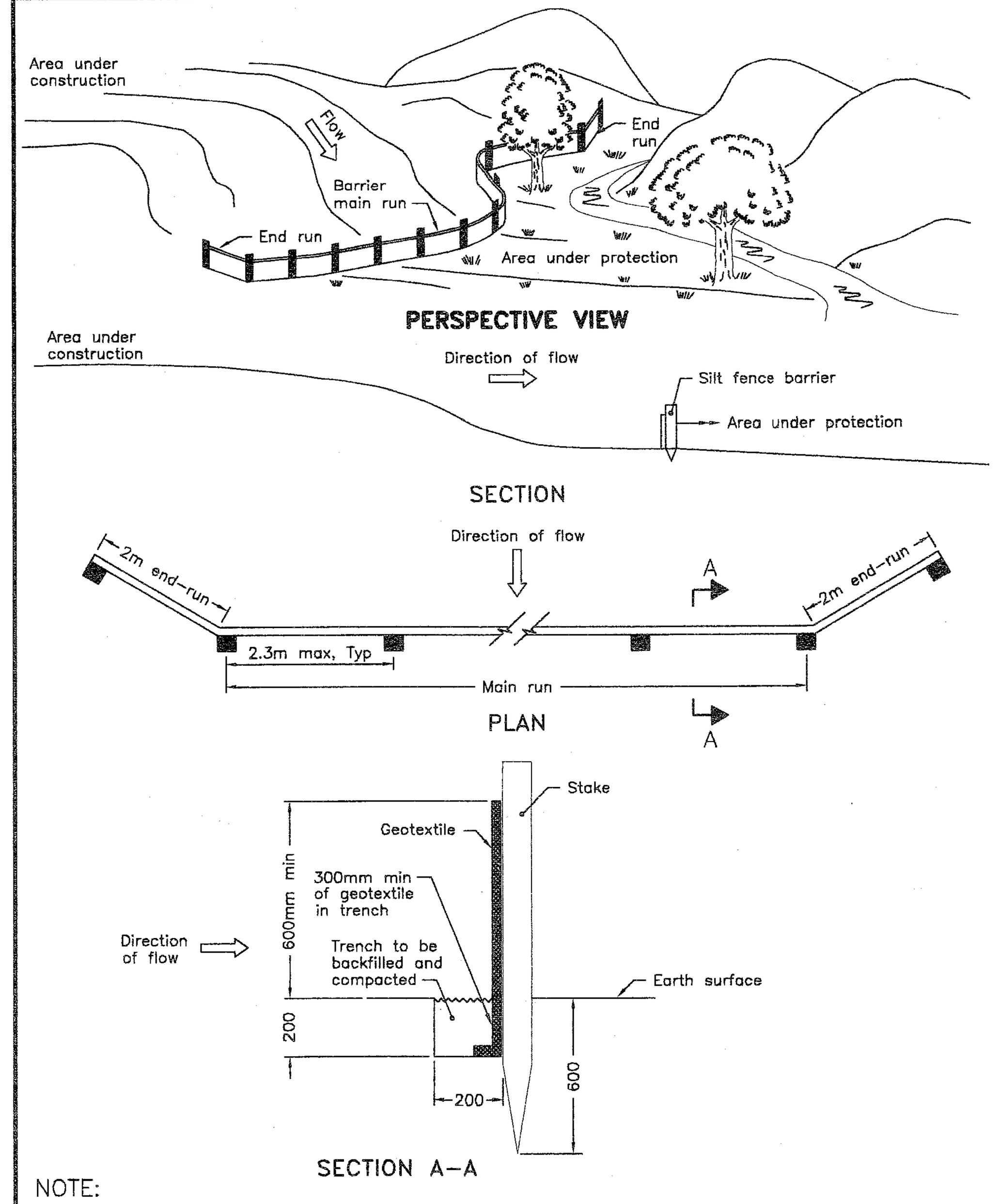
HAWTHORNE INDUSTRIAL PARK

DRAWING:

EROSION AND SEDIMENT CONTROL PLAN

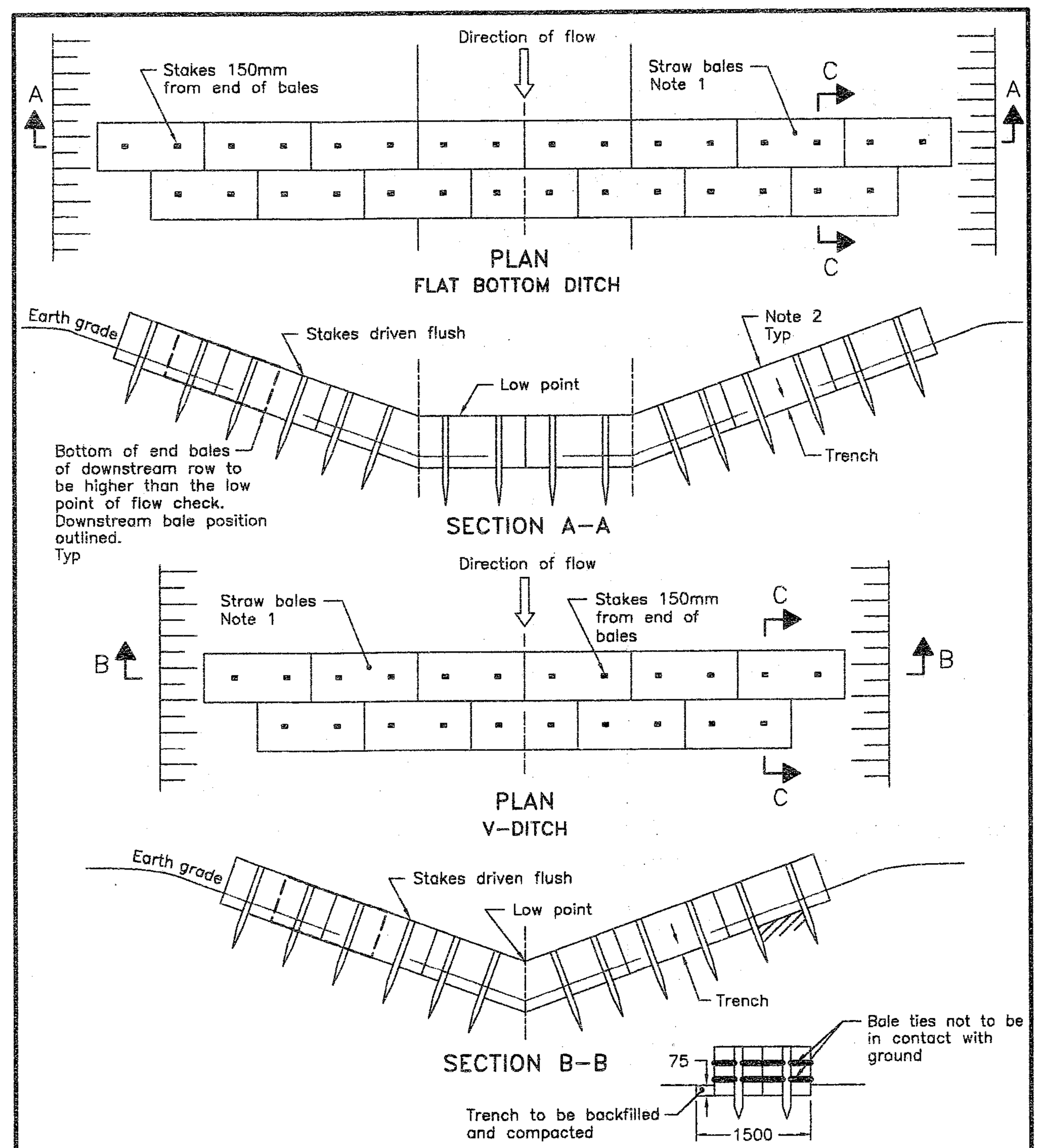
DESIGN: M.B.	DRAWING NO.: ESC
DRAWN: T.S.	
CHECKED: D.U.	JLR NO: 20983
PLOTTED: May 28, 2009	

File Location: V:\20983.D\J20983.C ESC.DWG



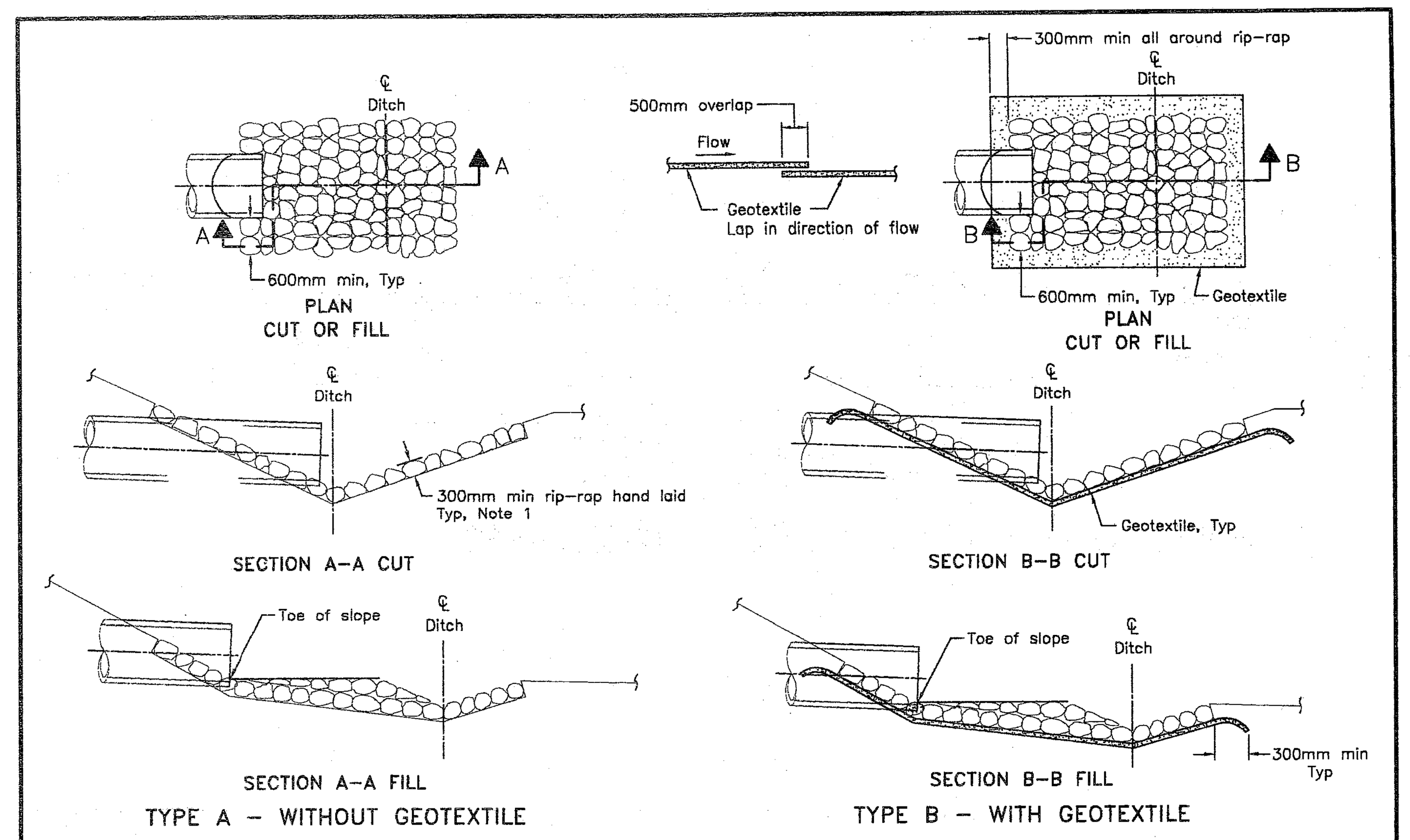
NOTE:
A All dimensions are in millimetres unless otherwise shown.

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



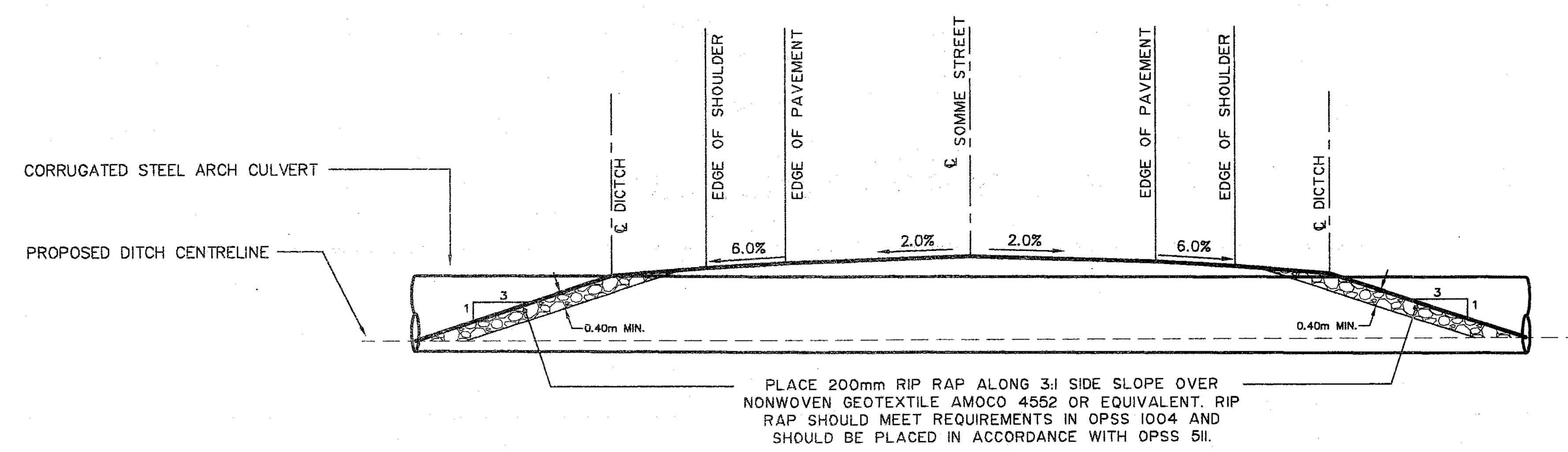
NOTES:
1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

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

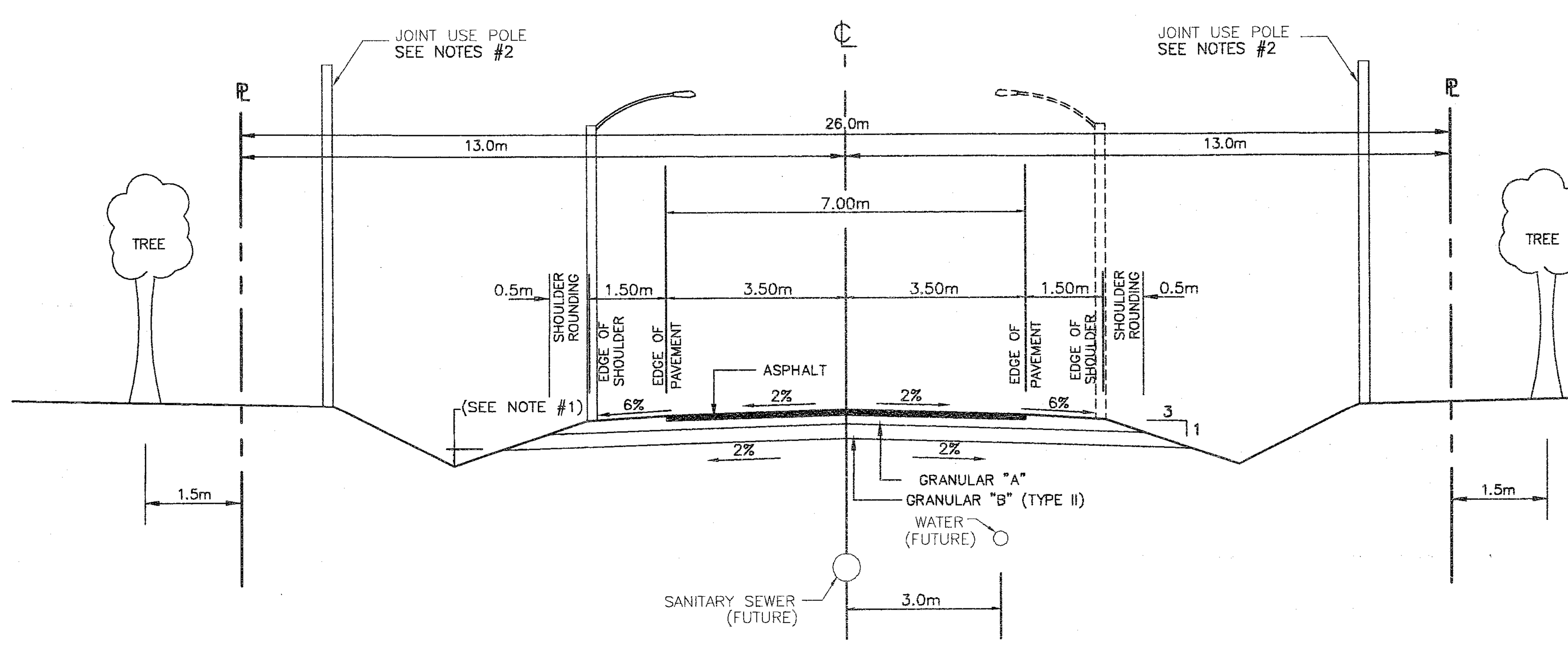


NOTES:
1 The thickness of the rip-rap layer shall be at least 1.5 times the rip-rap mean diameter.
A All dimensions are in millimetres unless otherwise shown.

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

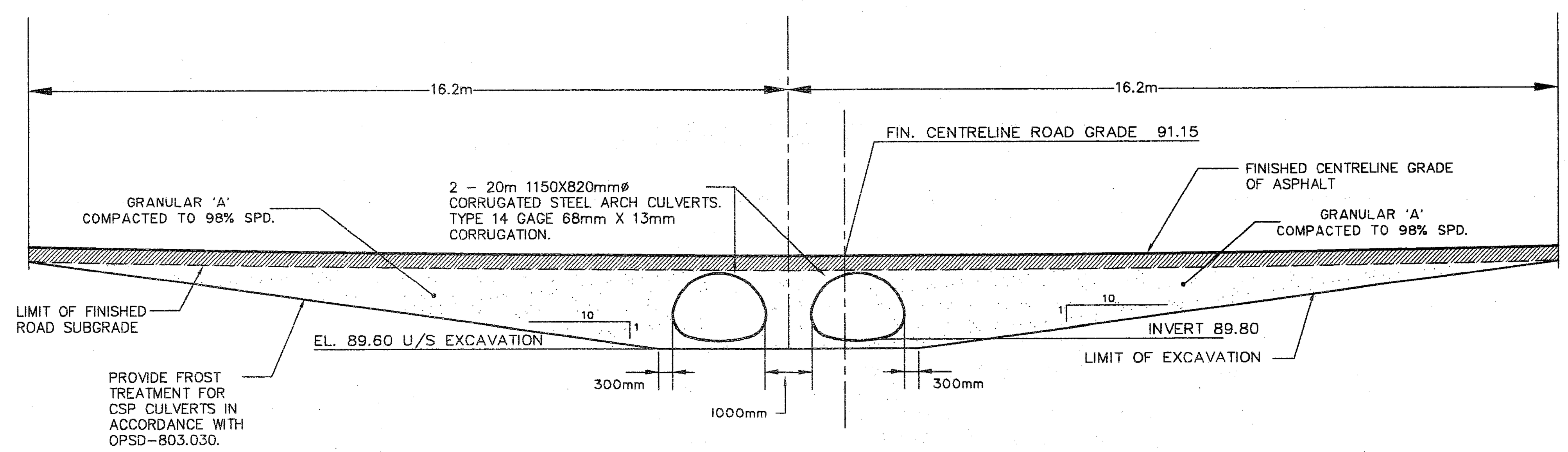
PAVEMENT STRUCTURE SCHEDULE

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

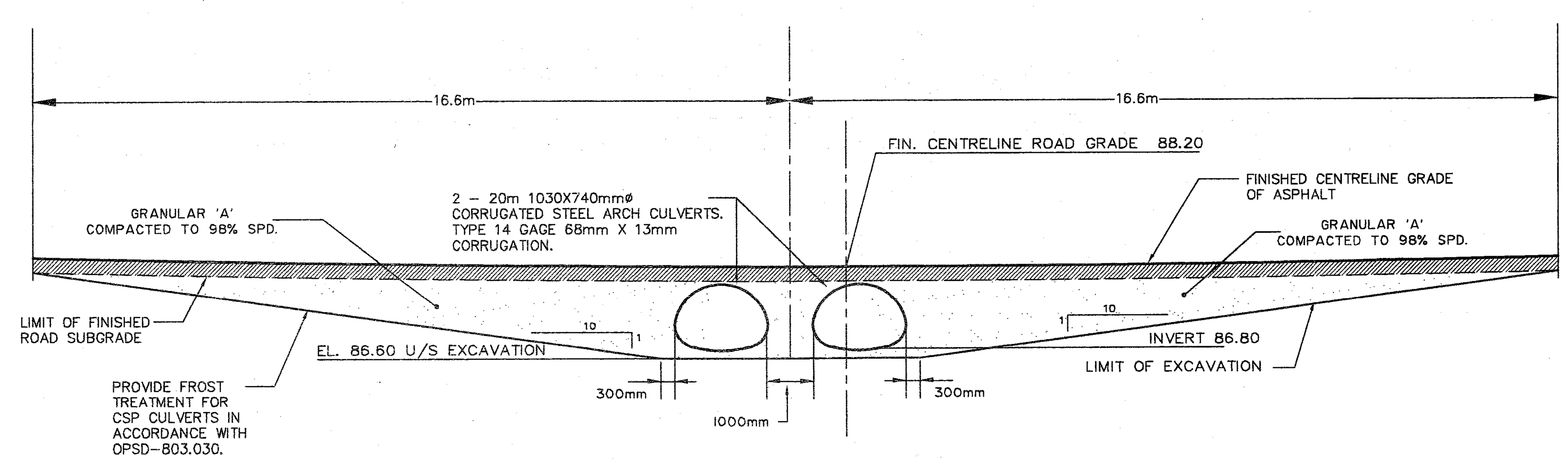
INTERNAL ACCESS ROADS:
- 50mm HL3 SURFACE COURSE (SUPERPAVE 12.5mm – PG58-34 LEVEL 2)
- 75mm HL8 BINDER COURSE (SUPERPAVE 19.0mm – PG58-34 LEVEL 2)
- 150mm OPSS GRANULAR "A" BASE
- 300mm OPSS GRANULAR "B" TYPE II SUB-BASE

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.

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
May 29/09
PROVINCE OF ONTARIO

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)

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	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				
			Area at C of									
	FROM	TO	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
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	U/S	D/S
	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	TIME (min)	Inv (m)	Inv (m)
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																	

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			
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	0.00	1.20	3.00	0.61	7702.7	1.78	189.60						1.77	93.65	92.50
CULVERT CROSSING	2	9		0.00	0.00	0.00	0.40	0.00	1.12	16.77	133.71	150.2				0.50			20.00	1	600	-----	NO	YES	0.63	92.50	92.40
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	0.00	1.20	3.00	0.73	8450.7	1.96	272.58						2.32	92.40	90.41
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	0.00	1.20	3.00	0.54	7283.5	1.69	245.24						2.42	90.41	89.08
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	0.00	1.20	3.00	0.53	7212.0	1.67	86.51						0.86	89.08	88.62
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	0.00	1.20	3.00	0.70	8282.1	1.92	94.12						0.82	88.62	87.96
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	0.00	1.20	3.00	0.97	9748.4	2.26	124.55						0.92	87.96	86.75
										24.75																	
CULVERT CROSSING	22	19		0.00	0.00	0.00	19.16	0.00	53.26	24.75	104.53	5567.5				0.50			20.00	2	-----	1.03 X 0.74	YES	NO	0.04	86.85	86.75
										24.79																	
POND INLET	19	POND		0.00	0.00	0.00	44.32	0.00	123.22	25.80	101.69	12813.8	3.09	0.55	5.00	5.68	13135.2	4.09	22.00						0.09	86.75	85.50
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	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 (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)			
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				
			AREA (A) at C of						TOTAL A*C	2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s
	FROM	TO	0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)	SUM(A)	SUM(A*C)						
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									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)			
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

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

[redacted]

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

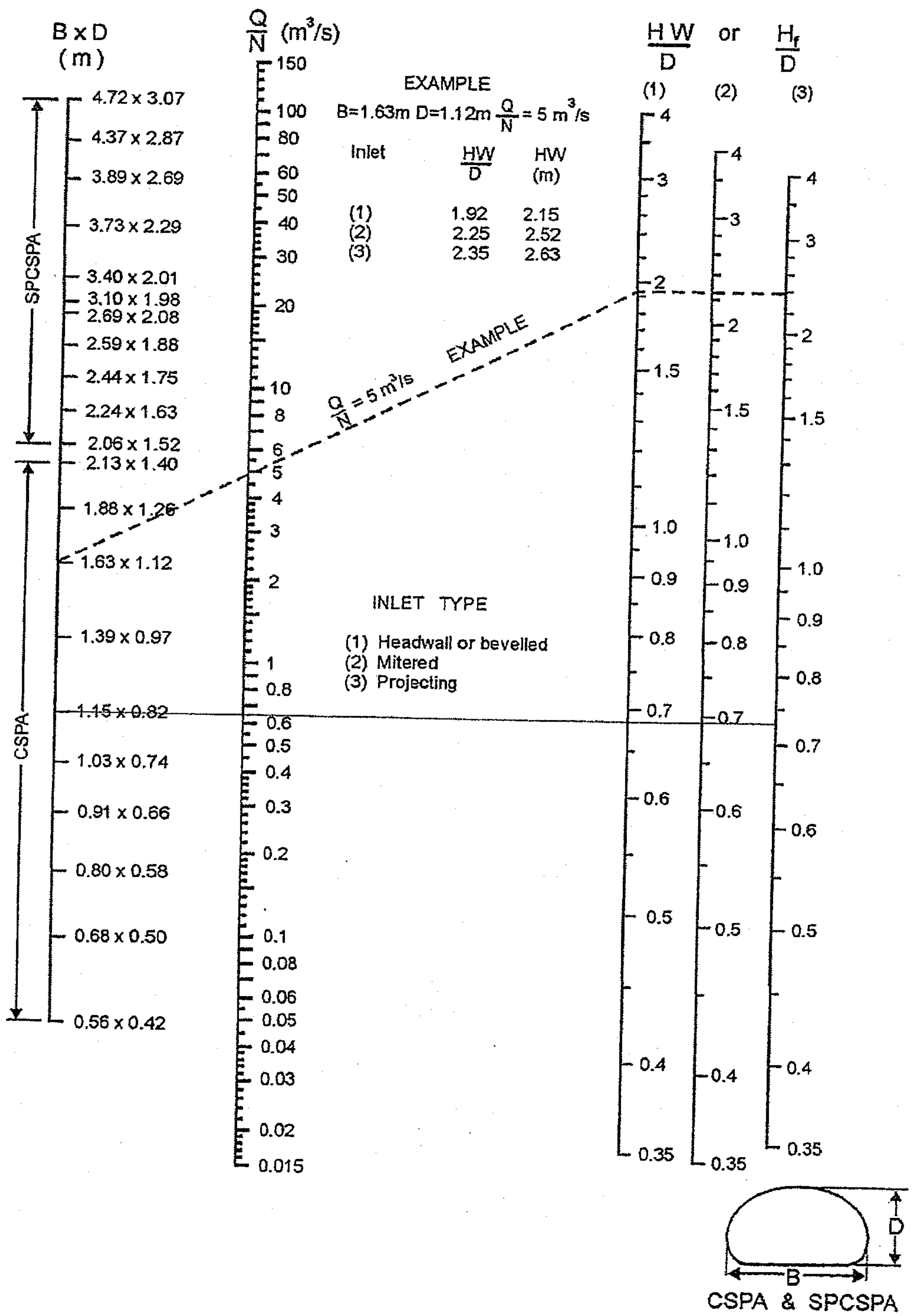
Prepared by: Mark Buchanan, E.I.T.
Reviewed by: Guy Forget, P.Eng.
Date: February 2009

	DESIGN DATA							CULVERT DATA						INLET CONTROL			OUTLET CONTROL								GOVERNING	VEL
Station	Q (m^3/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)

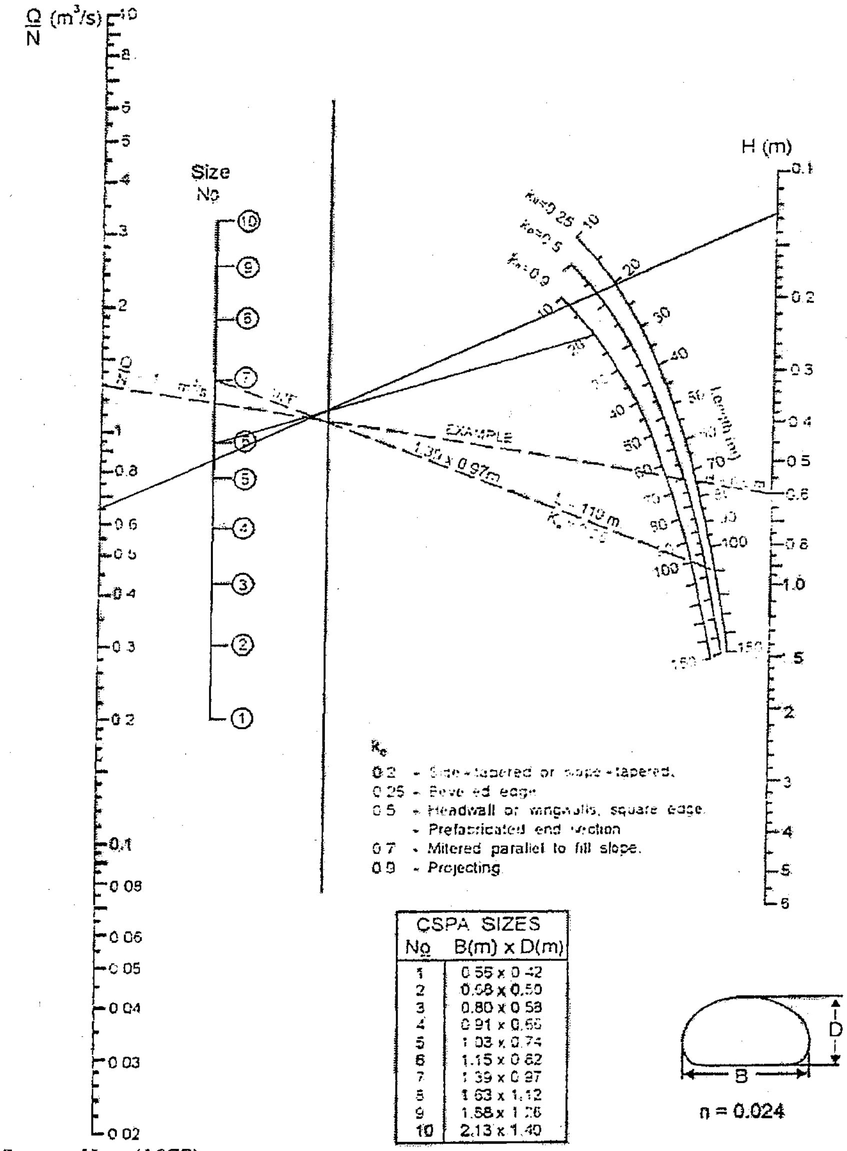
Culvert Crossing ⟨6⟩-⟨14⟩ 2x1.15m x 0.82m

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

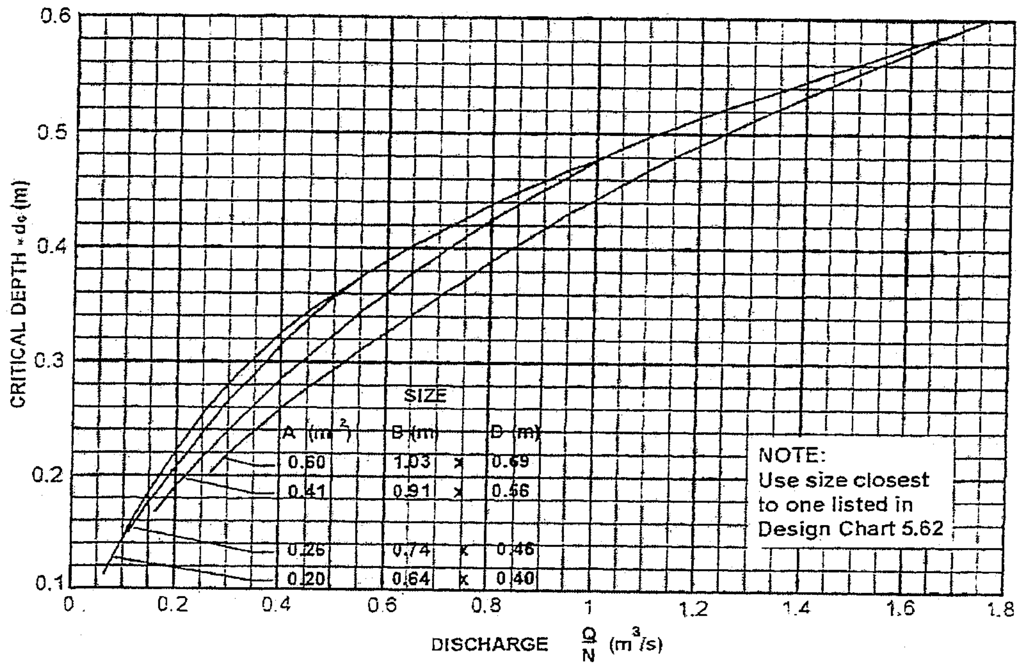


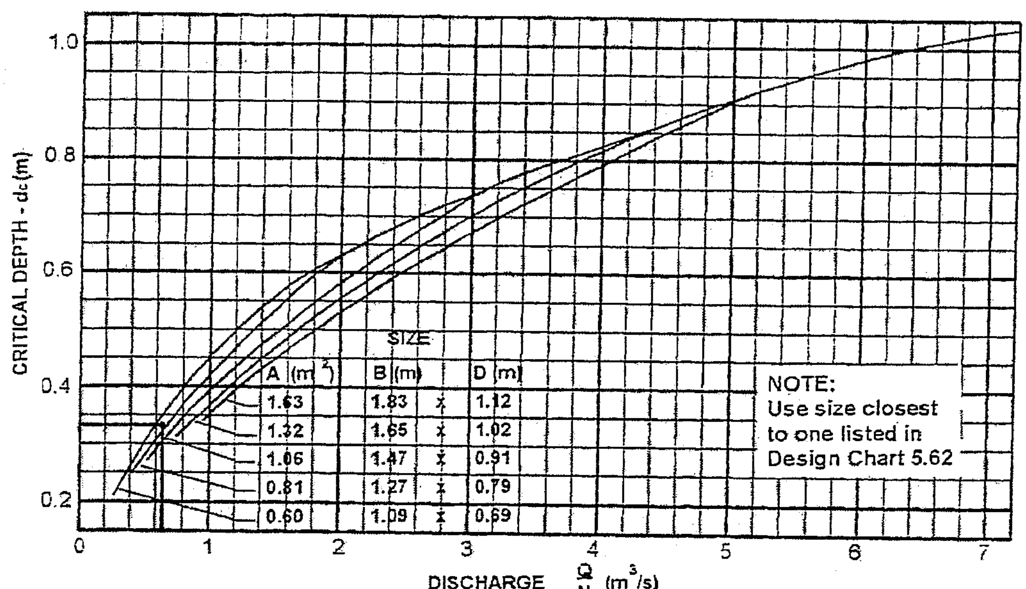
CSPA SIZES	
No	B(m) x D(m)
1	0.55 x 0.42
2	0.68 x 0.50
3	0.80 x 0.58
4	0.91 x 0.66
5	1.03 x 0.74
6	1.15 x 0.82
7	1.39 x 0.97
8	1.63 x 1.12
9	1.88 x 1.26
10	2.13 x 1.40

n = 0.024

Source: Herr (1977)

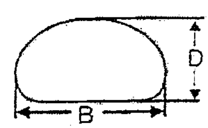
Design Chart 5.53: CSP Pipe Arch Culverts





($d_c \ngtr D$)

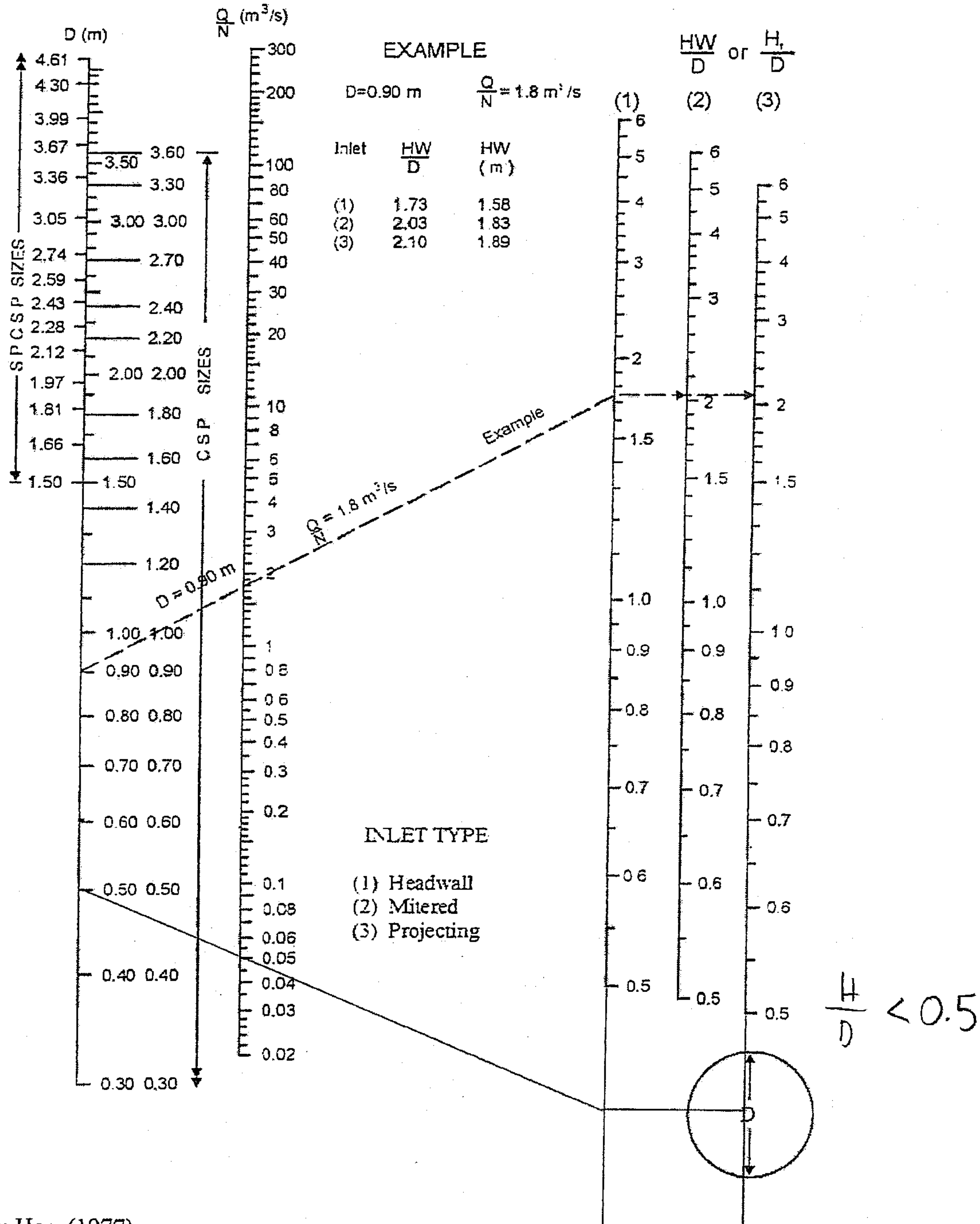
A = Cross-sectional area per barrel interpolated for other sizes



Source: Herr (1977)

Culvert Crossing 23b to 23c 500mm Ø

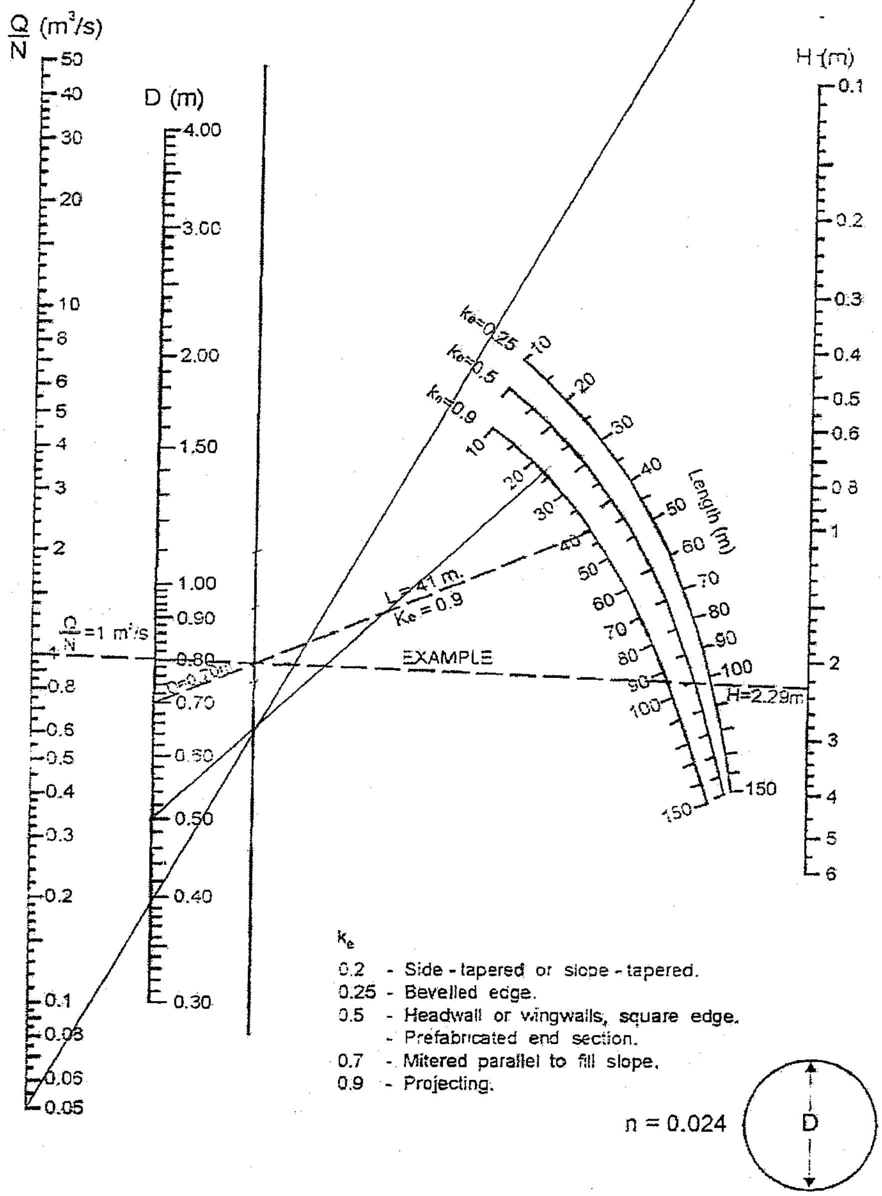
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

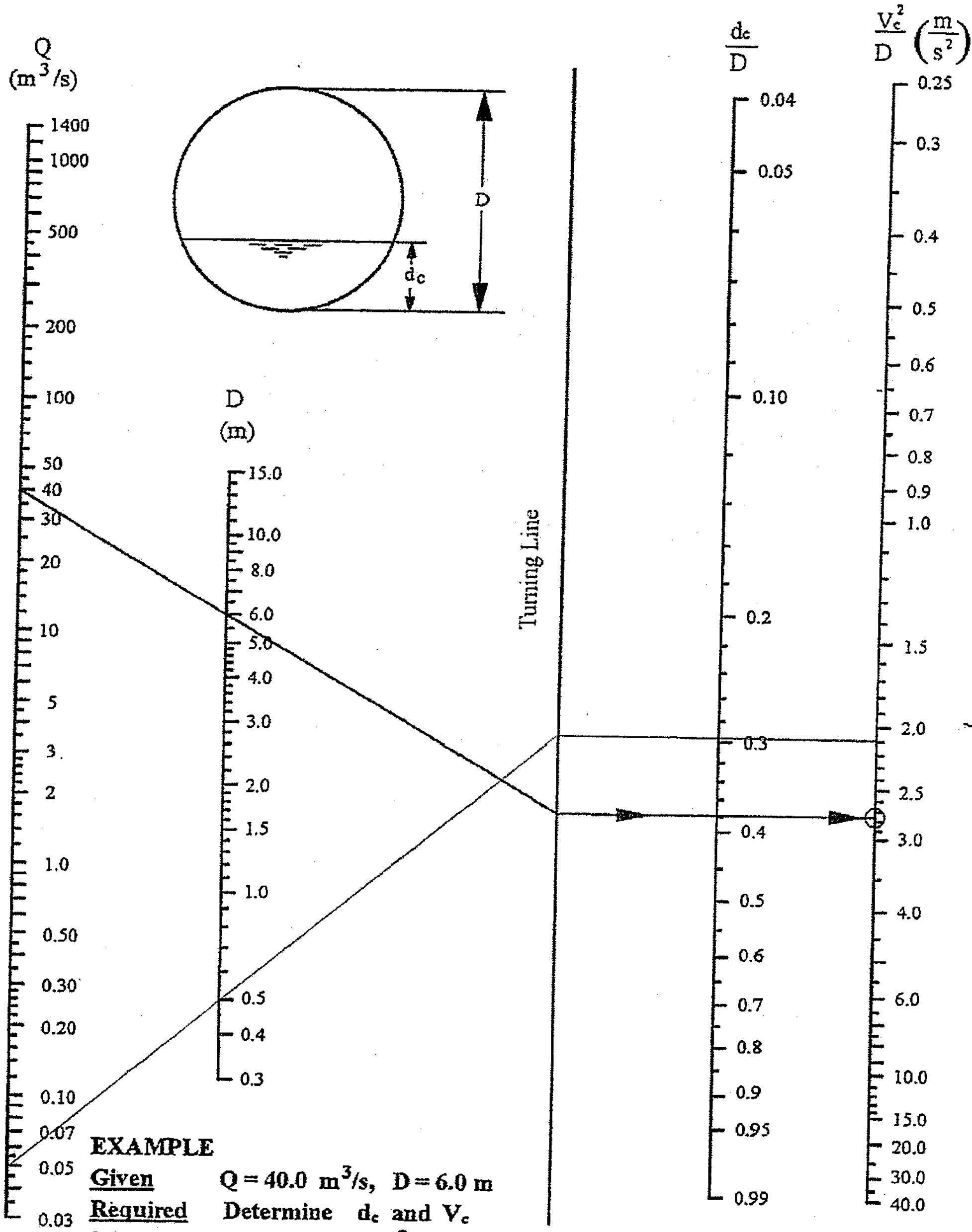
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

H < 0.1 m



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

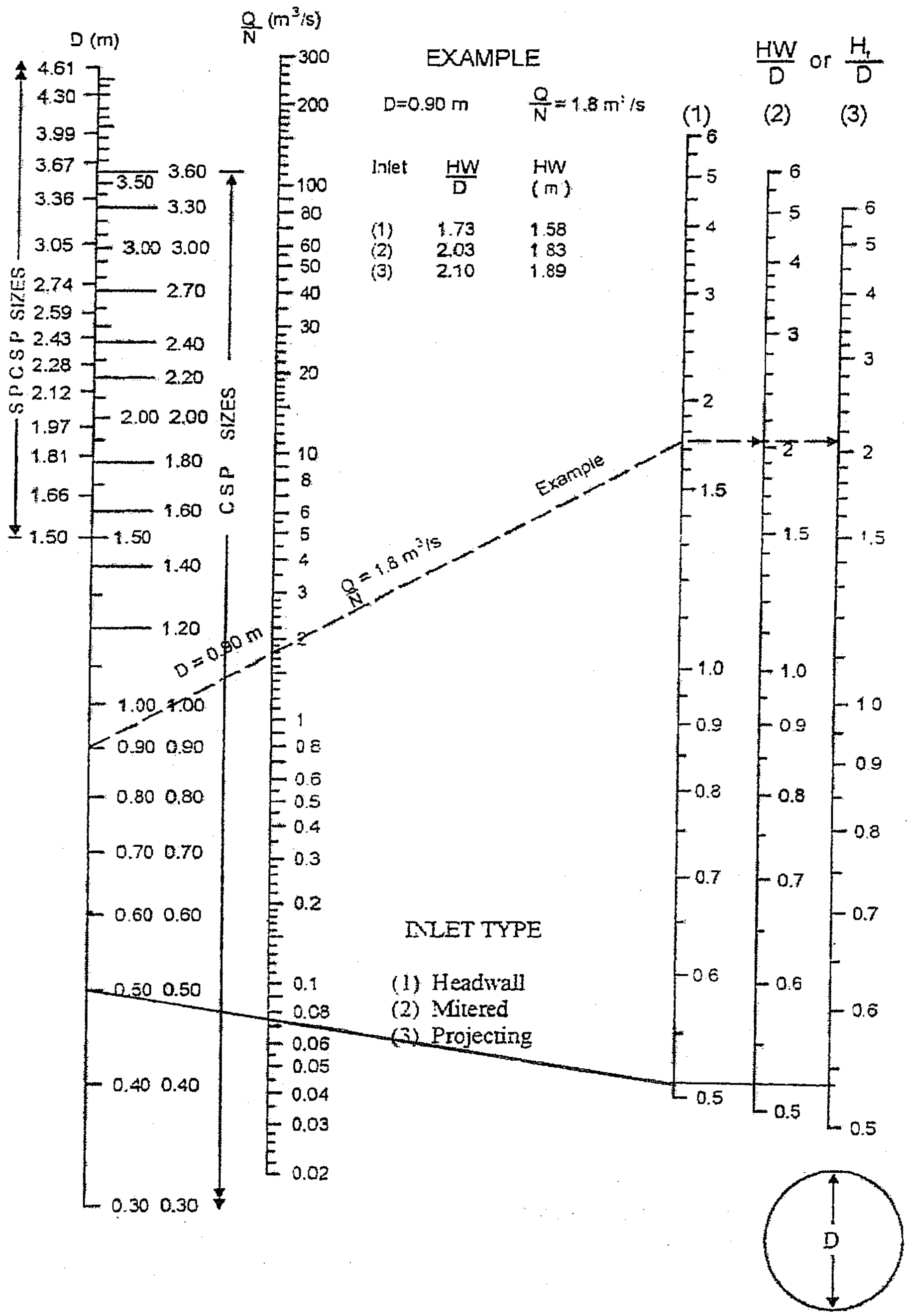
Required Determine d_c and V_c

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

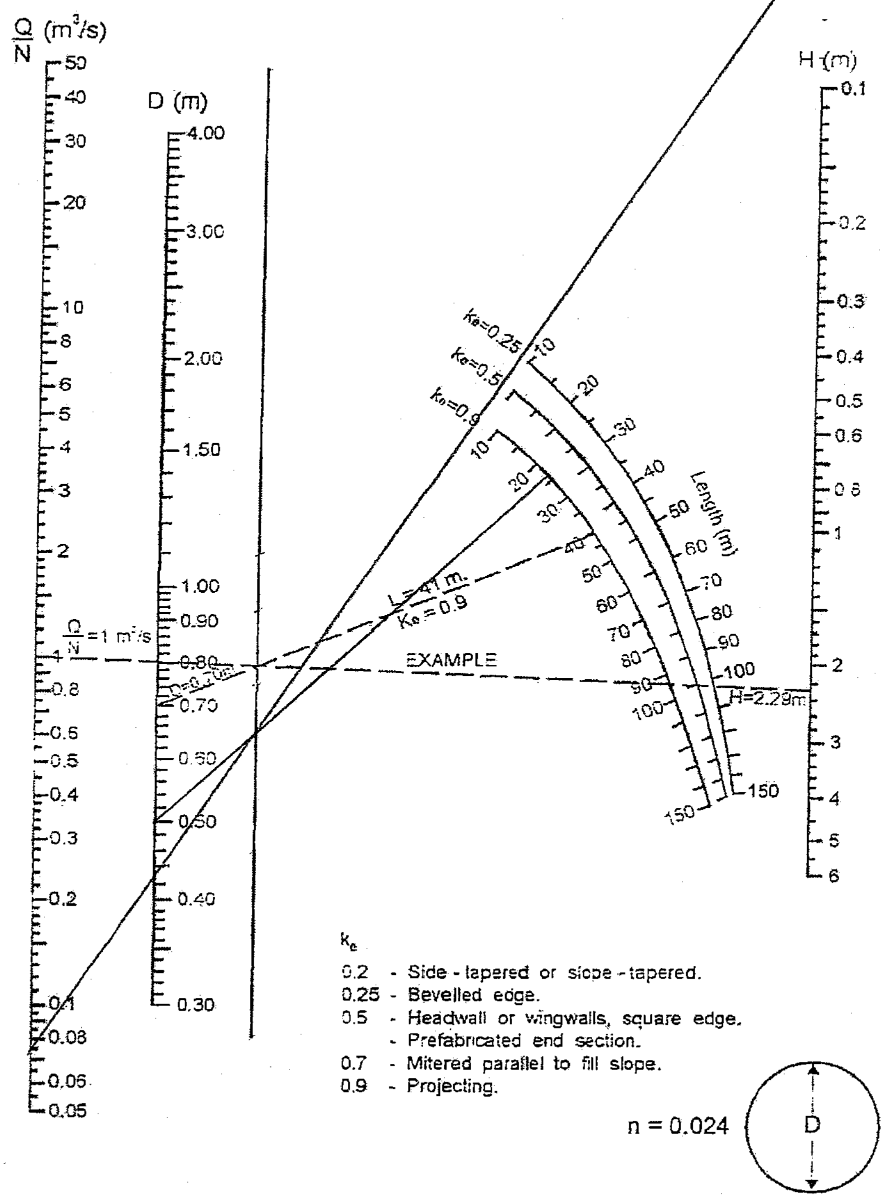
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

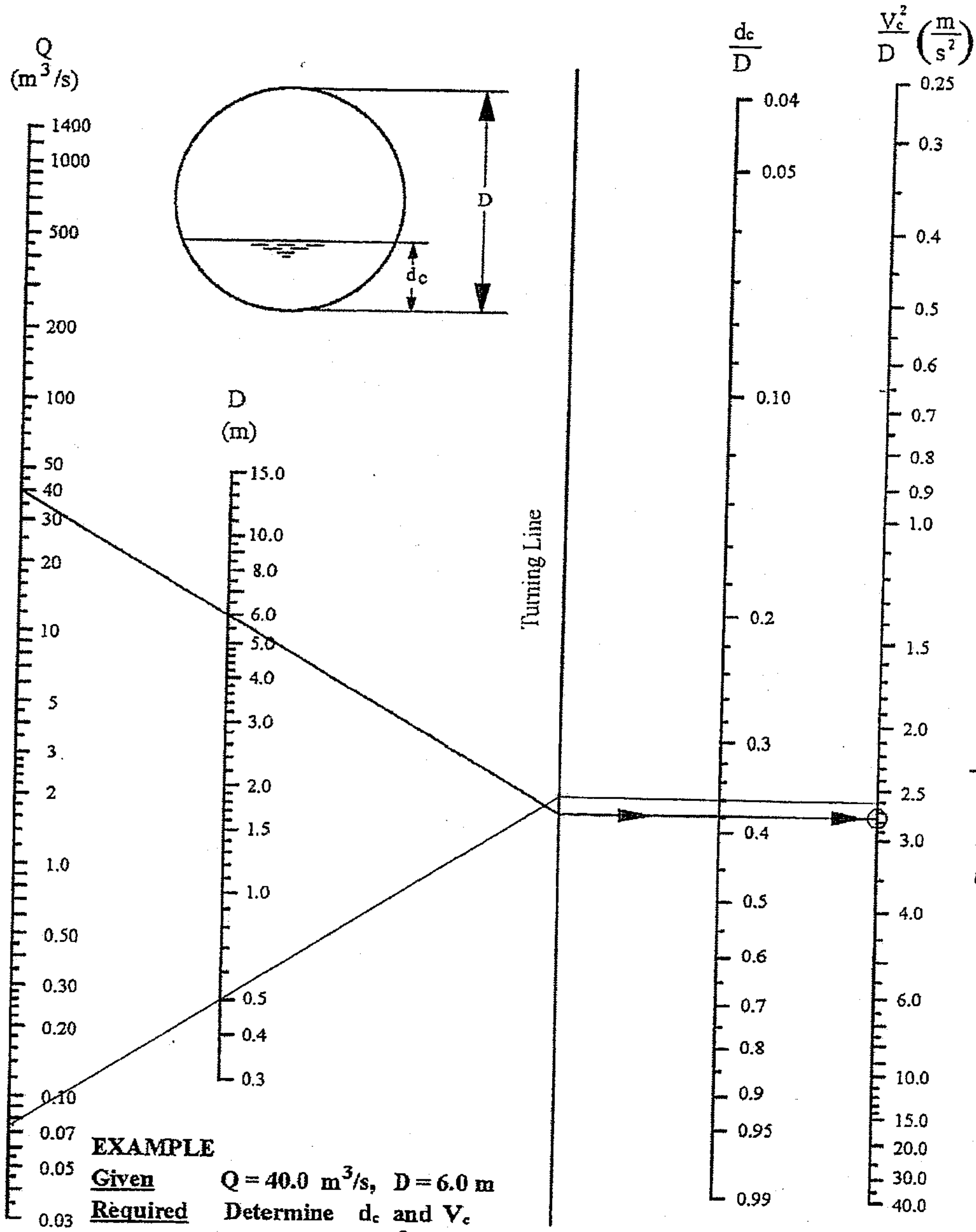
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

H < 0.1m



Source: Herr (1977)

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



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

$d_c \doteq 0.36 \times 0.5$

$\doteq 0.18$

EXAMPLE

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

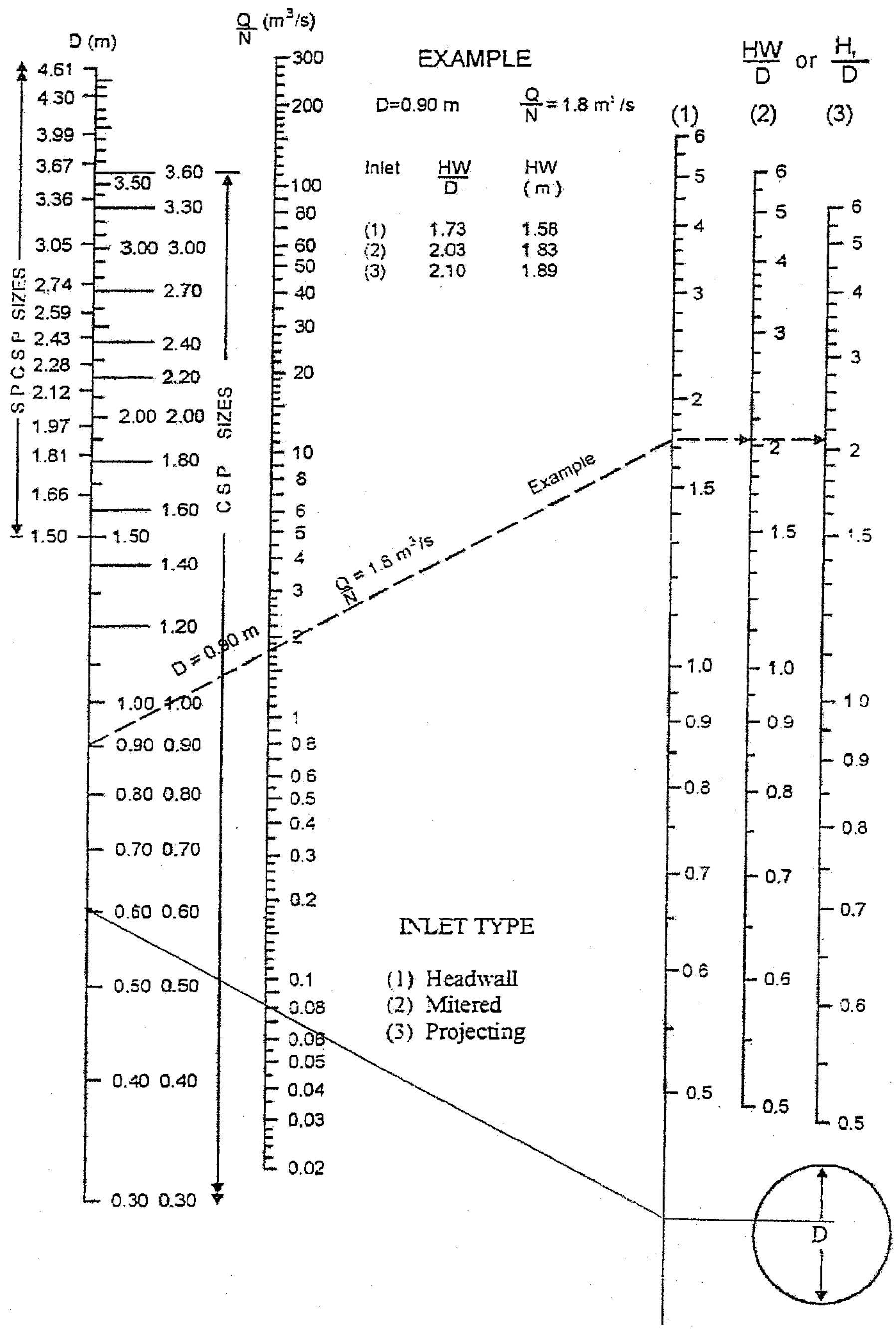
Required Determine d_c and V_c

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

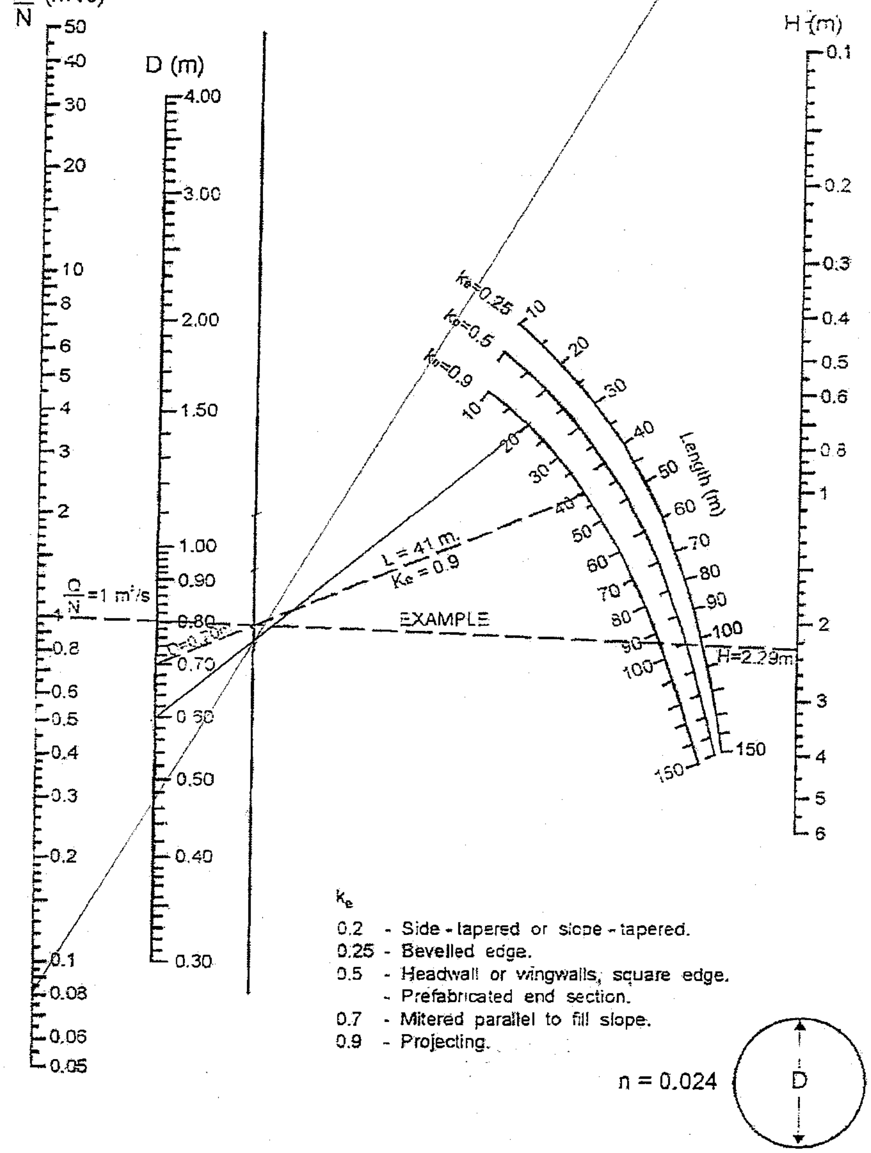


∴ HW/D < 0.5

Source: Herr (1977)

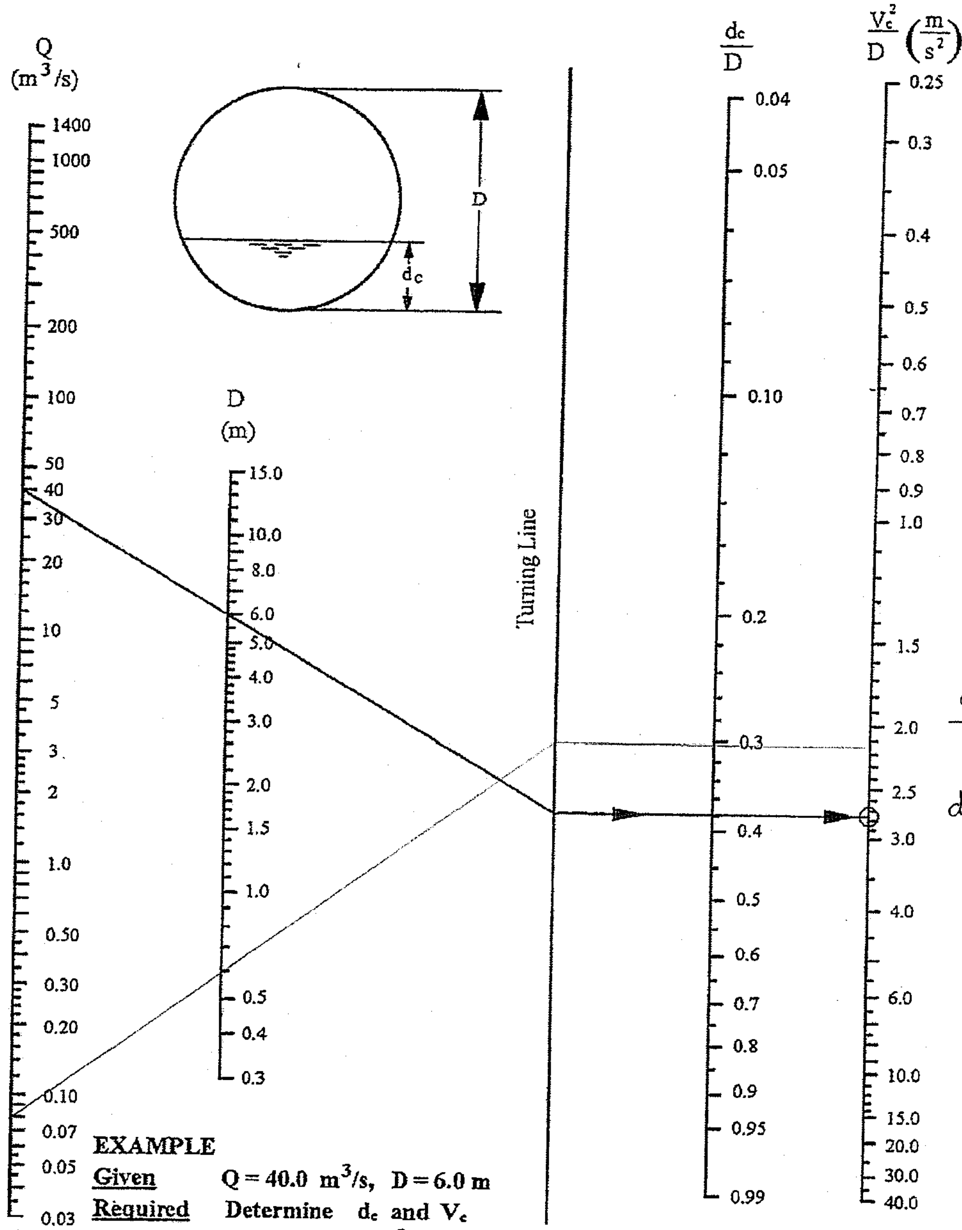
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

∴ H << 0.1m



Source: Herr (1977)

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



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

$d_c = 0.31 \times 0.6$

$= 0.186$

$= 0.19$

EXAMPLE

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

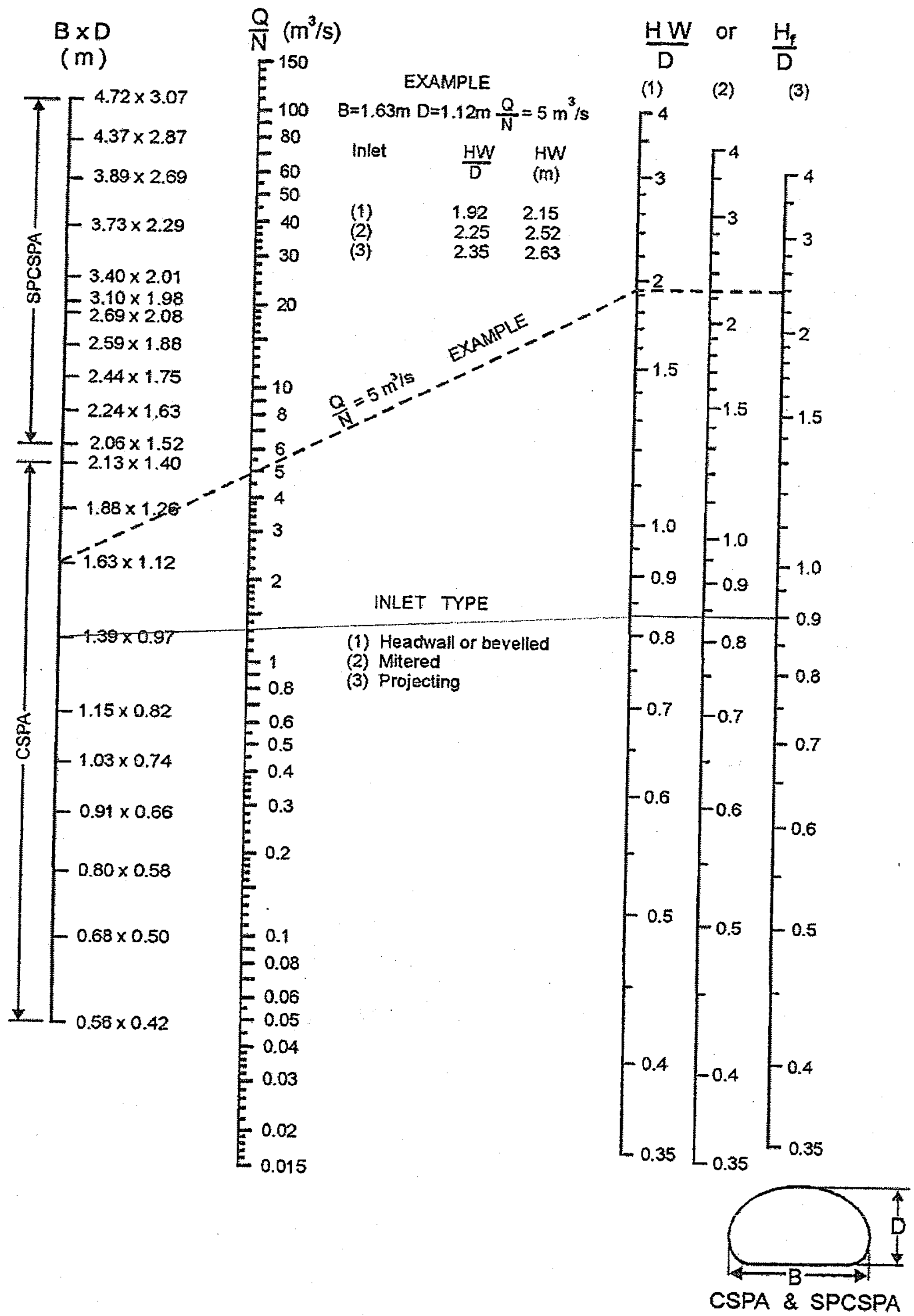
Required Determine d_c and V_c

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

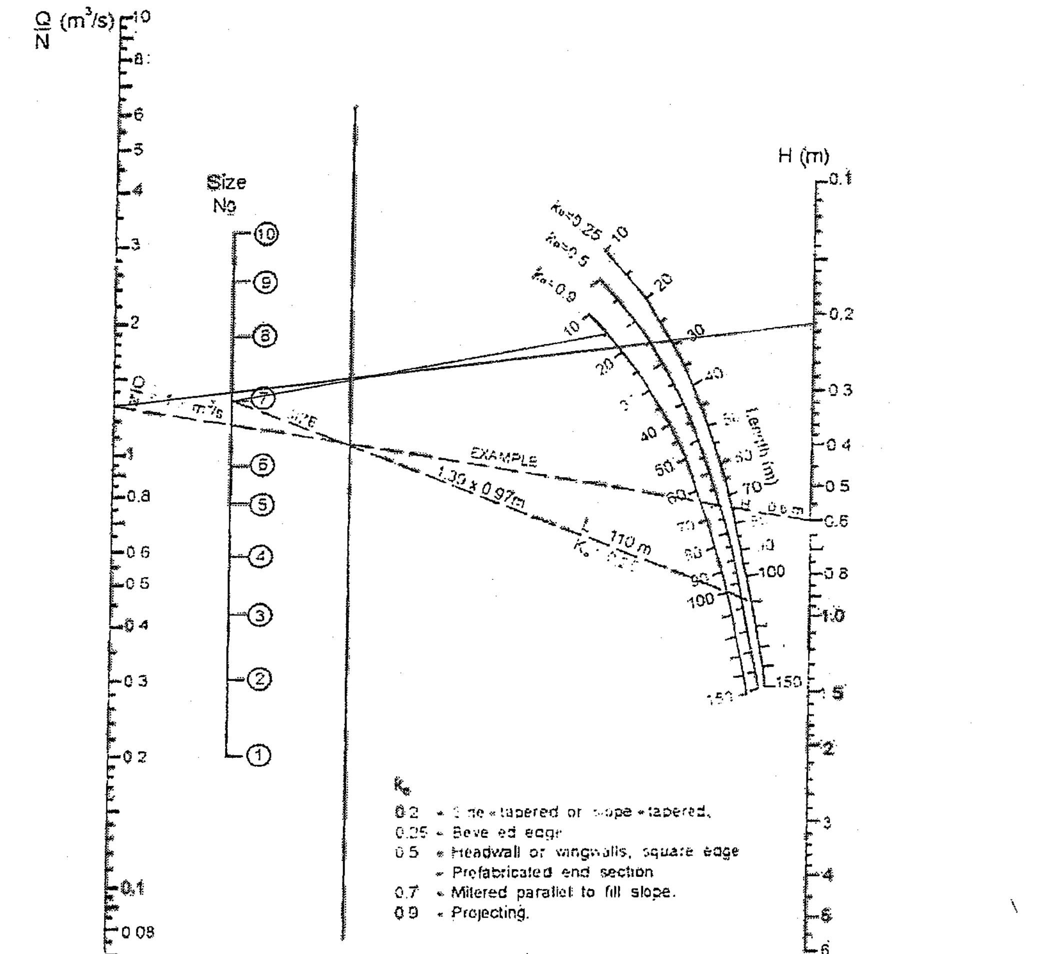
Culvert Crossing 27b to 27c 1.39 x 0.97 m

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts

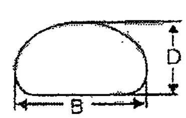


Source: Herr (1977)

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



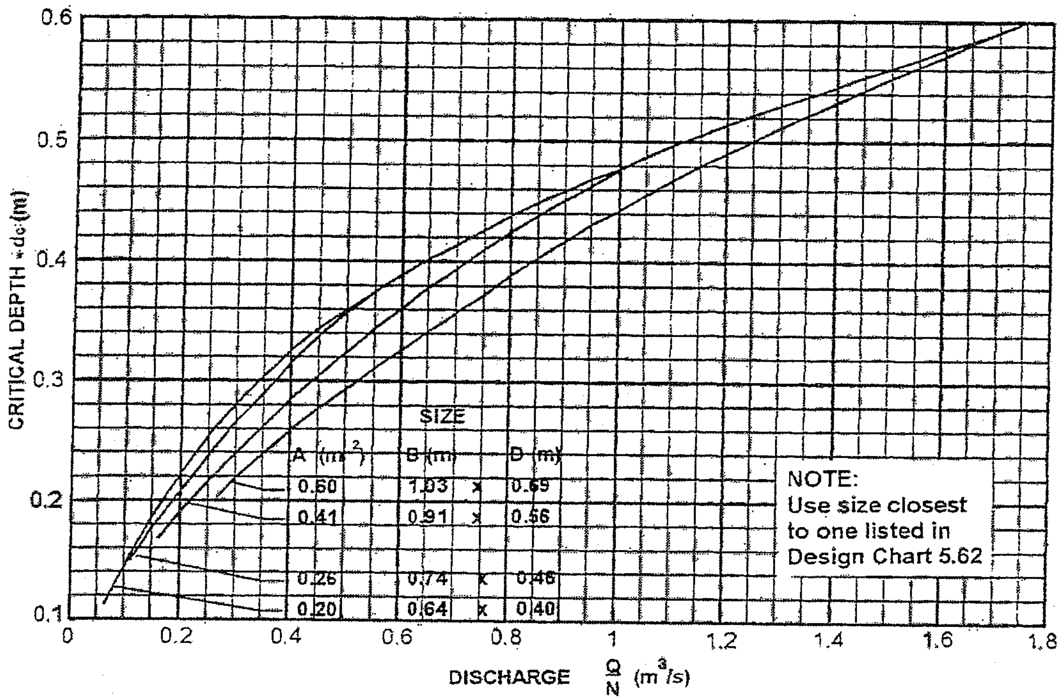
CSPA SIZES	
No	B(m) x D(m)
1	0.56 x 0.42
2	0.68 x 0.50
3	0.80 x 0.58
4	0.91 x 0.66
5	1.03 x 0.74
6	1.15 x 0.82
7	1.39 x 0.97
8	1.63 x 1.12
9	1.88 x 1.26
10	2.13 x 1.40

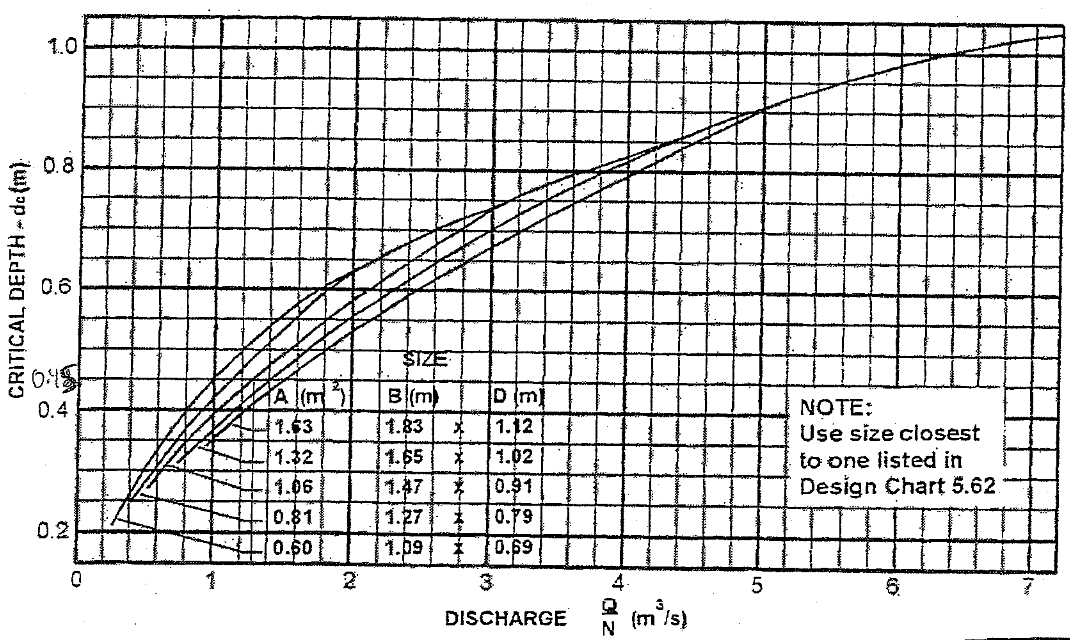


n = 0.024

Source: Herr (1977)

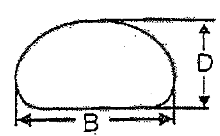
Design Chart 5.53: CSP Pipe Arch Culverts





($d_c \ngtr D$)

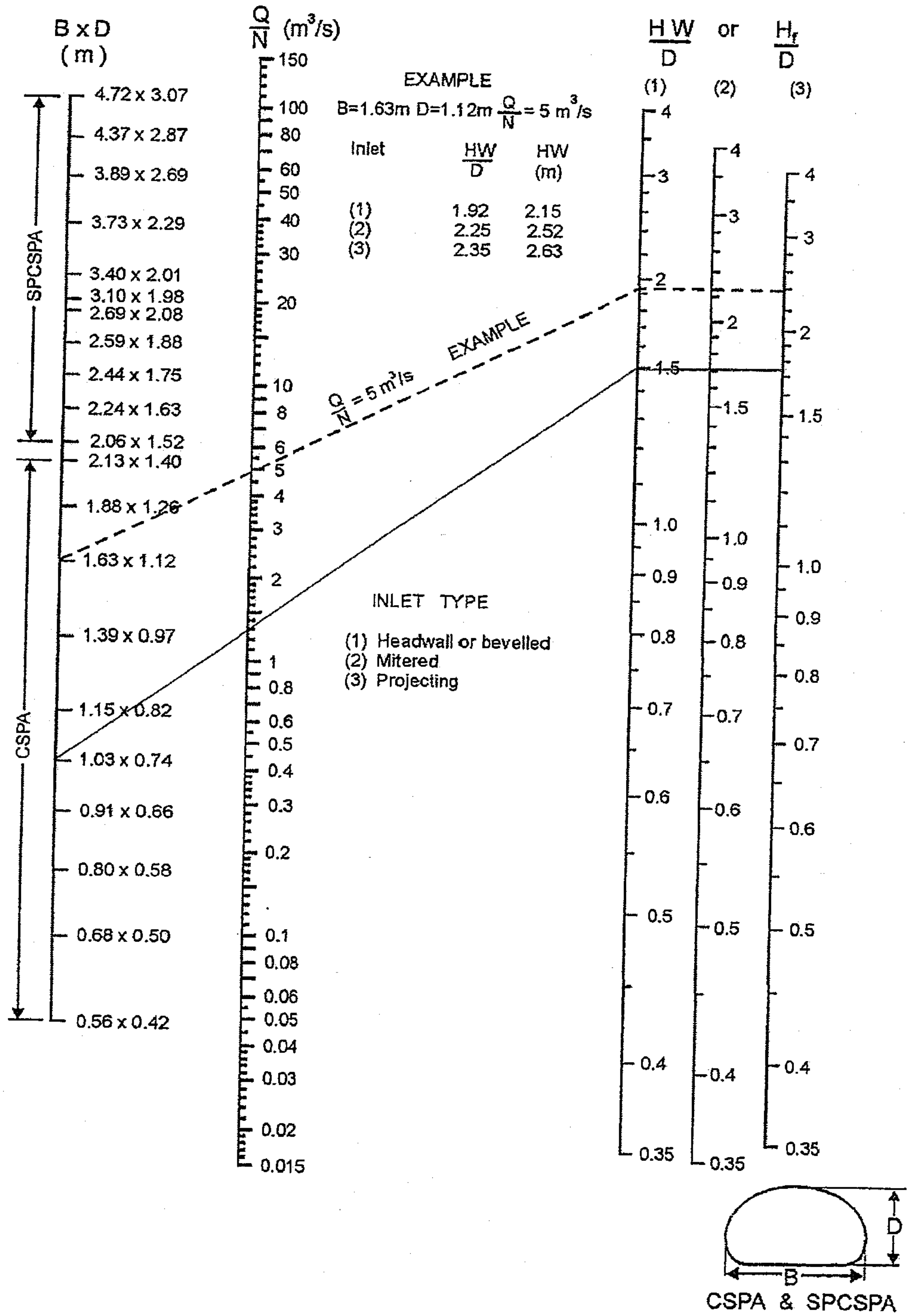
A = Cross-sectional area per barrel
interpolated for other sizes



Source: Herr (1977)

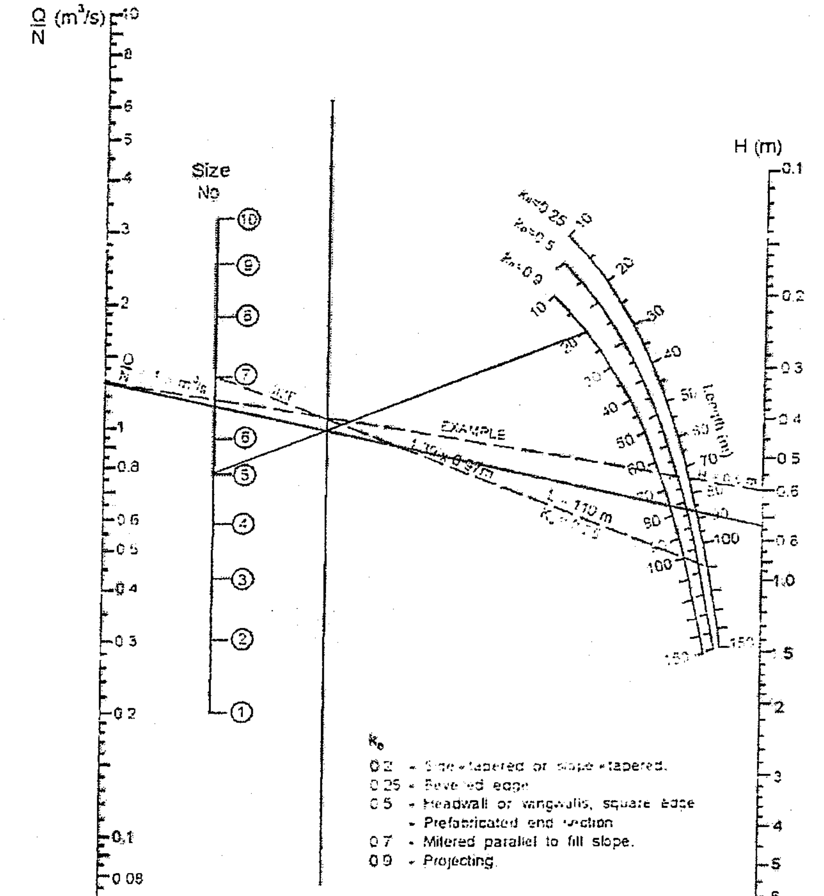
Culvert Crossing 22 - 19 2 x 1.03m x 0.74m

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts

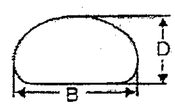


Source: Herr (1977)

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



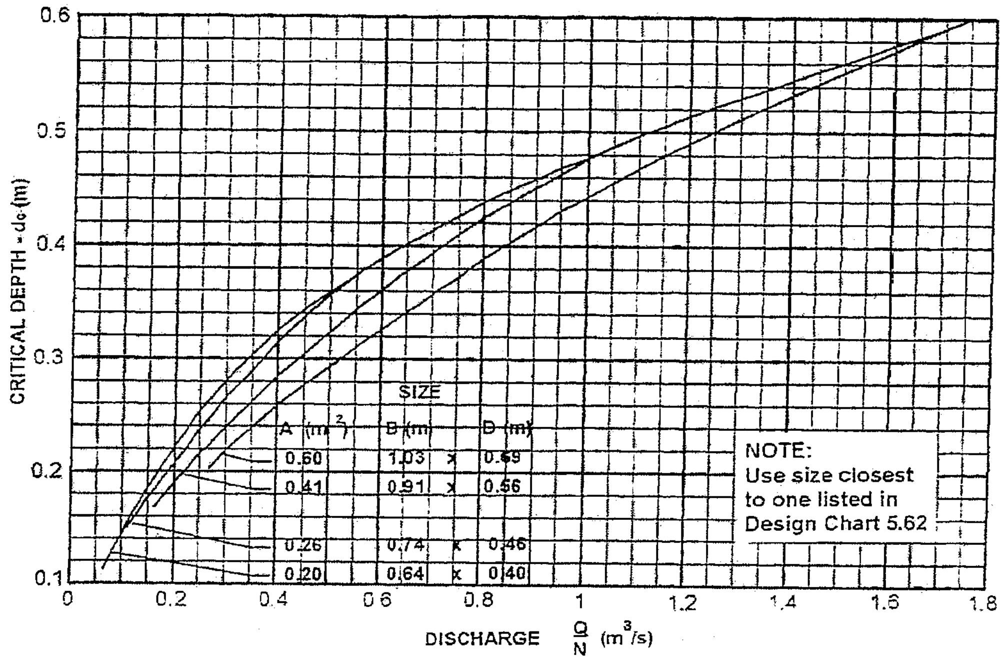
CSPA SIZES	
No	B(m) x D(m)
1	0.56 x 0.42
2	0.68 x 0.50
3	0.80 x 0.58
4	0.91 x 0.66
5	1.03 x 0.74
6	1.15 x 0.82
7	1.39 x 0.97
8	1.63 x 1.12
9	1.88 x 1.26
10	2.13 x 1.40

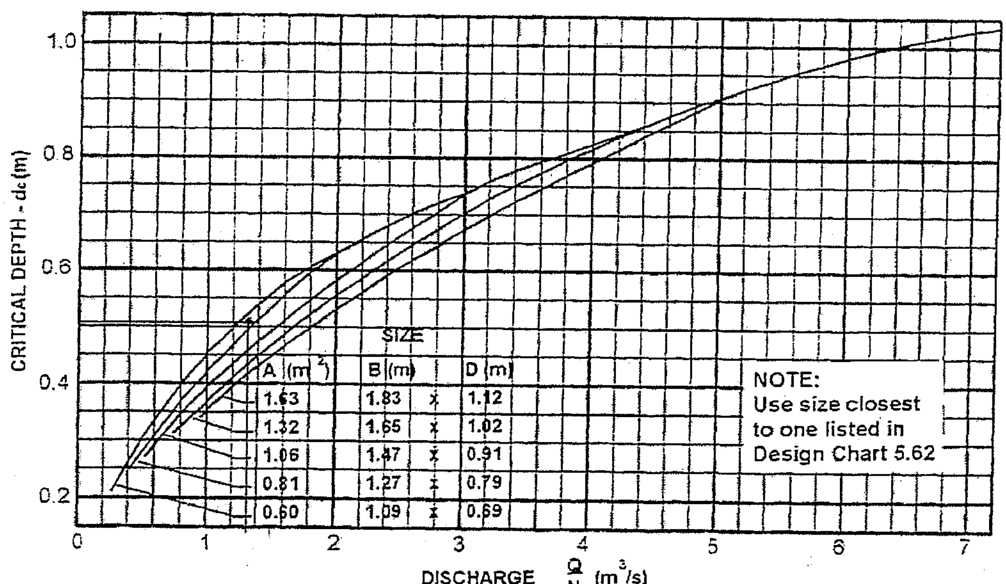


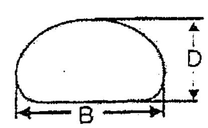
n = 0.024

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

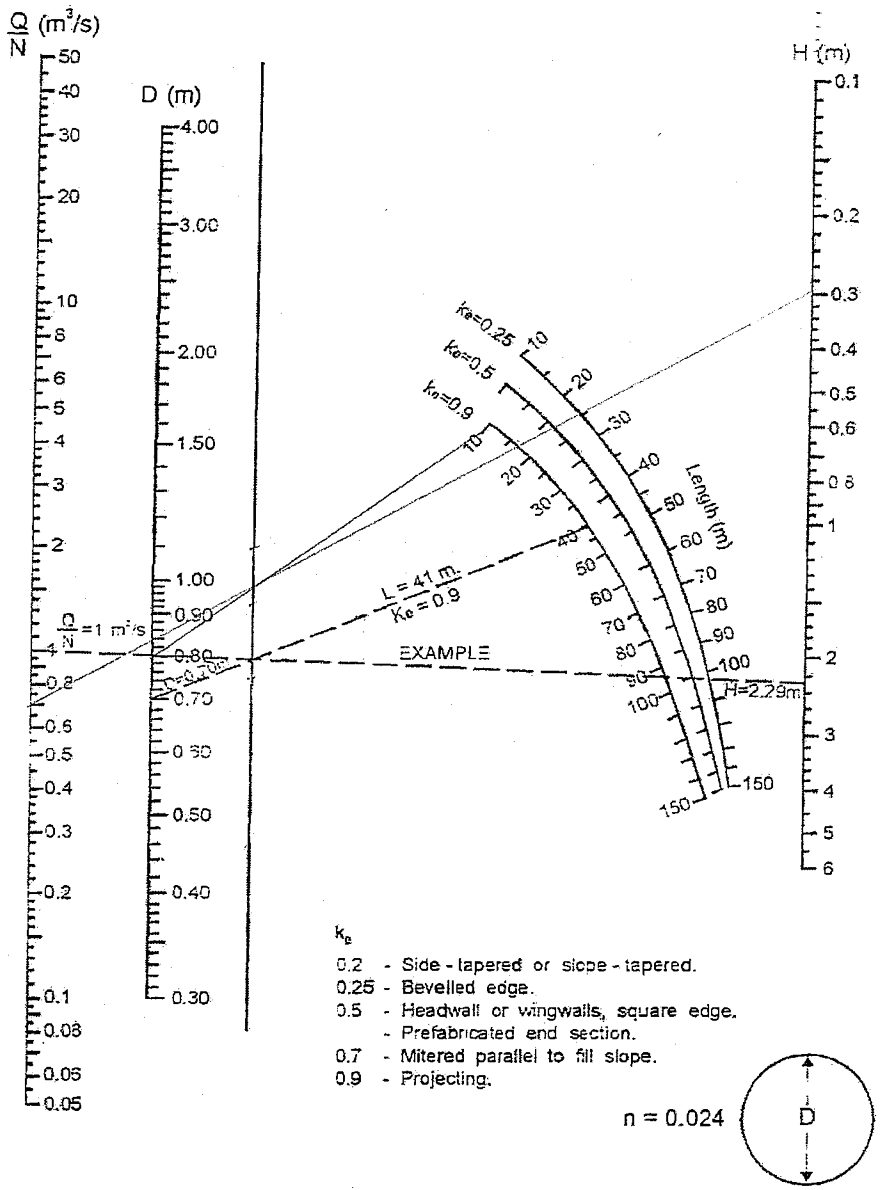
CONVENTIONAL CULVERT DESIGN

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 (m^3/s)	d (m)	d_e (m)	AHW (m)	Skew No.	L (m)	S (m/m)	Description	D or B x D (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	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	

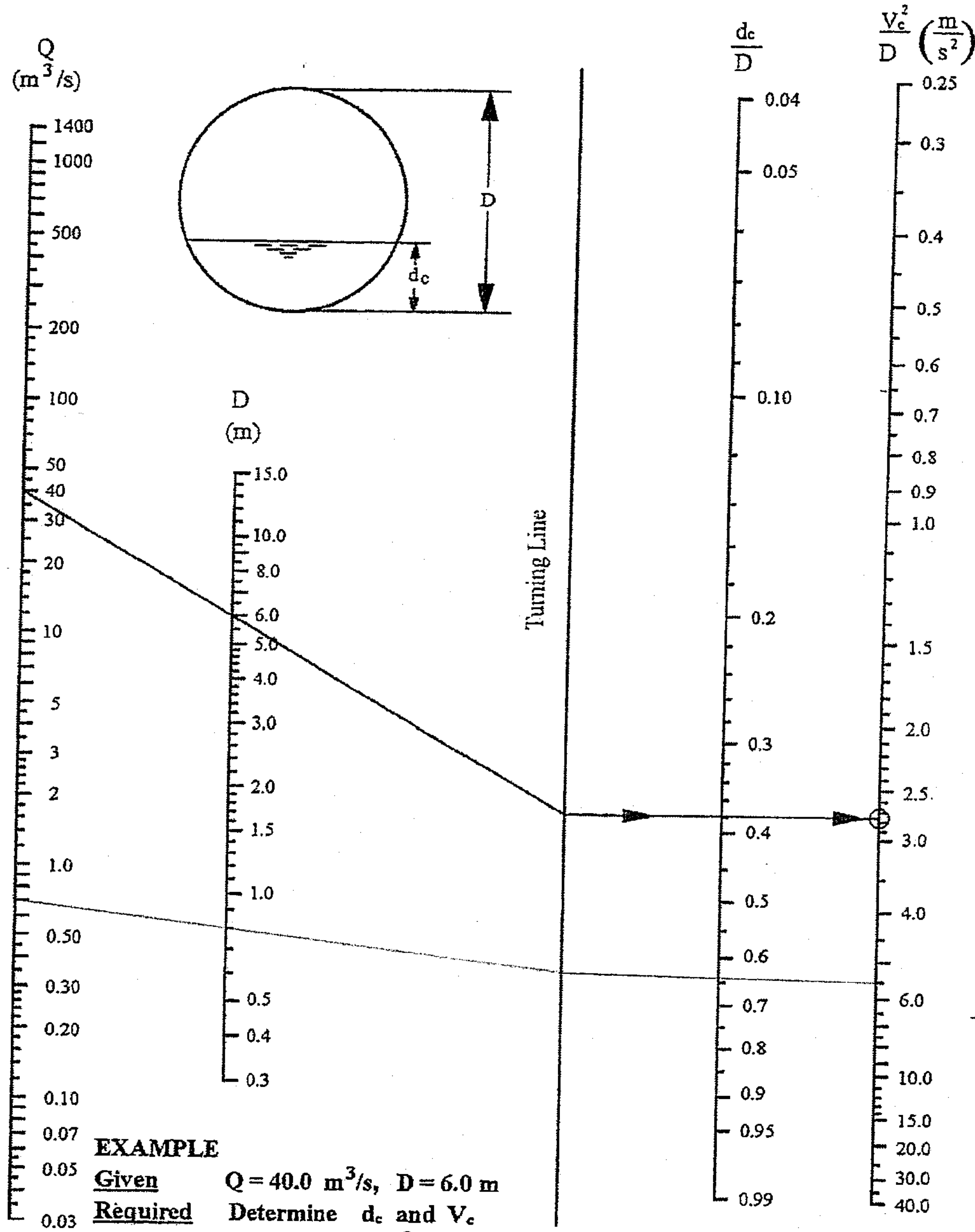
2 From Form PH-D-533, col. 12
3 Flood Depth
4 Embedment below channel invert
5 Col. 3 + col. 4 + allowable backwater
7 Allowance for skew if applicable
8 Culvert Slope
10 D (circular) or B x D (other)
11 Number of Barrels
13 Area per barrel
14 For box only
15 Charts D5-1A to C and E to J
16 HW = col. 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



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

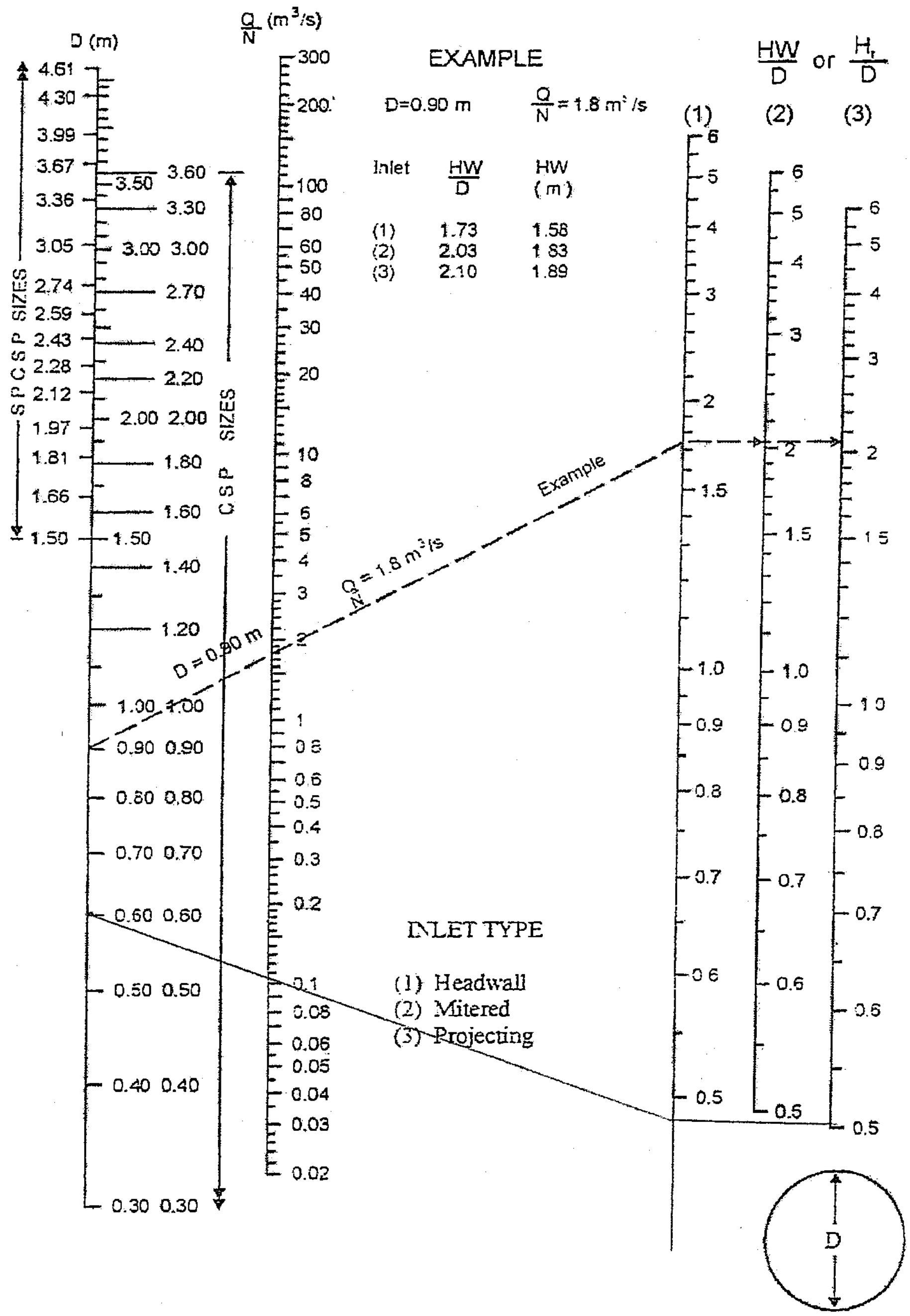
Required Determine d_c and V_c

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 600mm Ø

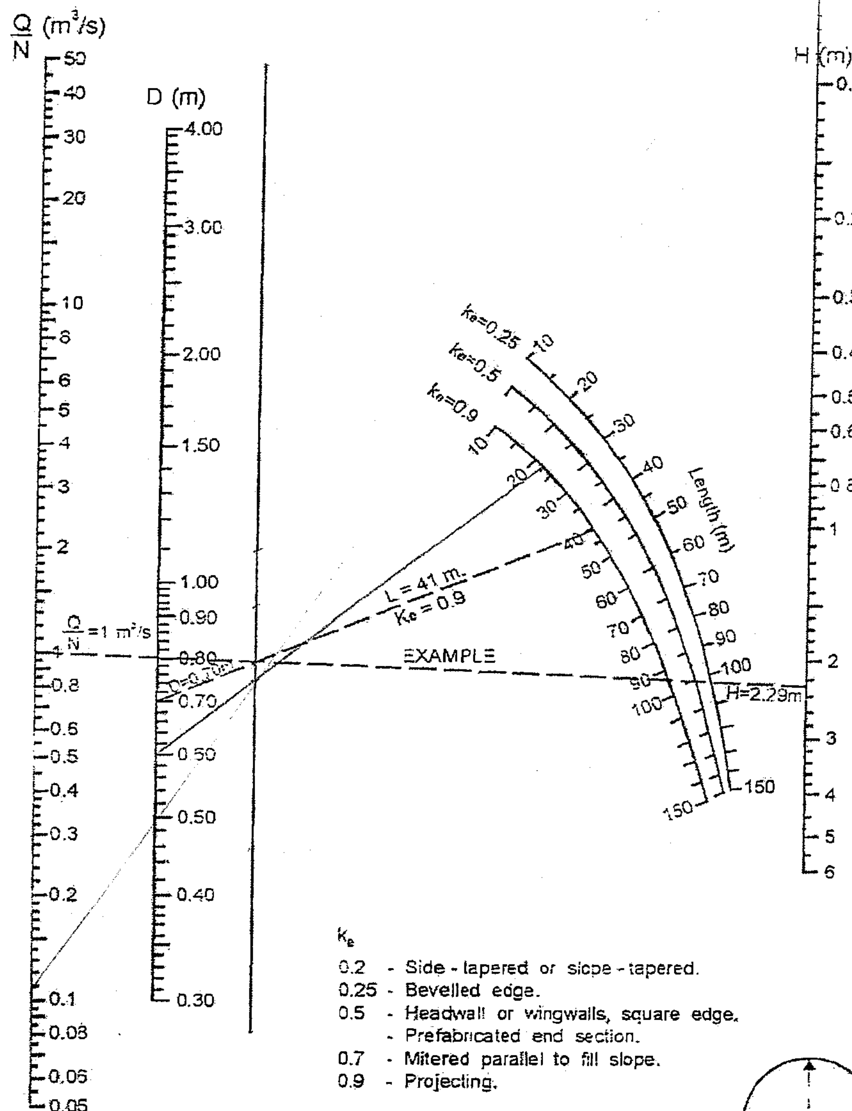
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

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

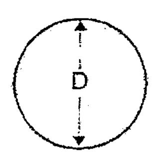
0.04



K_e

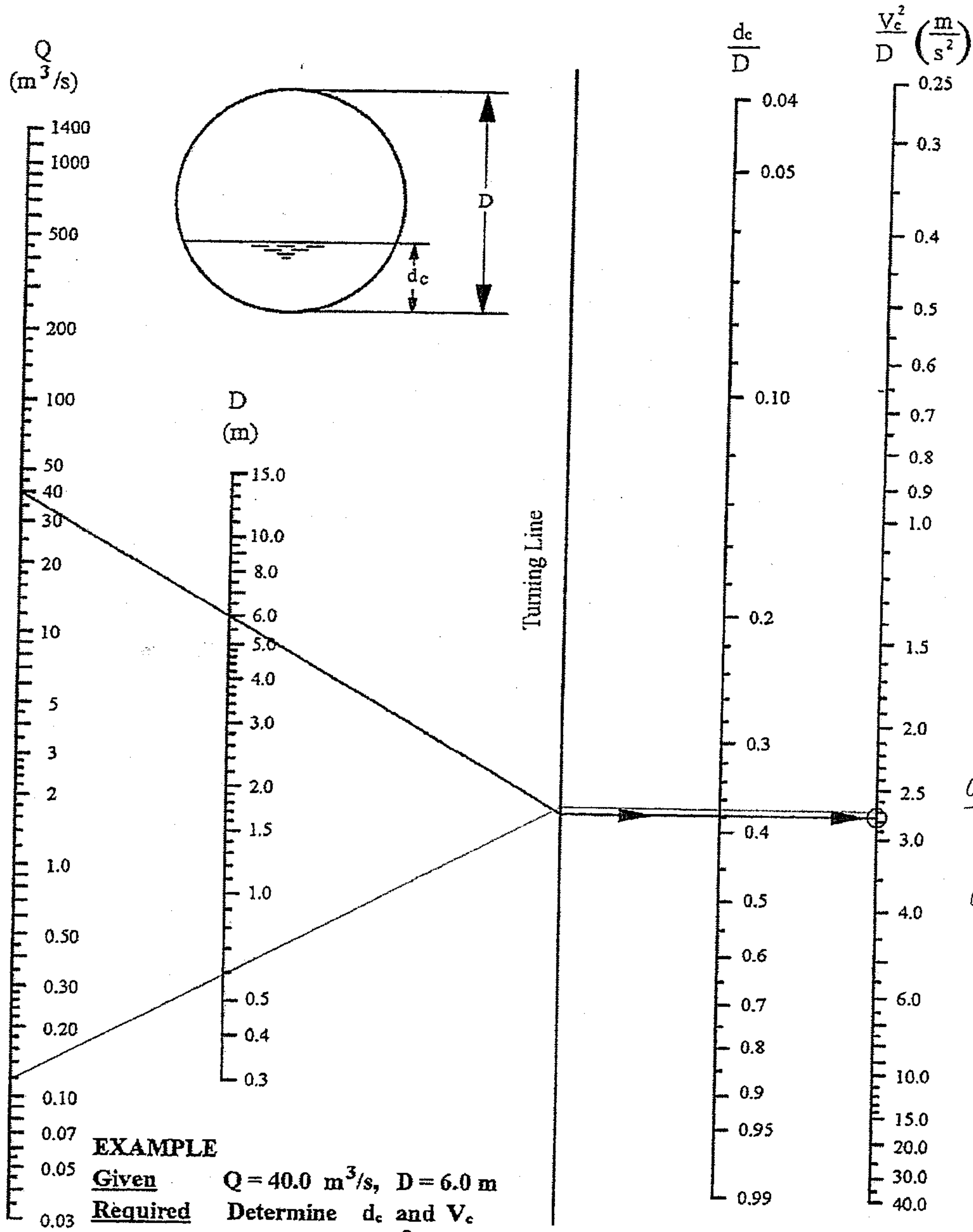
0.2 - Side - tapered or slope - tapered.
0.25 - Bevelled edge.
0.5 - Headwall or wingwalls, square edge.
 - Prefabricated end section.
0.7 - Mitered parallel to fill slope.
0.9 - Projecting.

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

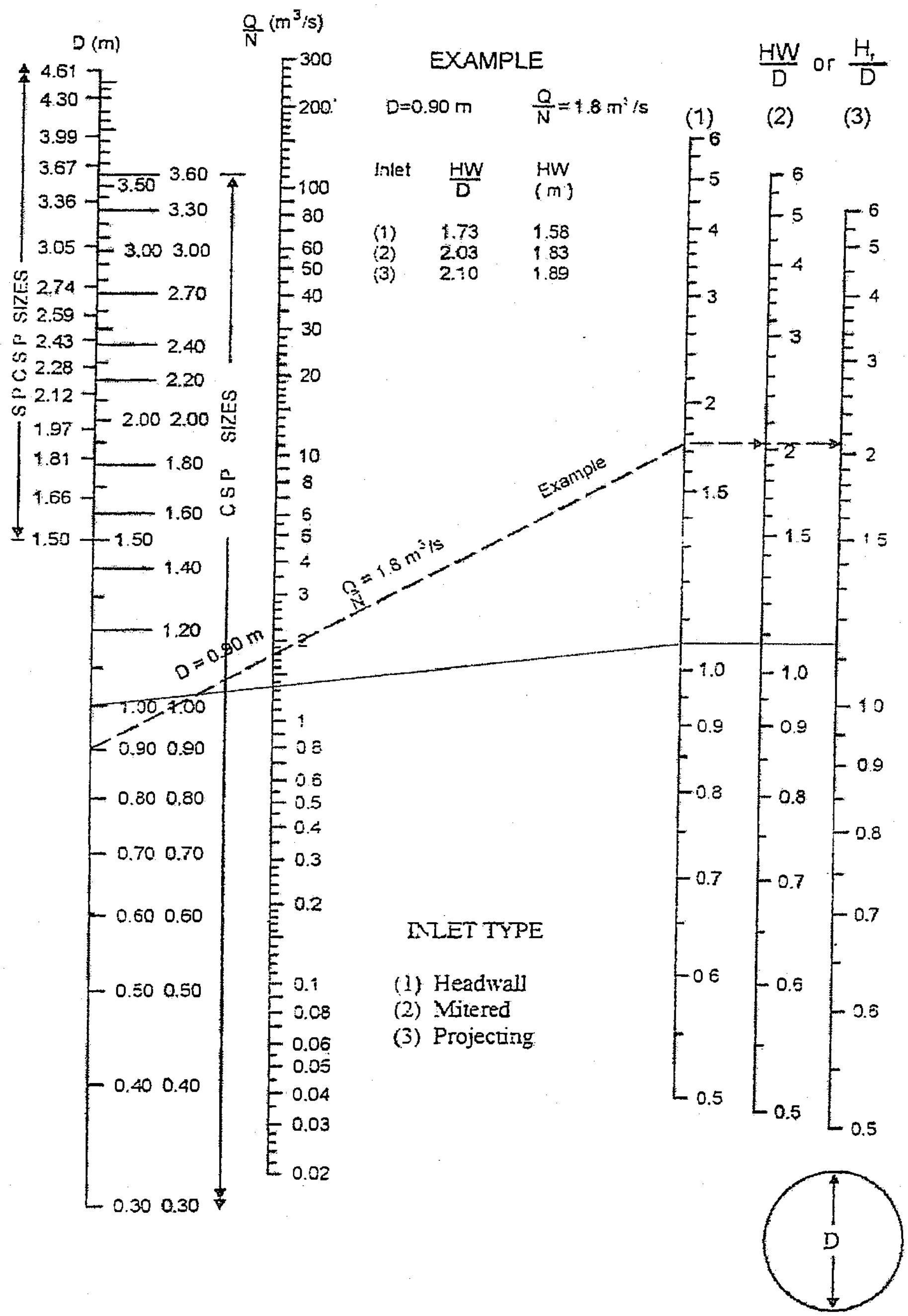
Required Determine d_c and V_c

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

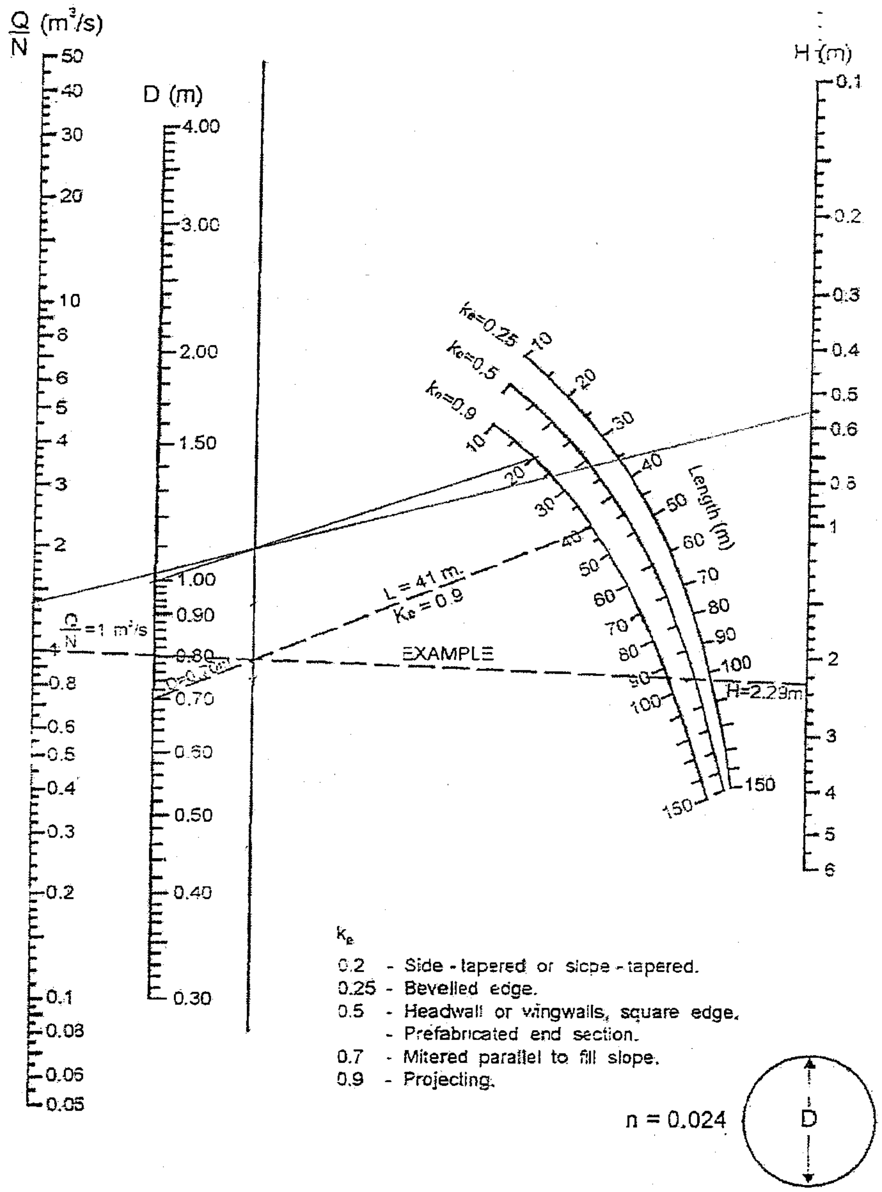
Culvert Crossing 14 to 23 1000mm Ø

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



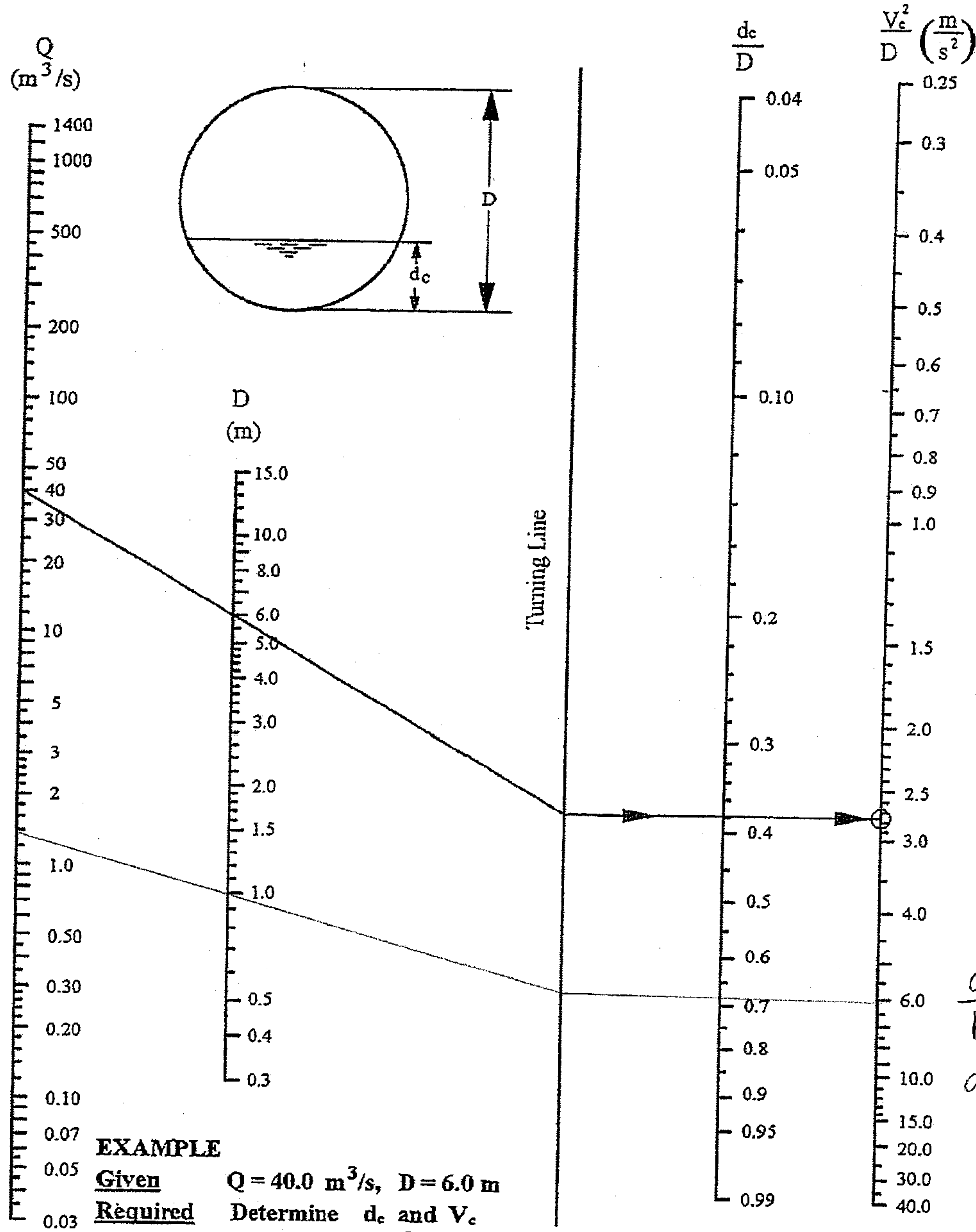
Source: Herr (1977)

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



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

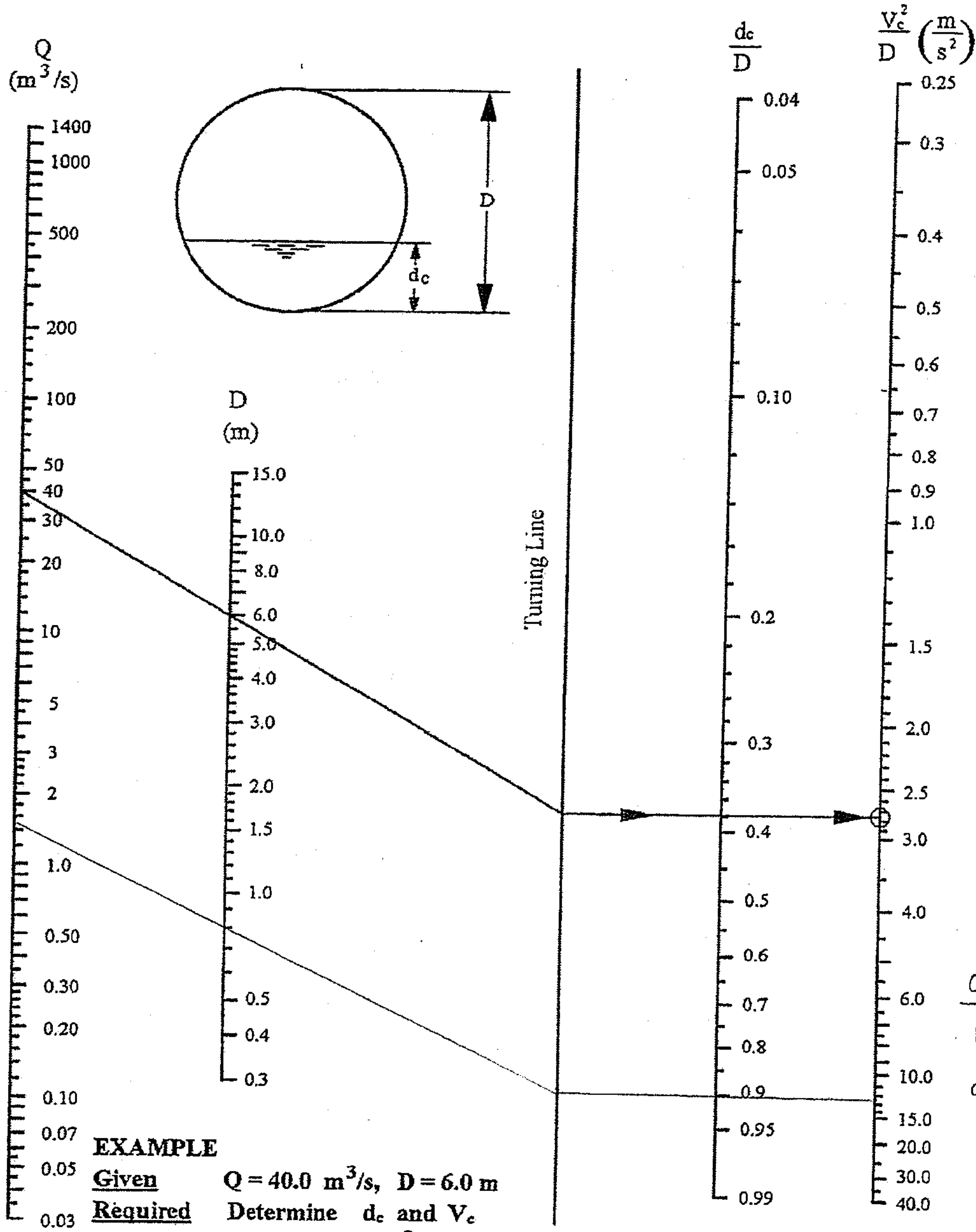
Given Q = 40.0 m³/s, D = 6.0 m

Required Determine d_c and V_c

Solution Join Q = 40.0 m³/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



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

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

$d_c = 0.90 \times 0.80$

$= 0.72$

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

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

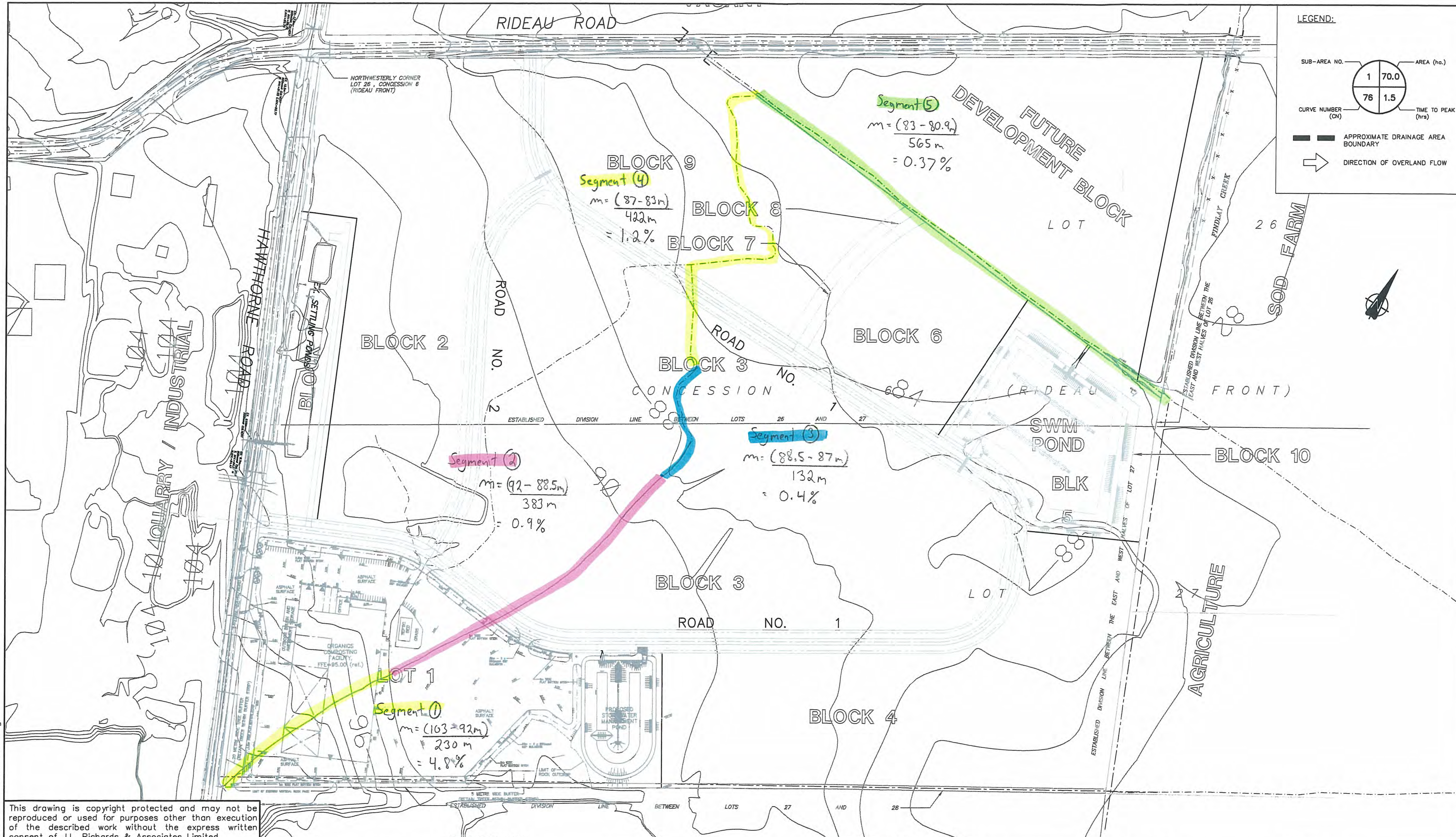
Gravel = 70% Impervious

Grass = 0% Impervious

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

= 70%

SHEET ____ OF ____



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

PROJECT: HAWTHORNE INDUSTRIAL PARK	DRAWING: 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: Jan 21, 2009	DRAWING NO.: FIGURE 2 JLR NO: 20983

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

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

$$= 4.8\%$$

Uplands Method Curve B - Woodland

Velocity = 0.32 m/s

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

$$= 719\ \text{sec}$$

Segment ②

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

$$= 0.9\%$$

Uplands Method Curve C - Pasture

Velocity = 0.21 m/s

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

$$= 1824\ \text{sec}$$

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

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

$$= 0.37\%$$

Uplands Method Curve F - Grassed waterway

$$\text{Velocity} = 0.28\ m/s$$

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

$$= 2018\ sec$$

$$\text{Total Time} = 1 + 2 + 3 + 4 + 5$$
$$= 719 + 1824 + 2640 + 898 + 2018$$

$$= 8099\ sec$$

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

$$= 5399\ sec$$

$$= 90\ min$$

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

--------------------------------------------------------------------------
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-------------------------------------------------------------------
* 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.
```

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-----------------------------------------------------------------------------
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=[21D](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  )   |     ========= 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-----------------------------------------------------------------------
*
*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:H1P08     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.

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```

```
 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.

-------------------------------------------------------------------------------
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  )    |     ========= 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      1.984     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
 =============================================================================
```

APPENDIX '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		AREA	VOLUME	VOLUME
Discharge Coeff. (C_d):	0.61	0.61	1.87		m^2	m^3	ha-m
ELEV. (m)	DISCH. (L/S)	DISCH. (L/S)	DISCH. (L/S)				
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   )   |     =========  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)=    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)    |     =========  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     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)    |     =========  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      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   )   |     =========  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)=    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)    |     =========  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     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)=        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.

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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     1.350    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   24.7D4 |   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    )  |    =========  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)=   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    )  |     =========  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     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)    |    =========  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    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     )  |     =========  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--------------------------------------------------------------------
---------------------
| 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.
```

```
--------------------------------------------------------------------------
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----------------------------------------------------------------------
 --------------------
 | 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   )   |    =========  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-----------------------------------------------------------------------
---------------------
| 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     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)    |     ========  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     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. <u>Application for Approval of Industrial Sewage Works</u> submitted by Ronald Tomlinson of R. W. Tomlinson Limited dated March 8, 2004;

2. <u>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</u> 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. OPERATIONS MANUAL

(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. CLOSED LOOP OPERATION

(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*

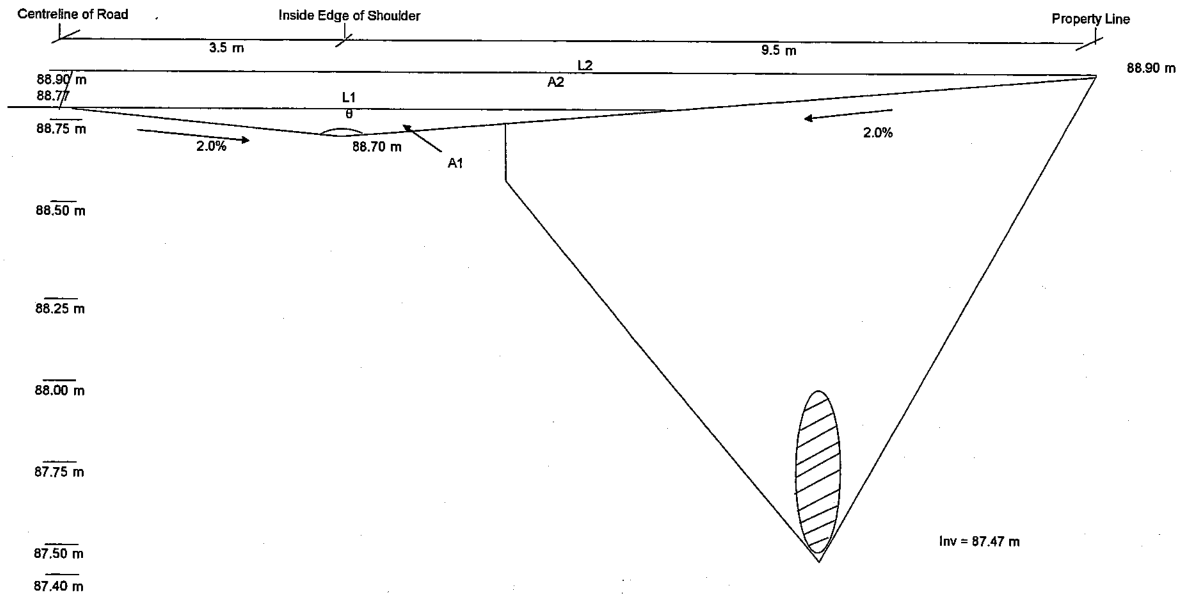
RC/
c: District Manager, MOE Ottawa
Nural Kuyucak, Golder Associates Ltd. ✓

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	use h = 88.9 - 88.77 = 0.13 m h = 0.13 m L3 = (L1 + L2) / 2 = 10m (Avg. Length)
L' = 6.99 m	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

A P P E N D I X '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.

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 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.

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 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

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 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.

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 001:0026-----------------------------------------------------------------------
      FINISH
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 *******************************************************************************
     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 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 within 15 days after receipt of this Notice, require a hearing by the Tribunal. 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 eachportion 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, 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 √

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Appendix C -
Hydrogeological Assessment

Hydrogeological Assessment Report

Proposed Commercial Development
Rideau Road and Somme Street
Gloucester Con 6 from Rideau River, Lot 26
Ottawa, Ontario

Prepared for: Consolidated Fastfrate (Ottawa) Holdings Inc.

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Appendices

1. Introduction

GHD Limited (GHD) is pleased to present the following hydrogeological report in support of a proposed commercial development at the intersection of Rideau Road and Somme Street in Ottawa, Ontario (herein referred to as "the Site"). The proposed development is to consist of a warehouse, cross-docks and office building, geographically located at Lot 26, Gloucester Concession 6 from the Rideau River. The Site covers an area of 7.02 hectares (17.35 acres) and will also consist of asphalt parking and storm water pond. The development will be serviced by a well and septic system. The Site consists of vacant parcel with evidence of fill (gravel, concrete, asphalt) observed on the ground surface. The surrounding lots in the area were in a similar condition.

This report has been prepared for the purposes of examining the hydrogeological characteristics of the Site and assessing the capacity of the on-site well to supply the proposed development and the potential impact to neighbouring properties. The scope of work was to identify the local hydrogeology of the Site including a desktop review of available geological and groundwater mapping and Ministry of the Environment, Conservation and Parks (MECP) well records; a water well survey within 500 m of the development, aquifer performance testing including analytical sampling; and single well response testing to determine hydraulic conductivity for purposes of construction dewatering. A septic assessment was not conducted in this report and the design is being completed by others.

1.1 Terms of Reference

GHD was retained by Consolidated Fastfrate (Ottawa) Holdings Inc. (the Client) to complete this hydrogeological assessment in accordance with our proposal reference no. 11216085 and dated November 6, 2020.

GHD (formerly Inspec Sol and Conestoga-Rovers & Associates) completed a Geotechnical Investigation and Phase II Environmental Site Assessment for the Site in 2008 and 2009, respectively; and a Geotechnical Investigation in 2020.

GHD has reviewed the following documents provided by the client as part of the investigation:

- Phase II Environmental Site Assessment and Hydrogeological Assessment, Report Ref. No. 045804 (12), by Conestoga-Rovers & Associates, dated September 2008;
- Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Report Ref. No. 08-1122-0215, by Golder Associates, dated December 2008;
- Geotechnical Study Subdivision Plan, Hawthorne Industrial Park, Report Ref. No. T020556-A1, by Inspec-Sol, dated May 4, 2009; and
- Stormwater Management Report. Hawthorne Industrial Park, Report Ref. No. JLR 20983, by J.L. Richards & Associates Limited, dated February 2009 (Revised May 2009).

2. Hydrogeological Assessment

2.1 Existing Conditions

The following sections provide details and discussion regarding the existing conditions of the Site.

2.1.1 Assessment Overview

The location of the Site relative to nearby roads and watercourses is illustrated on the mapping entitled Site Location Plan, Figure 1. The mapping shows the Site is undeveloped. The areas to the north, east and south are currently privately serviced. To the west is a quarry development and additional industrial / commercial properties that are municipally serviced. Plans and figures are discussed throughout this report and provided following the text.

A field program was completed consisting of a site inspection; aquifer performance testing and observation well monitoring; well survey; and, single well response testing in support of the proposed development. A preliminary concept plan was provided to GHD that illustrated a 4,650 square metre (m^2) (50,000 square feet or s.f.) warehouse; a 1,860 m^2 (20,000 s.f.) cross-docks and 280 m^2 (3,000 s.f.) office area with asphalt parking, stormwater pond, underground water tanks and a septic bed area. The concept plan is provided as Figure 2. As the concept plan is preliminary, locations of the well, building, septic, stormwater pond etc may be subject to change; however, the final locations will need to respect the setback distances required by the Ontario Building Code.

The hydrogeological assessment consisted of performing a pumping test of an existing drilled well at the Site known as test well TW-2 and monitoring of various observation wells including a private domestic well. The locations of the test well and observation wells is illustrated on the Well Location Plan, Figure 3.

The field work was conducted on November 19 and 20, 2020 by GHD to observe the general surficial characteristics of the Site, neighbouring lands and complete the pumping and hydraulic testing. The Site consists of undeveloped lands. GHD observed the test well and various production and monitoring wells in the vicinity of the Site. No surface water was observed on the Site. Photographs are provided in Appendix A.

Surrounding land use within 500 m of the Site are:

- East – undeveloped lands;
- West – undeveloped lands; Hawthorne Road then industrial properties (Tomlinson Rideau Quarry and Plant; LaFarge);
- North – Rideau Road, forested area then residential lots; and
- South – Somme Street; undeveloped lands then industrial / commercial lots (gated equipment lay-down yard and stormwater ponds; then Renewi Canada Ltd.).

Within 500 m of the proposed development, one residential lot was observed at 4885 Hawthorne Road.

2.1.2 Topography and Drainage

Regional topography is illustrated on Figure 4. The Site is relatively flat with the regional topography sloping from south to north. Topographic relief is on the order of 3 to 4 metres across the Site. Shallow groundwater flow is expected to follow the local topography.

Drainage of surface water is directed towards ditches alongside the Site. Drainage is generally to the east / northeast.

2.1.3 Physiography

The Site is situated within the physiographic region known as the Russell and Prescott Sand Plains. In the United Counties of Prescott and Russell, and the Regional Municipality of Ottawa-Carleton, there is a group of large sand plains separated by the clays of the lower Ottawa Valley. The plains cover an area of nearly 1500 square kilometers and a level surface of about 85 metres above sea level. The plains were originally a continuous delta that was built by the Ottawa River into the Champlain Sea. The plains are as thick as 6 to 10 m in some areas (Chapman and Putnam, 1984). The local physiography is illustrated on Figure 5 showing the Site is within a sand plains with Peat and Muck to the north and Limestone Plains to the west.

2.1.4 Geology and Soils

Surficial geology mapping on Figure 6 indicates the Site is a mix of organic deposits, Paleozoic bedrock and coarse textured glaciolacustrine deposits. The Quaternary geology (Figure 7) suggests carbonate and clastic sedimentary rock exposed at surface or covered by a discontinuous thin layer of drift. Bedrock outcrops are common in the area. Based upon GHD's previous geotechnical work (GHD, 2020), the upper soils are comprised of fill. Underlying the fill is native silty sand / sandy silt followed by a glacial till (GHD, 2020). Bedrock was found at 8.5 metres below ground surface (mbgs) based upon the well record for TW-2 at the Site.

The bedrock is Dolostone / Sandstone of the Beekmantown group (Figure 8). Golder's report also outlined the Gloucester Fault, a major northwest-southeast trending, steeply dipping structural feature in close proximity and northeast of the Site.

Based upon the well records reviewed within 500 m of the Site, bedrock was encountered within the drilled production wells at depths between ground surface and 8.5 mbgs.

2.1.5 Description of Surface Water Features

There are no surface water features on the Site.

2.1.6 MECP Well Records

Information regarding groundwater characteristics of the immediate area was obtained from an inventory of existing MECP well records. A total of seventeen (17) well records were identified within 500 m of the Site for statistical breakdown. A summary of the MECP well records and their locations are provided in Appendix B and summarized in Table 2.1.

The well records indicate a mix of overburden materials (fill, sand, clay, gravel etc.) overlying bedrock including shale, sandstone, limestone and quartz. Based upon the well records, there is one (1) primary bedrock aquifer in this immediate area that is tapped by drilled wells. Of the 17 records, seven (7) are for monitoring wells and will not be considered further within this discussion.

The groundwater was generally described as "fresh" in the well records reviewed. The information from the MECP data indicates that all ten (10) wells were drilled bedrock wells averaging a depth of about 41 m. The bedrock wells encountered water at an average depth of 31 m with pumping rates averaging nearly 100 L/min. No flowing artesian wells were reported.

No dug / bored well records were reviewed. Shallow dug / bored wells are susceptible to large seasonal fluctuations in the groundwater. The result is that shallow wells are also more prone to becoming dry in the winter and summer months. From a quality perspective, shallow dug / bored wells are generally difficult to seal at the surface and therefore considered to be susceptible to shallow sources of contamination and are not recommended for this commercial development.

Table 2.1: Summary of Information from MECP Well Records

Total Number of Wells Inventoried:	17
Dug/Bored Wells:	0 (0%)
Drilled Wells (Overburden):	0 (0%)
Drilled Wells (Bedrock):	10 (59%)
Monitoring Wells*:	7 (41%)

Parameters	Statistical Summary					
	Dug / Bored Wells		Drilled – Overburden		Drilled – Bedrock	
WELL YIELDS						
Range	--	--	--	--	19 to 680 L/min	5 to 180 USgpm
Average	--	--	--	--	99.1 L/min	26.2 USgpm
REPORTED YIELDS	Frequency		Frequency		Frequency	
Not Reported	0	0%	0	0%	0	0%
Dry	0	0%	0	0%	0	0%
0 to 1 USgpm	0	0%	0	0%	0	0%
2 to 4 USgpm	0	0%	0	0%	0	0%
5 to 9 USgpm	0	0%	0	0%	6	60%
≥10 USgpm	0	0%	0	0%	4	40%
STATIC WATER LEVELS						
Range	--	--	--	--	2.3 to 14.2 m	7.5 to 46.6 ft
Average	--	--	--	--	8.4 m	27.6 ft
WATER ENCOUNTERED						
Range	--	--	--	--	9.1 to 75.0 m	30 to 246 ft
Average	--	--	--	--	31.2 m	103.5 ft
WELL DEPTH						
Range	--	--	--	--	17.4 to 75.6 m	57 to 248 ft
Average	--	--	--	--	40.8 m	133.9 ft

Notes: Data based on MECP well record information (refer to Appendix B for well information).
*Monitoring wells are not included in the statistical data summarized in Table 2.1

2.1.7 Well Survey

A well survey was conducted. There was one home within 500 m of the Site at 4885 Hawthorne Road. This residential dwelling utilizes a drilled well that is 10.9 metres deep. The owner indicated they had resided at the home for about 3 months and that the water had a sulphur odour and was of sufficient quantity. No other issues were identified. The owner also provided authorization to use the well for monitoring purposes during our pumping test.

2.1.8 Groundwater Levels

Water levels were obtained from the test well, observation wells and neighbouring residential well on November 19, 2020 prior to the commencement of the pumping test. The data is summarized in Table 2.2. Based upon the water levels obtained from the drilled production wells, the groundwater flow tapped by the drilled wells is in a southeasterly direction. Shallow groundwater flow tapped by monitoring wells was not assessed.

Table 2.2: Water Level Summary

Location	Ground Elevation* (masl)	Depth of Well (mbgs)	Water Level (mbgs) November 19, 2020	Potentiometric Elevation (masl)
TW-2	90	34.9	6.90	83.1
MW7-08	90	5.9	3.00	87.0
MW1-20	90	7.0	3.80	86.2
A305146	90	> 30	7.00	83.0
4885 Hawthorne	85	10.9	1.23	83.8
TW-5	90	29.9	7.23	82.8
Well 1514733	100	35.4	12.36	87.6

Notes:
masl = metres above sea level
*Elevations estimated from topographic contours provided on Figure 4. The elevations provided are for the purposes of evaluating potentiometric elevations and should not be relied upon as a legal survey or topographic elevation survey.

2.2 Aquifer Performance Assessment

The following sections discuss the test well, pumping test results and coefficients, well interference and water quality.

2.2.1 Test Well Information

The following sections discuss the test well utilized for the aquifer performance testing. For this project, an existing production well was utilized for assessment of the local aquifer via a pumping test. Based upon the location of the well and location identified on the well record, it is GHD professional opinion that the test well record provided in Appendix B is TW-2. The existing well is a drilled well constructed by Capital Water Supply Ltd. (MECP License No. 1558) and completed in on August 8, 1993. The test well is located on Figure 3 and is identified as TW-2. Adjacent water production wells, monitoring wells and a residential well that were monitored during testing are also illustrated on Figure 3.

Test Well TW-2

Test well TW-2 has the following characteristics based upon the well record filed with the MECP:

- Drilled to total depth of 30.5 mbgs (100 feet). GHD measured the actual well depth to be 34.9 mbgs. The well record indicates overburden materials consisting of brown sand with stone to 1.5 m and hardpan with boulders from 1.5 m to 8.5 m. The well is confined with the sandstone between 8.5 m and 30.5 m;
- Water was encountered at 17.7 mbgs and 26.8 mbgs and was not tested;
- The well was tested by the drillers at 75.6 litres per minute or L/min (20 gallons per minute or gpm) resulting in a drawdown of 2.1 m or about 7% of the available drawdown. The well is recommended for pumping at 18.9 L/min; and
- Construction was completed in August 1993. Constructed with steel casing to 11.9 mbgs (39 feet) then open hole to the bottom of the well. From grade to 11.4 mbgs (37.5 feet) the annular space was grouted and sealed with cement.

2.2.2 Discussion of Pumping Test

A pumping test was conducted at TW-2 on November 19, 2020 to assess aquifer conditions and confirm the availability of a suitable groundwater resource for the proposed commercial development. A pumping test was conducted for six (6) hours at a constant rate of 60 L/min (15.9 gpm). Recovery measurements were collected after the pumping was completed.

A submersible pump was used in the well to conduct the testing. Water levels in the test well and adjacent observation and monitoring wells were monitored throughout the aquifer performance testing manually and through the use of data loggers to evaluate drawdown, recovery and the potential of mutual interference with adjacent wells. The discharge water was directed away from the pumped well a distance of about 30 m downgradient. This practice safeguards against artificial recharge of the well from occurring during the pumping test.

The test well was chlorinated in advance of the pumping test. Chlorine levels were confirmed in the field prior to bacteria sampling conducted at the test well. The residual chlorine was at trace levels or non-detect prior to obtaining the bacteriological samples.

Water samples were collected and submitted to an accredited analytical laboratory for testing. The analytical data is provided in Appendix C.

Field measurements of methane, pH, temperature, free chlorine, turbidity, and conductivity were completed with a turbidity meter, Hach Pocket Pro+ Multi 2 and chlorine meter. Calibration of the instruments was completed prior to the pumping test. The field measurements are provided in Appendix D on Figure D-3.

The results of the constant rate pumping tests including field testing data are graphically presented in Appendix D. Pumping test information is summarized in Table 2.4.

Test Well TW-2

The water level during the pumping test at TW-2 is illustrated on Figures D-1 and D-2 showing water level versus time. The plot shows the water level very slowly lowering over the course of the testing at 60.0 L/min. After six hours of pumping, the water level was about 9.0 metres below top of pipe (mbtp). The drawdown was about 1.15 m over the course of the testing with about 23.9 m of available drawdown above the pump remaining. Approximately 4.6% of the available drawdown was used during the pumping test. A total groundwater volume of 21,600 L was pumped during the testing. Based upon the preliminary septic design flow calculations, about 10,000 L/day has been estimated. Actual groundwater usage is expected to be much less than 10,000 L/day for the warehouse and offices.

Recovery measurements were collected manually for 60 minutes after pumping ceased. The water level recovered about 46% in one (1) hour and fully recovered 100% in 13.5 hours. The estimated transmissivity for TW-2 was 47.6 m^2/day (3193 gpd/ft) based on the drawdown and 46.4 m^2/day (3115 gpd/ft) based on the recovery period and represents a high transmissivity. The specific capacity for this well is calculated to be 52.6 L/min/m based upon the pumping test completed.

The plotted data indicates the aquifer that this well is tapped into can safely provide long-term quantities of groundwater at a pumping rate of 60 L/min (15.9 gpm) based upon the pumping test completed.

Pumping tests were completed previously at TW2 in 1994 and 2008 and documented by Golder in 2008. Previous testing was completed at 67 L/min and 55 L/min in 1994 and 2008, respectively. The drawdowns of these tests were similar to our drawdown at 1.18 m in 1994 and 1.2 m in 2008. Static water levels were also similar 3.15 mbgs in 1994 and 6.90 mbgs in 2020, indicating that development in this area including quarries on nearby properties has not resulted in significant negative effects to the water supply well at the Site.

2.2.3 Summary of Aquifer Performance

Table 2.3 summarizes the data and coefficients obtained from the pumping test.

Table 2.3: Aquifer Performance Testing Summary

WELL No.	STEP No.	YIELD		TEST TYPE	TIME	MAXIMUM DRAWDOWN		AVAILABLE DRAWDOWN*		SPECIFIC CAPACITY		ESTIMATED TRANSMISSIVITY	
		gpm	L/min		minutes	feet	metres	feet	metres	gpm/ft	L/min/m	gpd/ft	m^2/day
TW-2	1	0	0	Static	0	0	0	82.1	25.0	---	---	---	---
	2	10	60.0	Const.	360	3.7	1.15	78.4	23.85	4.2	52.6	3193	47.6
	3	0	0	Recvy.	46% recovery in 60 minutes; 100% recovery in 13.5 hours							3115	46.4

Notes:
gpm = gallons per minute; gpd/ft = gallons per day per foot
“Recvy” refers to Recovery measurements; “Const” refers to the Constant Rate test conducted for 360 minutes.
*Available Drawdown refers to the height of water in the well above the pump.
Static water level at TW-2 was 7.83 metres below top of pipe (6.90 metres below ground surface).

2.2.4 Test Well Water Quality

Groundwater samples for laboratory testing were collected during the course of the pumping test for the purpose of water quality analyses. The well was sampled after one (1) hour into the constant rate test and at the end of the test on November 19, 2020. The water samples were delivered to Paracel Laboratories Ltd. in Ottawa, an accredited laboratory, for chemical analyses. The bacteria parameters of E.coli, Total Coliform and Fecal Coliform were re-sampled on December 10, 2020 to confirm the initial bacteria results were non-detect (i.e. zero colony forming units). Certificates of chemical analyses are presented in Appendix D. The water quality data are summarized and compared with the Ontario Drinking Water Standards (ODWS) in Table 2.4.

Table 2.4: Test Well Water Quality Summary

PARAMETER	Test Well TW-2			ODWS	
	1 hour (Nov. 19, 2020)	End of test (Nov. 19, 2020)	TW-2 Re-Test** (Dec. 10, 2020)	MAC	AO/OG
Alkalinity (as $CaCO_3$)	269	267	--	--	30 to 500
Ammonia as N	0.25	0.25	--	--	--
Dissolved Organic Carbon	2.4	2.2	--		
Calcium	154	153	--	--	--
Chloride	91	94	--	--	250
Colour (ACU)	67	68	--	--	--
Conductivity (mS/cm)	1390	1380	--	--	--
Fluoride	0.3	0.3	--	1.5	--
Hardness (as $CaCO_3$)	**633**	**632**	--	--	80 to 100
Iron	**0.739**	**0.699**	--	--	0.3
Magnesium	60.6	60.9	--	--	--
Manganese	**0.176**	**0.180**	--	--	0.05
Nitrite as N	<0.05	<0.05	--	1.0	--
Nitrate as N	<0.1	<0.1	--	10	--
pH (units)	7.8	7.7	--	--	6.5 to 8.5
Potassium	9.55	9.77	--	--	--
Phenolics	<0.001	<0.001	--	--	--
Sodium	69.2*	68.6*	--	--	200
Sulphate	378	389	--		500
Sulphide	<0.02	<0.02	--	--	0.05
Tannin and Lignin	<0.1	<0.1	--	--	--
Total Dissolved Solids	**930**	**940**	--	--	500
Total Kjeldahl Nitrogen	0.3	0.4	--	--	--
Turbidity (NTU)	**10**	**9.5**	--	--	5
E. coli	--	ND (<10)	0	0	--
Total Coliform	--	ND (<10)	0	< 6	--
Fecal Coliform	--	ND (<10)	0	0	--
Heterotrophic Plate Count	--	<10	--	--	--

Notes:
Units are mg/L unless otherwise stated; "<" indicates concentrations are less than laboratory reporting limits
MAC = maximum acceptable concentration
AO / OG = aesthetic objective / operational guideline
Bold / shaded indicates the concentration exceeds the ODWS AO / OG. There are no exceedances of MAC (health related).
*The aesthetic objective for sodium in drinking water is 200 mg/L. When the sodium concentration exceeds 20 mg/L, this information should be communicated to those on sodium restricted diets.
**Re-tested at SGS Laboratory to confirm bacteria was non-detect.

The laboratory analyses confirmed that there were no health-related parameter exceedances of the ODWS. In general, the test results indicate the majority of parameters meet the ODWS with several exceedances of aesthetic objectives:

- Hardness;
- Total Dissolved Solids;
- Turbidity;
- Manganese; and
- Iron.

Elevated hardness is related to the overburden materials containing calcium and to a lesser extent, magnesium. Elevated hardness and iron are common traits of groundwater supplies in Southern Ontario and can be treated using commercially available treatment equipment such as a water softener.

The bacteria results were reported by Paracel as non-detect (i.e. <10 colony forming units per 100 mL (CFU)). GHD collected a re-sample from the well on December 10, 2020 to confirm that the bacteria results were non-detect. The sample was collected after pumping a well volume from the well and submitting the sample to SGS Environmental Laboratory in Lakefield, ON. The residual chlorine was measured in the field prior to testing and confirmed to be less than 0.05 mg/L.

As a proactive measure, GHD recommends that bacteriological treatment (i.e. ultraviolet (UV) treatment) be used at a minimum. As it is anticipated that this well system will be regulated and will require treatment to meet appropriate standards to ensure potable water is available to employees and visitors.

To supplement the analytical data, field measurements were obtained throughout the pumping test by GHD. At the end of the pump test, the groundwater at the well head had a conductivity of 1.2 mS/cm, a water temperature of 9.2 degrees Celsius, a pH of 6.65 and turbidity of 1.4 NTU. There was no methane detected within the water.

2.2.5 Well Interference

The potential for hydraulic connection between the test well TW-2 and neighbouring wells was monitored during the pumping test to assess the potential for hydraulic connection and well interference and overall impact on the aquifer with increased groundwater usage. Water levels were recorded of the observation wells during the pumping test and is provided in Appendix E. The approximate linear distances between the test well and observation wells are provided in Table 2.5.

Table 2.5: Distance Between Pumping Well and Observation Wells

Location	Distances between Test Wells and Observation Wells in metres						
	TW-2	TW-5	4885 Hawthorne	Well 1514733	Well A305146	MW1-20	MW7-08
TW-2 (test well)	---	555	635	495	130	125	10
TW-5	555	---	1185	785	450	670	550
4885 Hawthorne	635	1185	---	675	735	510	640
Well 1514733	495	785	675	---	450	430	520
Well A305146	130	450	735	450	---	225	145
MW1-20	125	670	510	430	225	---	145
MW7-08	10	550	640	520	145	145	---

Notes:
Distances based upon locations identified on Well Location Plan, Figure 3.
MW = monitoring well; TW = test well

The following table illustrates the maximum drawdowns that were observed in the test well and adjacent neighbouring wells during the pumping test.

Table 2.6: Maximum Drawdowns in Pumping and Observation Wells

PUMPING WELL		OBSERVATION WELLS	
LOCATION	MAXIMUM DRAWDOWN AT PUMPING WELL(m)	LOCATION	DRAWDOWN AT OBSERVATION WELL(m)
TW-2	**1.15**	TW-5	~0.03
		4885 Hawthorne	~0.03
		Well 1514733	0
		Well A305146	~0.95
		MW1-20	0
		MW7-08	0

2.2.5.1 Interference Assessment

During the pumping test, data loggers were installed within nearby production wells (TW-5, Well 1514733 and Well A305146); a residential well (4885 Hawthorne Road) and monitoring wells (MW1-20 and MW7-08). This was completed to quantify any hydraulic connection between the overburden and bedrock aquifer, and, within the bedrock aquifer itself.

There was no drawdown attributable to pumping at TW-2 within the monitoring wells (MW1-20 and MW7-08) indicating that there is no vertical hydraulic connection between the overburden groundwater and confined bedrock aquifer that TW-2 draws from.

There was no drawdown at Well 1514733 and minimal drawdown within TW-5 and the residential well throughout the duration of the pumping test. The drawdown at TW-5 and 4885 Hawthorne Road was about 3 cm based upon the data logger readings and is considered insignificant. No impacts are expected at these wells as a result of future TW-2 usage.

The results of the interference monitoring did illustrate a hydraulic connection between TW-2 and Well A305146 about 130 m to the south. The drawdown at this well was about 95 cm during the pumping test. It is expected that these wells are confined within the same aquifer unit and are hydraulically connected.

The testing showed that the pumping of over 20,000 L resulted in the usage of about 5% of the available drawdown of the test well. As daily usage is expected to be below 10,000 L/day, the pump test results indicate that there is sufficient water quantity below the Site for the planned development without significant interference to future and existing neighbouring wells. In our professional opinion the risk of interference is minimal.

2.3 Water Supply

The water supply system for the commercial development is expected to be regulated under Ontario Regulation 170 with the MECP. Based upon the pumping test, the test well TW-2 provided sufficient water quantity and could support a higher yield if required. The testing indicated that the bedrock aquifer below the Site can produce enough groundwater to support the proposed commercial development without significant impact to other wells.

It is also understood by GHD that, due to the location of TW-2, a replacement production well may be drilled for the Site. The following requirements are outlined for a new replacement well.

2.3.1 Production Well Requirements

Based on the results of this assessment, it is recommended that the commercial development be serviced by a properly constructed drilled well. GHD understands that the current drilled well used at the Site may be used to support the proposed development. However, if a new replacement well is needed, the current well should be abandoned in accordance with Regulation 903 of the Ontario Water Resources Act.

A future well should target the bedrock aquifer on the order of about 30 m deep. Large diameter (300 mm or greater) wells are not considered suitable as a source of water supply as they can be susceptible to shallow sources of contamination and may be prone to going dry during summer and winter months. Water wells installed should be in accordance with Regulation 903 of the Ontario Water Resources Act and the following design specifics:

1. If the well is a bedrock well, the casing should be sealed in accordance with Regulation 903 to the bedrock.
2. The well must be developed by conventional techniques to obtain a minimum of 70% efficiency. It is recommended that a statement be provided that indicates the well is essentially sand-free (i.e. less than 5 mg/L sand). In addition, the statement should also include that the total drawdown in the well, comprising the pumping level plus the mutual interference from the other wells, is within a reasonable tolerance of the available drawdown.
3. A water sample must be collected from the new well and analyzed for the following, at a minimum, test parameters to meet the ODWS:

-Iron	-Manganese	-Nitrate
-Sodium	-Hardness	-Turbidity
-Total Coliform	-E.*coli*	-Fecal coliform
-Chloride	-Total Dissolved Solids	

4. It is recommended that the new well be pump tested by qualified hydrogeologic personnel prior to issuance of a building permit. The well should be pump tested to determine a safe long-term yield and short-term capacity to ensure uninterrupted water supply for the development and to ensure that adjacent properties will not be impacted. A report should be prepared by a Professional Engineer or Professional Geoscientist verifying the pump testing data.

The use of a properly constructed drilled well that is adequately sealed and certified by qualified hydrogeological personnel should be sufficient to provide ample quantities of potable water while preserving the long term water quality of the existing aquifer complexes. Based on the aforementioned water quality data, some aesthetic related exceedances were noted. Aesthetic objectives are not health related. Methane was not observed in the test well discharge water or detected with our field instrumentation.

The use of groundwater heat pumps that extract water from the aquifer is not recommended. Geothermal drilling is unregulated and there are no mandatory requirements to seal boreholes that are drilled through or into aquifers. Therefore, unsealed or improperly sealed boreholes into the aquifer could put the water supply at risk.

2.4 Septic Waste Disposal

The septic waste disposal system is being designed by others.

2.5 Construction Dewatering

Based upon the GHD Geotechnical Report (2020), approximately 6 m of fill was encountered on the Site. The report suggests that foundations are to be either shallow foundations completed in the fill (requiring soil improvements, such as dynamic compaction) or deep foundations (Drilled Micro piles or drilled cast-in-place concrete piles / caissons). Bedrock was encountered at depths of 8.2 to 11.1 mbgs. Groundwater during the geotechnical program was encountered at depths of 3.3 to 4.0 mbgs at the Site and measured on November 19, 2020 to be 3.0 mbgs at MW7-08 and 3.8 mbgs at MW1-20.

Based on these observations, the excavations for the deep foundation option will extend below the water table and will require dewatering to remove groundwater seepage as well as surface water runoff and precipitation to ensure safe and dry working conditions.

2.5.1 Groundwater Sampling for Construction Dewatering

On November 19, 2020, a groundwater sample was collected from MW7-08 as part of the hydrogeological assessment. The sample was submitted to Paracel Laboratories in Ottawa, Ontario for analysis of metals, general inorganics, and volatile organic compounds (VOCs). The results were compared to criteria described in City of Ottawa By Law 2003-514, which addresses discharge to the Municipal sewage system. The analytical results are summarized and provided with the certificates of analysis in Appendix G.

When the analytical results are compared to the City of Ottawa criteria, it is noted that the following parameters exceeded the criteria:

- Phosphorus (total);
- Suspended solids (total);
- Arsenic (total);
- Copper (total);
- Manganese (total);
- Nickel (total); and
- Zinc (total).

The results represent total concentrations including dissolved and sorbed particulate. Based on these observations, the water discharged from an excavation must be filtered to minimize the particulate and reduce the total concentrations to meet the City of Ottawa criteria. The discharge would be expected to be a combination of groundwater, surface water runoff and precipitation into the excavation and would require further assessment to verify its quality. City of Ottawa approval, sewer-use discharge permit and pre-treatment will be required prior to discharge to a drainage ditch or sewer.

2.5.2 Single Well Response Testing

On November 20, 2020, Single Well Response Tests (SWRTs) were completed on monitoring wells MW1-20 and MW7-08, both of which are completed within the overburden. The tests consisted of inducing a measurable change to the water level in the monitoring well and measuring the rate at which the water level recovers. In this case, dataloggers were placed in the wells, then water in the wells were displaced by inserting a solid slug. When water levels had stabilized, the slug was then removed.

The SWRT was analysed using AQTESOLV and the Bouwer-Rice solution for unconfined groundwater unit within the fill. The results yielded a geometric mean of 5.7×10^{-5} cm/s at MW1-20 and 2.1×10^{-3} cm/s at MW7-08 in the general area of the southern edge of the proposed warehouse. The SWRT analyses are provided in Appendix F. The hydraulic conductivity testing suggests that excavations within fill material such as MW7-08 would be expected to yield moderate water infiltration.

It is noted that the hydraulic conductivities in MW7-08 was significantly faster than that measured at MW1-20 (near the northwest limit of the Site). This is attributed to a combination of differing screened depths and variations in fill composition. Accordingly, it is assumed that the hydraulic conductivities vary across the Site. For the calculations used in this report, hydraulic conductivity will be assumed to be 1 x10^{-3} cm/sec.

2.5.3 Water Taking Evaluation

This section of the report is not intended to be considered for use as a dewatering plan for the construction contractor, as the water takings are for the purposes of regulatory submissions. It must also be noted that groundwater levels are transient and tend to fluctuate with the seasons, periods of precipitation and temperature.

The Site-specific borehole data, results of the hydraulic testing (i.e. single well response tests) and groundwater water monitoring were utilized to determine the aquifer hydraulic properties (hydraulic conductivity) and conditions to provide the basis for estimating the construction water taking rates and area of influence. If excavations extend beyond 3 mbgs, it is expected that groundwater will be encountered. The water takings and area of influence were determined using the field data and by employing analytical modelling methods. The projected drawdown was calculated as a partially penetrating excavation in an unconfined aquifer within the fill.

The radius of influence (R_o) was estimated using an empirical relationship developed by Sichardt and Kryieleis that gives R_o as a function of drawdown and hydraulic conductivity (Powers et al., 2007).

$R_o = 3000(H-h)\sqrt{K}$ (For circular source)

$R_o = 1750(H-h)\sqrt{K}$ (For line source)

Based upon an excavation depth of 8.5 m (i.e. removing all of the fill and native soil to bedrock as per the depth of bedrock at TW-2), the radius of influence is about 70 to 90 m. Based upon the size of the Site, no impacts to neighbouring properties is expected.

The steady state dewatering (Q) into the excavation was estimated using:

$$Q = \frac{\pi K\left(H^2 - h_w^2\right)}{\ln R_0 / r_w}$$ (For steady state into a semi-penetrating shaft)

Where: $r_w = \sqrt{\frac{ab}{\pi}}$

There are a number of assumptions to this method including:

- Homogeneous material
- Steady state
- Initial horizontal potentiometric surface
- Unconfined aquifer
- Partially penetrating well
- Gravity flow
- Circular source
- Effect of a large rectangular excavation is equivalent to circular excavation of same area

Based upon an excavation size that includes the entire warehouse area (4650 m^2) but does not include the cross docks or office areas, and assuming a dewatering depth to 9.5 m (one (1) m below the bedrock as per the bedrock depth at TW-2 to maintain dry conditions) steady state dewatering is estimated to be on the order of 725,000 L/day. This estimation includes a safety factor of 1.5 that was applied to the infiltration rate. The initial flows from the excavation may also be expected to be two to three times greater than the steady state.

Accordingly, the Owner should be aware of the limitations associated with the flow volume estimate contained in this report before utilizing the flow estimates for any use beyond their intended purpose (the generation of estimates to assess the need for a Permit To Take Water or an Environmental Activity and Sector Registry (EASR) application for construction). Our calculations assumed that there are 8.5 m of material to be removed to the bedrock for construction of the warehouse and dewatering to a depth of 9.5 m required to maintain 'dry' conditions. There may be areas on the Site with greater depths of material above the bedrock; or, other areas that have greater permeability and have more significant groundwater volume to be dewatered. The calculations also assumed that the footprint of the warehouse would be excavated in its entirety. To reduce groundwater pumping efforts, smaller areas of the warehouse footprint could be excavated at one time or alternative construction methods may be considered.

It is recommended that any contractor carry out a test excavation and / or pump testing of the fill layer prior to dewatering to evaluate the conditions and the most appropriate method to deal with the onsite conditions.

Based on the above assumptions and the scenario presented, we suggest that that the Client should:

- **Submit a Permit To Take Water (PTTW) application** to remove water from the Site, allowing for a water taking volume of greater than **400,000 Litres/day (L/day)** for the purposes of the submission. It should be noted that PTTW reviews may take up to 90 business days (i.e. 4.5 months). Alternatively, an EASR application for construction dewatering can be obtained within several days and allows for up to 400,000 L/day of groundwater pumping for construction dewatering purposes.
- **If required, obtain a City Ottawa Discharge Permit** to allow discharge to the local municipal sewer system or ditch. At a minimum, the construction water takings will require sediment filtration prior to discharge such as a sediment filter bag or equivalent methods.

The discharge from the dewatering should be directed to the nearby ditches or ground surface away from the excavation in an area protected from erosion. In addition, the discharge water should be properly filtered to reduce turbidity and total suspended solids. The volume and rate of the water takings will be recorded daily and measured using a flow meter or other acceptable method. The daily groundwater discharge shall be maintained below the limits identified in PTTW or EASR permit, and the City of Ottawa Discharge Permit (if required).

It is important to conduct the excavation and dewatering work in a timely manner (i.e. short duration) if possible. In addition, the ideal period to conduct the program is during the summer when groundwater and surface water are expected to be at their lowest. Any suppression of the local shallow groundwater from dewatering during the construction phase is expected to be of a temporary nature.

3. Summary and Recommendations

Supporting data upon which our conclusions and recommendations are based have been presented in the foregoing sections of this report. The following conclusions and recommendations are governed by the physical properties of the subsurface materials that were encountered at the Site and assume that they are representative of the overall Site conditions. It should be noted that these conclusions and recommendations are intended for use by the designers only. Contractors bidding on or undertaking any work at the Site should examine the factual results of the assessment, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of this factual data as it affects their proposed construction techniques, equipment capabilities, costs, sequencing, and the like. Comments, techniques, or recommendations pertaining to construction should not be construed as instructions to the contractor.

Based on the results of the assessment, the test well has sufficient water of good quality and quantity to provide ample supply of potable groundwater for the proposed commercial development while preserving the long-term water quality of the aquifer complex. There was minor interference between adjacent wells; however, the interference is not considered significant to impact the operation of the wells. There is no vertical hydraulic connection between the shallow overburden groundwater and the bedrock aquifer unit. In the long term, it is our opinion that the bedrock aquifer tested can support the commercial development and neighbouring wells.

Water quality impacts are not expected provided that the waste disposal system is properly constructed. No impact is anticipated on downgradient baseline water quality functions or to the existing water bearing aquifers.

If a new well is drilled for the development, the well must be properly constructed and adequately sealed and the existing well decommissioned in accordance with Ontario Regulation 903.

Construction dewatering is estimated to be about 725,000 L/day or greater based upon field testing and dewatering the entire warehouse footprint to the bedrock surface. A PTTW is recommended for this approach. For dewatering of volumes up to 400,000 L/day, an EASR application is recommended. No significant impacts from construction dewatering are anticipated.

It is GHD's opinion that the results of this hydrogeological assessment support the development of the proposed commercial development.

The following Statement of Limitations should be read carefully and is an integral part of this report. We trust this report meets your immediate needs. Should any questions arise regarding any aspect of our report, please contact our office.

Sincerely,

GHD

PROFESSIONAL GEOSCIENTIST
JAN. 19/21
LIMITED MEMBER
ROBERT W. NECK
2262
ONTARIO

Robert Neck, M.Eng., P.Geo. (Limited)

LICENSED PROFESSIONAL ENGINEER
N. C. McILVEEN
Jan 14/21
PROVINCE OF ONTARIO

Nyle McIlveen, P.Eng.

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Ontario Ministry of the Environment. June 2003. Revised June 2006. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines.

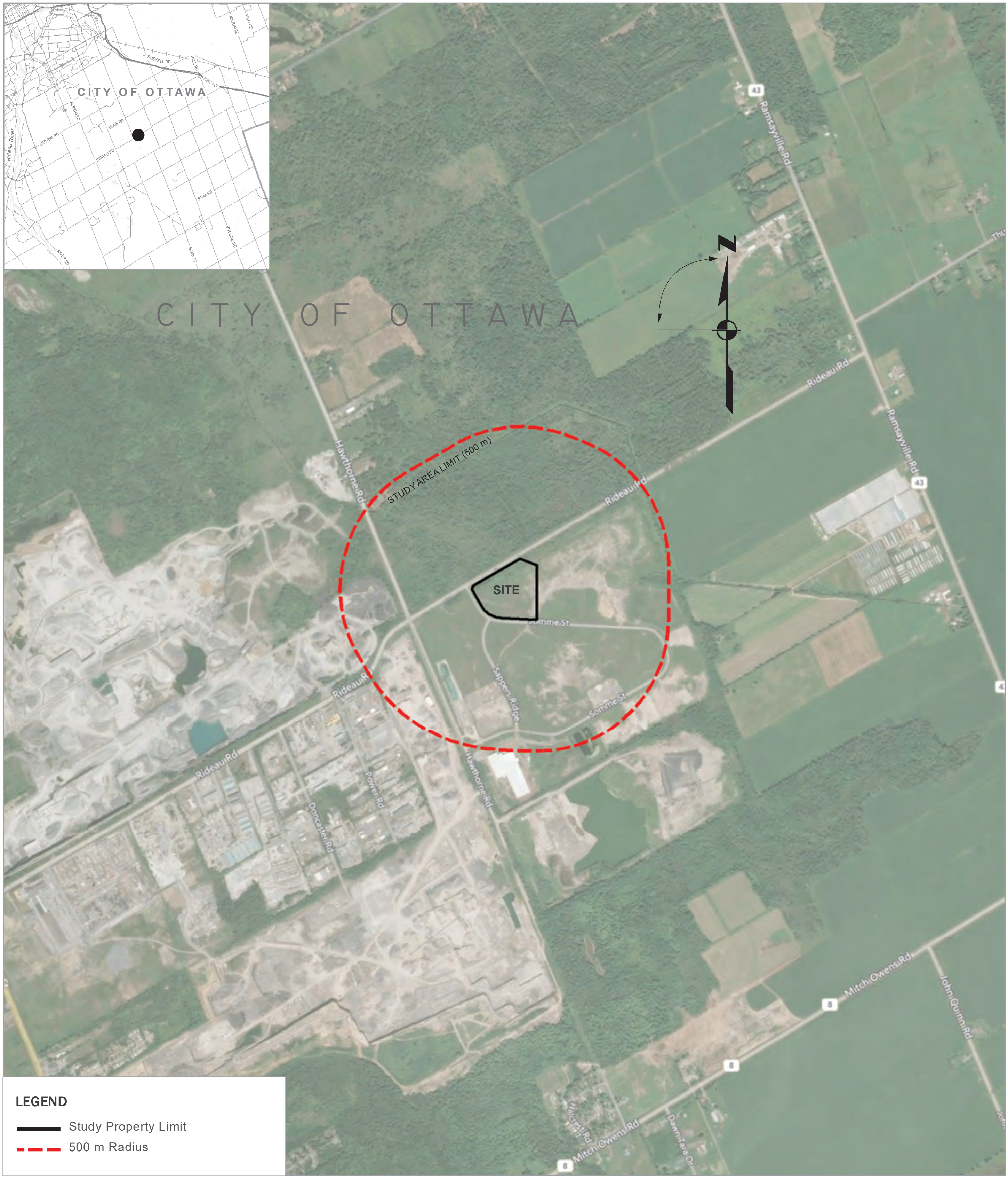
5. Statement of Limitations

This report is intended solely for Consolidated Fastfrate (Ottawa) Holdings Inc. in assessing the hydrogeological aspects of the Site (Rideau Road and Somme Street, Ottawa, Ontario) and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. Client shall defend, indemnify and hold GHD harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of hydrogeological engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a hydrogeological study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

Enclosures



Service Layer Credits: © 2020 Microsoft Corporation © 2020 Maxar ©CNES (2020)
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NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

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Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
SITE LOCATION PLAN

Project No. 11220832-01
Revision No. 1
Date Jan. 2021

FIGURE 1

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NAD83, MTM Zone 9
1 cm : 18 meters
Meters
0 20 40 80

ATTRIBUTION STATEMENTS
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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
PRELIMINARY CONCEPT PLAN

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Revision No.	1
Date	Jan 21

FIGURE 2

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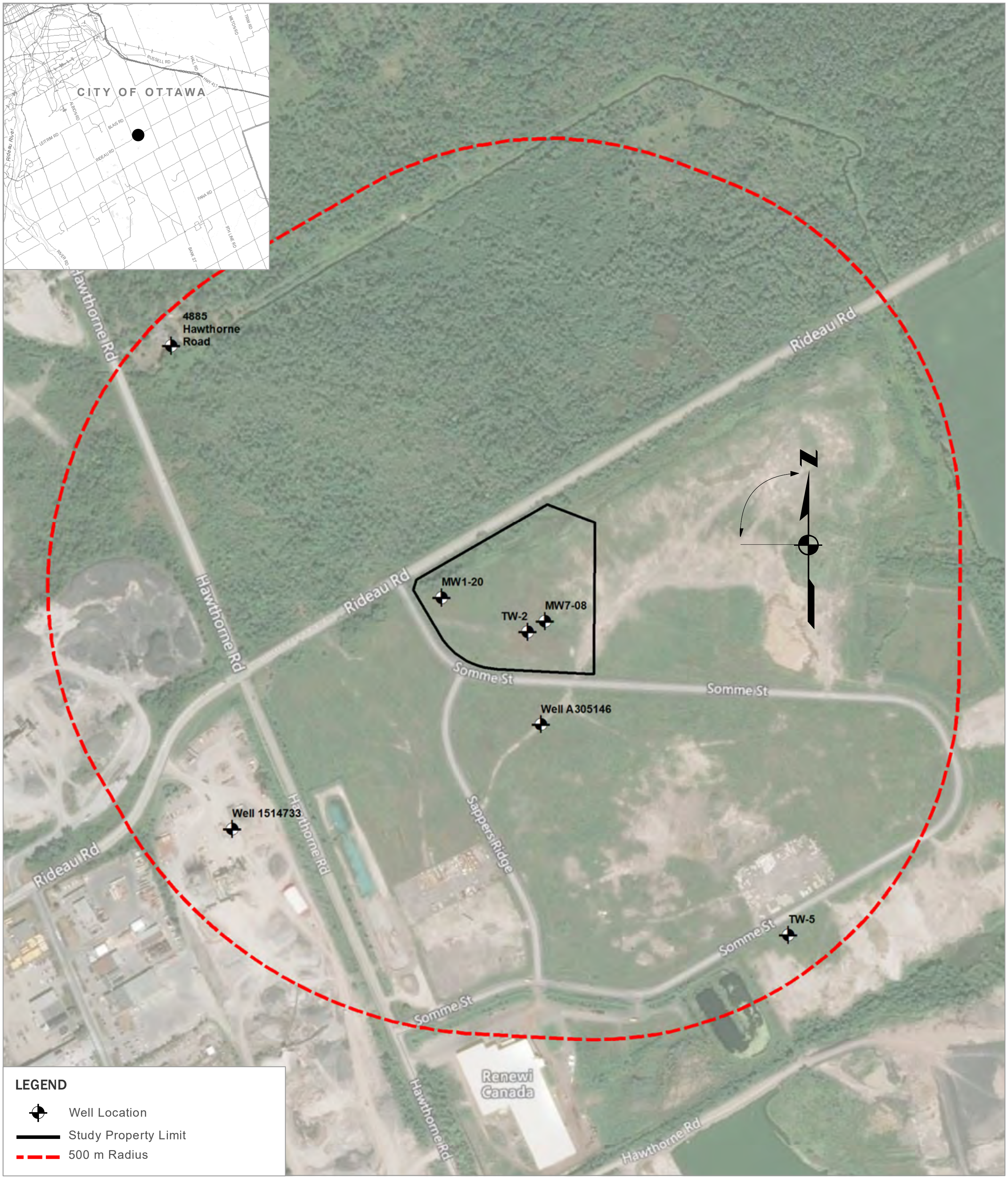

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NAD83, MTM Zone 9
1 cm : 72 meters
Meters
0 80 160 320

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GHD

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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
WELL LOCATION PLAN

Project No.	11220832-01
Revision No.	1
Date	Jan 21

FIGURE 3

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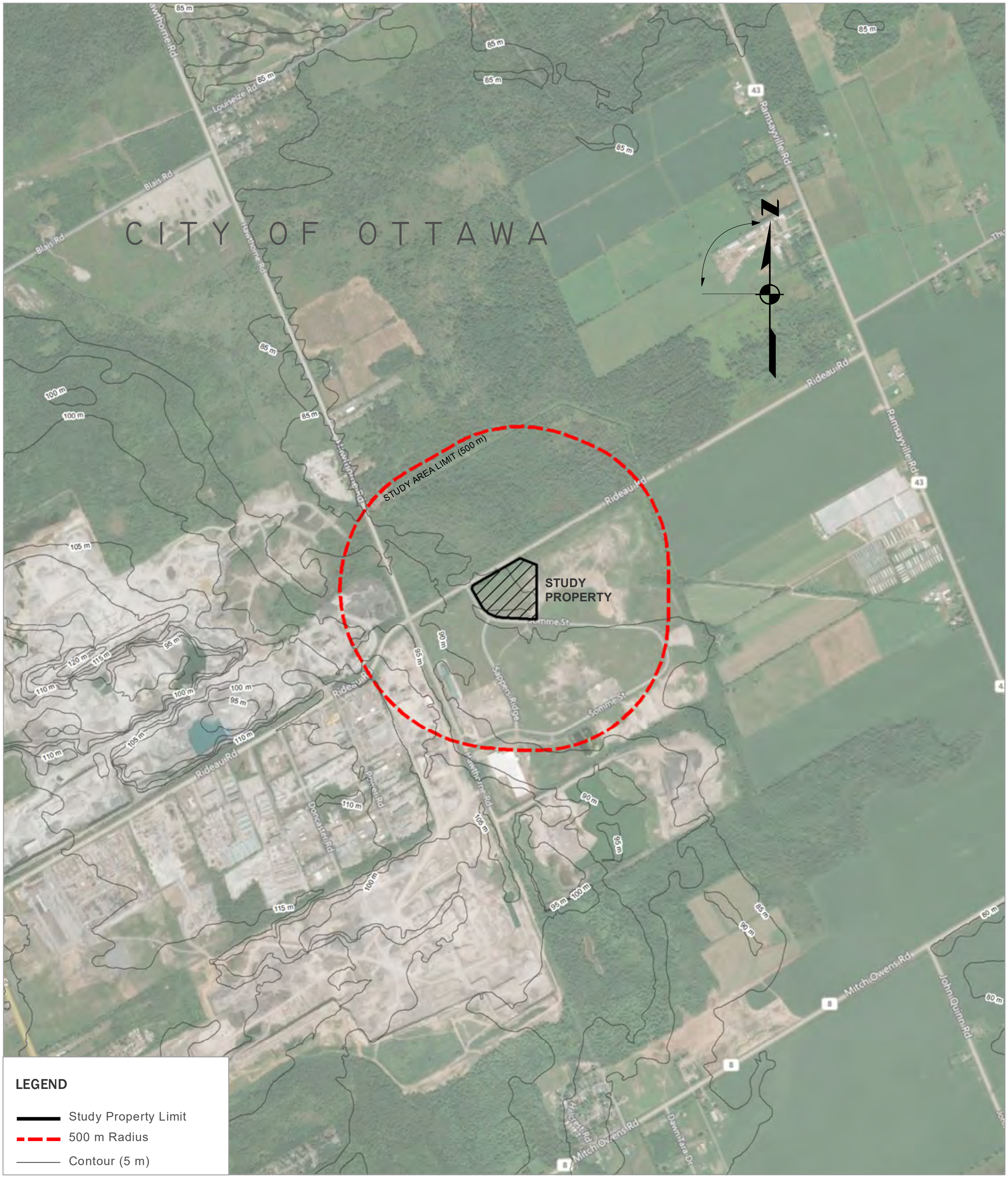

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NAD83, MTM Zone 9
1 cm : 200 meters

Meters
0 220 440 880

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- MRD128-REV. Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 128 – Revised.
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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
REGIONAL TOPOGRAPHY

Project No.	11220832
Revision No.	-
Date	Jan 21

FIGURE 4

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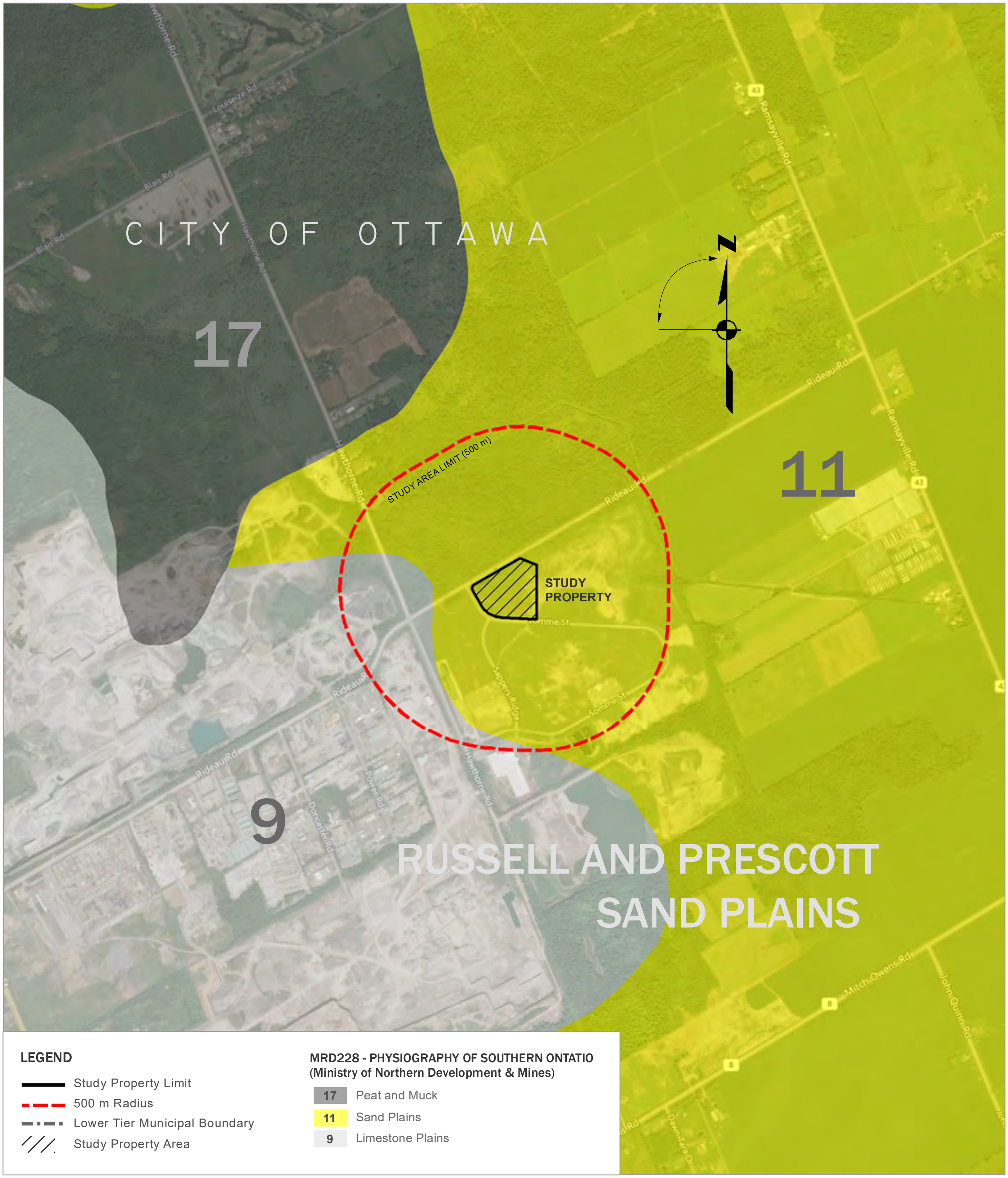

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NAD83, MTM Zone 9
1 cm : 200 meters

Meters
0 220 440 880

ATTRIBUTION STATEMENTS

- MRD228-REV. Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228.
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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
PHYSIOGRAPHY

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FIGURE 5

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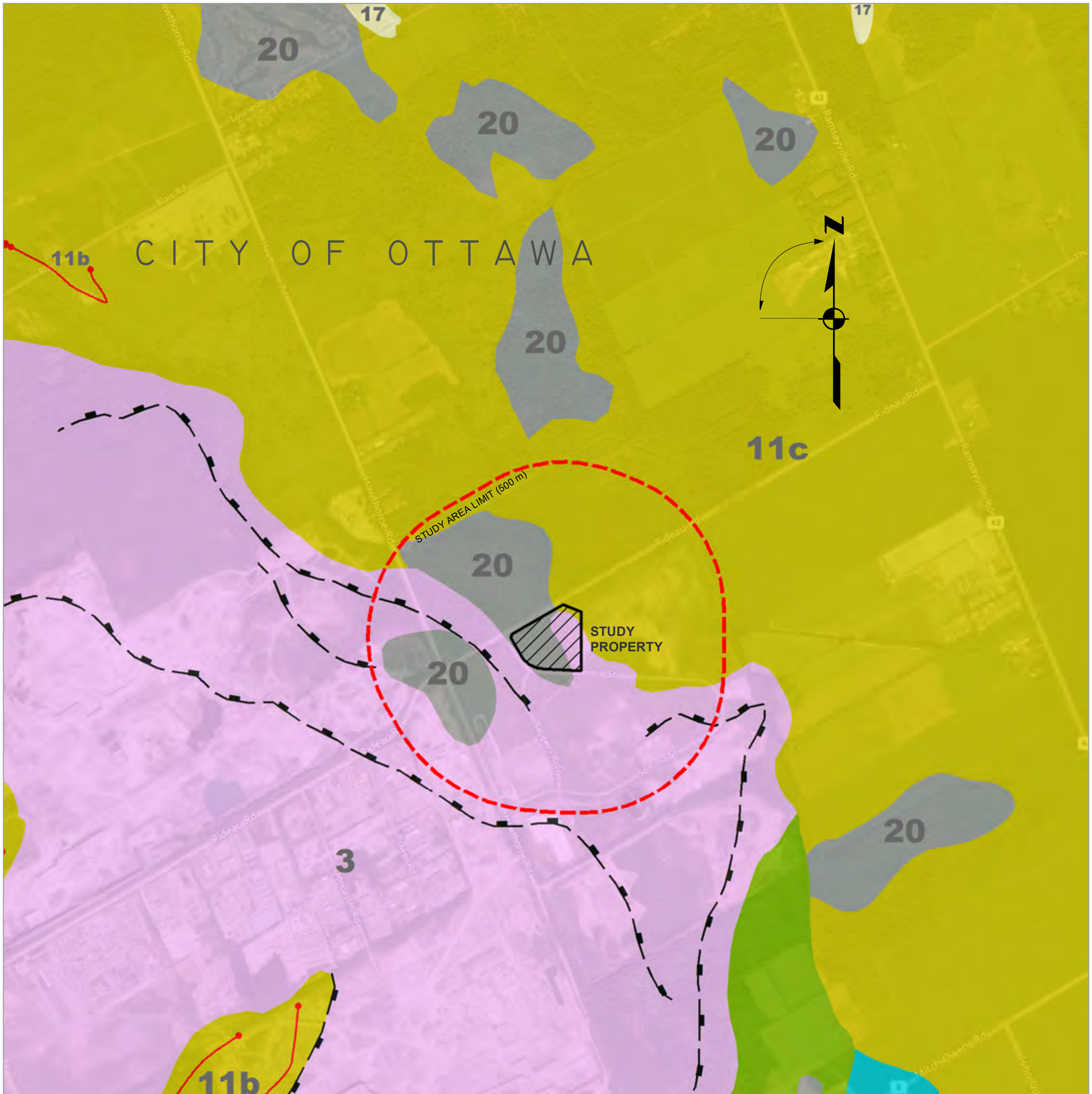

LEGEND

- Study Property Limit
- 500 m Radius
- Landslide Scar
- Beach

MRD128 - SURFICIAL GEOLOGY (Ministry of Northern Development & Mines)

Unit	Description
3	**Paleozoic Bedrock**
20	**Organic Deposits:** peat, muck, marl
17	**Eolian deposits:** fine to very fine sand and silt
11	**Coarse-textured glaciolacustrine deposits:** sand, gravel, minor silt and clay 11b Littoral deposits 11c Foreshore and basinal deposits
10	**Fine-textured glaciomarine deposits** 10a Massive to well laminated
5b	**Till:** Silty sand to sand-textured till on Precambrian terrain 5b Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain

NAD83, MTM Zone 9
1 cm : 200 meters

Meters
0 220 440 880

ATTRIBUTION STATEMENTS

- MRD128-REV. Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 128 – Revised.
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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
SURFICIAL GEOLOGY

Project No. 11220832
Revision No. -
Date Jan 21

FIGURE 6

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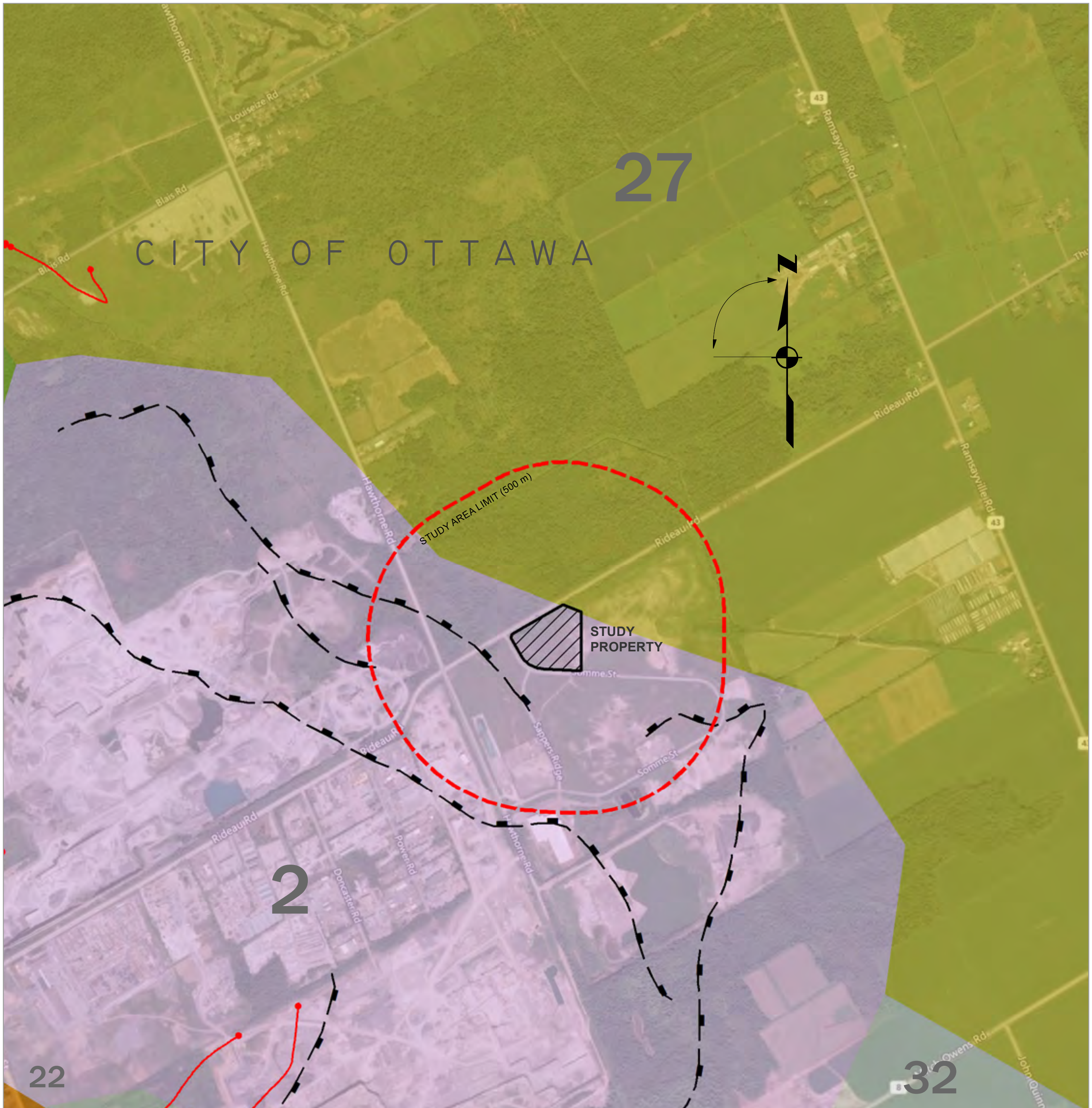

LEGEND

- Study Property Limit
- 500 m Radius
- Landslide Scar
- Beach

EDS014 - QUATERNARY GEOLOGY (Ministry of Northern Development & Mines)

32 **Organic deposits:** peat, muck and marl

27 **Glaciomarine and marine deposits:** sand, gravelly sand and gravel nearshore and beach deposits

22 **Glaciofluvial ice-contact deposits:** gravel and sand minor till includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits

2 **Bedrock:** undifferentiated carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift

NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

ATTRIBUTION STATEMENTS

- EDS014-REV. Ontario Geological Survey, 1997. Quaternary geology, seamless coverage of the province of Ontario: Ontario Geological Survey, Data Set 14.
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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

**HYDROGEOLOGY ASSESSMENT
QUATERNARY GEOLOGY**

Project No.	11220832
Revision No.	-
Date	Jan 2021

FIGURE 7

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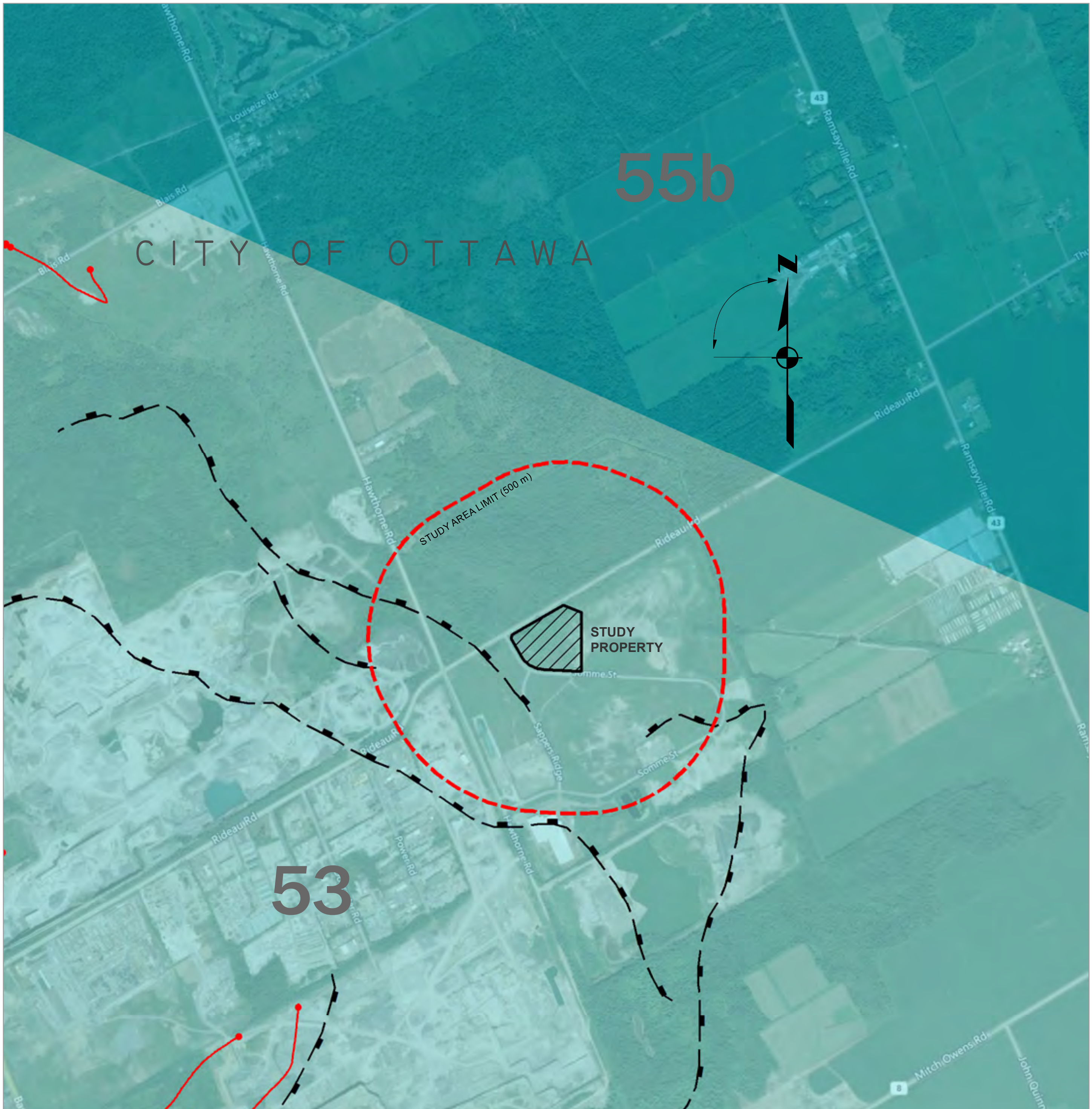

LEGEND

- Study Property Limit
- 500 m Radius
- Landslide Scar
- Beach

MRD126 - BEDROCK GEOLOGY (Ministry of Northern Development & Mines)

ORDOVICIAN (443.7 Ma to 488.3 Ma)

UPPER ORDOVICIAN

55 **Shale, limestone, dolostone, siltstone**
55b Georgian Bay Fm.; Blue Mountain Fm.; Billings Fm.; Collingwood Mb.; Eastview Mb.

53 **Dolostone, sandstone:** Beekmantown Gp.

NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

ATTRIBUTION STATEMENTS

- MRD126-REV. Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision
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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
BEDROCK GEOLOGY

Project No. 11220832
Revision No. -
Date Jan. 2021

FIGURE 8

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Appendix A
Photographs

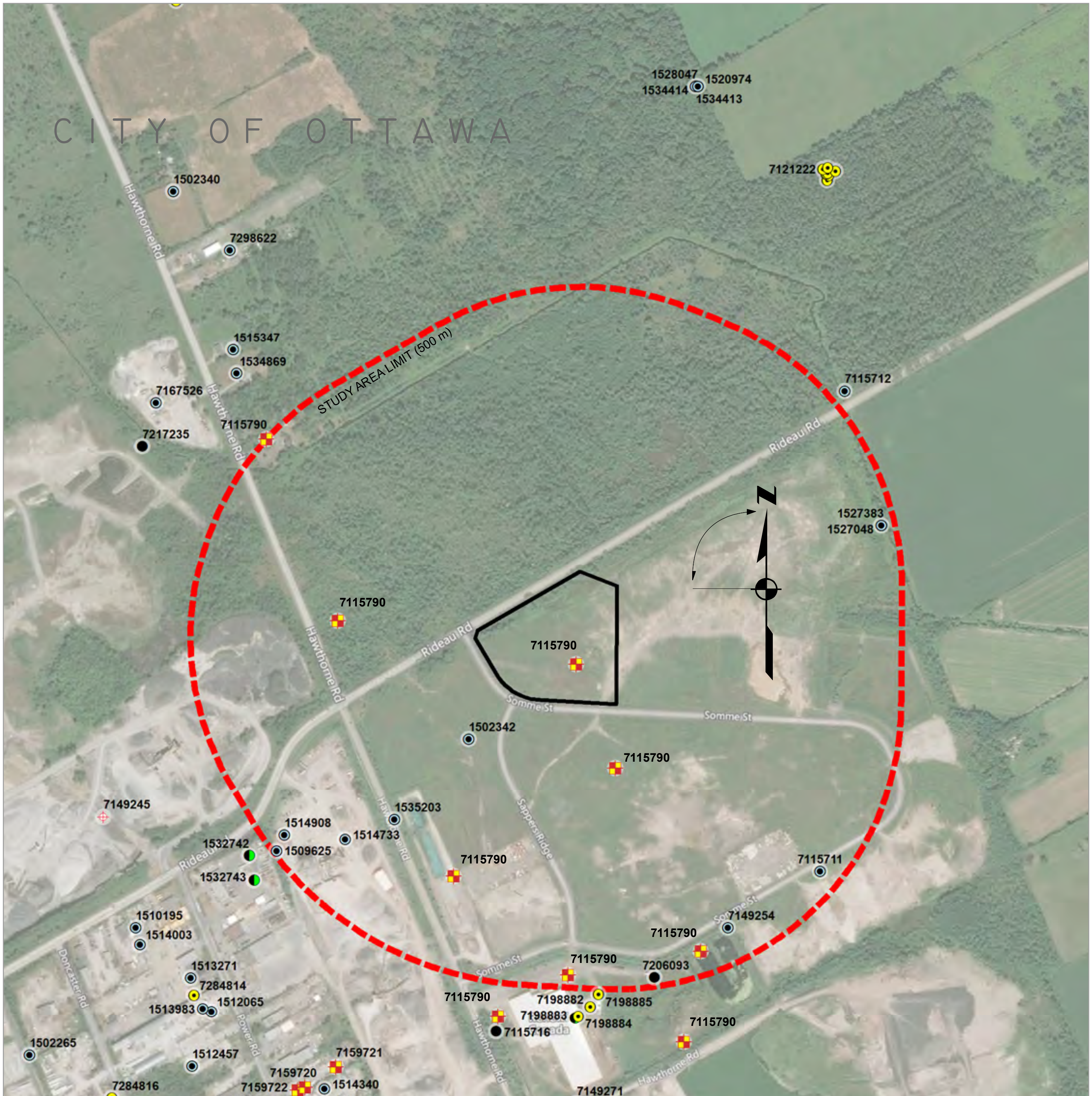
Photo 1 - View of drilled test well on the Site used during pumping test.

Photo 2 - View of discharge area looking across the Site.

Site Photographs

Photo 3 - Example of observation well (ID A305146) used during pumping test for monitoring of potential interference effects.

Appendix B
MECP Well Records



LEGEND

- Study Property Limit
- 500 m Radius

MECP Well, Final Status

- Abandoned Monitoring and Test Hole
- Abandoned-Other
- Abandoned-Quality
- Abandoned-Supply
- Alteration
- Dewatering
- Monitoring and Test Hole
- Observation Wells
- Recharge Well
- Replacement Well
- Test Hole
- Unfinished
- Water Supply
- Other Status
- No Data
- Not A Well

NAD83, MTM Zone 9
1 cm : 100 meters

Meters
0 110 220 440

ATTRIBUTION STATEMENTS

Consolidated Fastfrate (Ottawa) Holdings Inc.
RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
MECP WATER WELLS

Project No.	11220832
Revision No.	-
Date	Jan 21

APPENDIX B

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WELL RECORD LISTINGS

Ministry of the Environment Conservation & Parks (MECP)

Database Currency: 2020-04-30

Date Accessed: 2020-11-13

Project ID: 11220832 **Office:** Peterborough, ON

Lot:	LOT 27	**Well ID:**	7206093
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1004500104
Township:	GLOUCESTER	**Completion Date:**	7/18/2013
County:	OTTAWA-CARLETON	**Received Date:**	8/12/2013
Street:	35 SAPPERS RIDGE	**Tag:**	A089801
City:	Ottawa	**Audit No:**	Z103282
Site:		**Contractor License:**	3749
Elevation:	89.57 *masl.*		
UTM:	18 E 456749 N 5016668	**Long/Lat:**	-75.552 , 45.302

DETAILS

Primary Use: Public **Secondary Use:** Public **Final Status:**

Well Depth: 47.2 m **Depth to Bedrock:** 0 m **Static Level:** 7.6 m **Well Type:**

Pump Rate: 10 GPM **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	14.29	12.19	-0.61

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
	LIMESTONE	7.32	47.24
	FILL	0.00	2.44
GREY	CLAY	2.44	7.32

Lot:	LOT 27	**Well ID:**	7115790
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1002782554
Township:	GLOUCESTER	**Completion Date:**	7/7/2008
County:	OTTAWA-CARLETON	**Received Date:**	11/26/2008
Street:	HAWTHORNE ROAD AT RIDEAU ROAD	**Tag:**	A074584
City:	Ottawa	**Audit No:**	M02897
Site:		**Contractor License:**	1844
Elevation:	90.95 *masl.*		

UTM: 18 E 456598 N 5016675 **Long/Lat:** -75.554 , 45.302

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 1 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	FILL	0.27		1.43
GREY	SAND	1.43		1.83
BROWN	TILL	1.83		2.32
GREY	FINE SAND	0.00		0.27

Lot:	LOT 27	**Well ID:**	7115790
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1002782518
Township:	GLOUCESTER	**Completion Date:**	7/7/2008
County:	OTTAWA-CARLETON	**Received Date:**	11/26/2008
Street:	HAWTHORNE ROAD AT RIDEAU ROAD	**Tag:**	A074584
City:	Ottawa	**Audit No:**	M02897
Site:		**Contractor License:**	1844
Elevation:	94.41 *masl.*		

UTM: 18 E 456831 N 5016712 **Long/Lat:** -75.551 , 45.303

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 1.3 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS | DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	15.86	-0.45		6.40

FORMATION DETAILS | DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	SANDSTONE	1.30		9.10
BROWN	TOPSOIL	0.00		1.30

Lot:	LOT 27	**Well ID:**	7149254
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1003262503
Township:	GLOUCESTER	**Completion Date:**	5/25/2010
County:	OTTAWA-CARLETON	**Received Date:**	8/4/2010
Street:	TW#7 HOAWTHORNE RD.	**Tag:**	A082844
City:	GLOUCESTER	**Audit No:**	Z101832
Site:		**Contractor License:**	1558
Elevation:	88.61 *masl.*		
UTM:	18 E 456879 N 5016752	**Long/Lat:**	-75.550 , 45.303

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Water Supply

Well Depth: 29.9 m **Depth to Bedrock:** 0 m **Static Level:** 4.4 m **Well Type:**

Pump Rate: 27.3 LPM **Boring Method:** Rotary (Reverse)

CASING DETAILS | DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	15.86	-0.45		6.40

FORMATION DETAILS | DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	SANDSTONE	1.30		9.10
BROWN	TOPSOIL	0.00		1.30

Lot:	LOT 26	**Well ID:**	7115790
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1001905211
Township:	GLOUCESTER	**Completion Date:**	7/14/2008
County:	OTTAWA-CARLETON	**Received Date:**	11/26/2008
Street:	HAWTHORNE ROAD AT RIDEAU ROAD	**Tag:**	A074584
City:	Ottawa	**Audit No:**	M02897
Site:		**Contractor License:**	1844

Elevation: 89.13 *masl.*

UTM: 18 E 456400 N 5016852 **Long/Lat:** -75.556 , 45.304

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 7.6 m **Depth to Bedrock:** 0 m **Static Level:** 1.7 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	FINE SAND	0.00		0.27
BROWN	FILL	0.27		1.43
BROWN	TILL	1.83		2.32
GREY	SAND	1.43		1.83

Lot:	LOT 27	**Well ID:**	7115711
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1001904894
Township:	GLOUCESTER	**Completion Date:**	9/26/2008
County:	OTTAWA-CARLETON	**Received Date:**	12/2/2008
Street:	TW #5	**Tag:**	A068335
City:	GLOUCESTER	**Audit No:**	Z84410
Site:		**Contractor License:**	1558

Elevation: 87.38 *masl.*

UTM: 18 E 457043 N 5016848 **Long/Lat:** -75.548 , 45.304

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 29.9 m **Depth to Bedrock:** 0 m **Static Level:** 6.8 m **Well Type:** Bedrock

Pump Rate: 180 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	25.40		5.49
OPEN HOLE	22.86		58.52

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
BROWN	SANDSTONE	0.00	15.85
GREY	QUARTZITE	15.85	21.95
WHITE	SANDSTONE	21.95	48.77
GREY	SANDSTONE	48.77	58.52

Lot:	LOT 26	**Well ID:**	1509625
Con:	CON 5 FROM RIDEAU RIVER	**Borehole ID:**	10031657
Township:	GLOUCESTER	**Completion Date:**	5/4/1968
County:	OTTAWA-CARLETON	**Received Date:**	6/12/1968
Street:		**Tag:**	
City:		**Audit No:**	
Site:		**Contractor License:**	3002

Elevation: 103.27 *masl.*

UTM: 18 E 456091 N 5016902 **Long/Lat:** -75.560 , 45.304

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 58.5 m **Depth to Bedrock:** 0 m **Static Level:** 11 m **Well Type:** Bedrock

Pump Rate: 180 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
OPEN HOLE	22.86		58.52

STEEL	25.40		5.49

FORMATION DETAILS		DEPTH IN METERS	
Colour	Material	Top	Bottom
BROWN	SHALE	0.61	3.05
BROWN	TOPSOIL	0.00	0.61
GREY	LIMESTONE	3.05	35.36

Lot:	LOT 26	**Well ID:**	1514733
Con:	CON 5 FROM RIDEAU RIVER	**Borehole ID:**	10036703
Township:	GLOUCESTER	**Completion Date:**	4/15/1975
County:	OTTAWA-CARLETON	**Received Date:**	7/8/1975
Street:		**Tag:**	
City:		**Audit No:**	
Site:		**Contractor License:**	1517

Elevation: 99.42 *masl.*

UTM: 18 E 456211 N 5016920 **Long/Lat:** -75.559 , 45.304

DETAILS

Primary Use: Commerical **Secondary Use:** Commerical **Final Status:** Water Supply

Well Depth: 35.4 m **Depth to Bedrock:** 0.6 m **Static Level:** 12. m **Well Type:** Bedrock

Pump Rate: 10 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	Diameter (cm)	Top	Bottom
OPEN HOLE	12.70		35.36
STEEL	12.70		5.49

FORMATION DETAILS		DEPTH IN METERS	
Colour	Material	Top	Bottom
BROWN	TOPSOIL	0.00	0.61
BROWN	SHALE	0.61	3.05
GREY	LIMESTONE	3.05	35.36

Lot:	LOT 26	**Well ID:**	1514908
Con:	CON 5 FROM RIDEAU RIVER	**Borehole ID:**	10036875
Township:	GLOUCESTER	**Completion Date:**	8/15/1975
County:	OTTAWA-CARLETON	**Received Date:**	9/11/1975

Street:	3500 RIDEAU ROAD	**Tag:**	A018916
City:	GLOUCESTER	**Audit No:**	Z19099
Site:		**Contractor License:**	1119
Elevation:	90.37 *masl.*		
UTM:	18 E 456105 N 5016929 **Long/Lat:** -75.560 , 45.304		

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 75.6 m **Depth to Bedrock:** 0 m **Static Level:** 12. m **Well Type:** Bedrock

Pump Rate: 75.71 LPM **Boring Method:** Air Percussion

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
OPEN HOLE		6.09	42.67
STEEL	15.88	0.00	6.70

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
GREY	LIMESTONE	10.68	13.01
GREY	SANDSTONE	0.37	10.68
	GRAVEL	0.00	0.37

Lot:	<null>	**Well ID:**	1535203
Con:		**Borehole ID:**	11172955
Township:	GLOUCESTER	**Completion Date:**	10/27/2004
County:	OTTAWA-CARLETON	**Received Date:**	11/26/2004
Street:	3500 RIDEAU ROAD	**Tag:**	A018916
City:	GLOUCESTER	**Audit No:**	Z19099
Site:		**Contractor License:**	1119
Elevation:	90.37 *masl.*		
UTM:	18 E 456298 N 5016953 **Long/Lat:** -75.557 , 45.305		

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 42.7 m **Depth to Bedrock:** 1.2 m **Static Level:** 14. m **Well Type:** Bedrock

Pump Rate: 75.71 LPM **Boring Method:** Air Percussion

CASING DETAILS DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	FINE SAND	0.00		0.27
GREY	SAND	1.43		1.83
BROWN	TILL	1.83		2.32
BROWN	FILL	0.27		1.43

Lot: LOT 26
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa
Site:
Elevation: 85.10 *masl.*
UTM: 18 E 456687 N 5017036 **Long/Lat:** -75.552 , 45.305

Well ID: 7115790
Borehole ID: 1002782572
Completion Date: 7/15/2008
Received Date: 11/26/2008
Tag: A074584
Audit No: M02897
Contractor License: 1844

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 3 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	TILL	1.83		2.32
BROWN	FILL	0.27		1.43
GREY	SAND	1.43		1.83

GREY	FINE SAND	0.00	0.27

Lot:	LOT 26	**Well ID:**	1502342
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	10024385
Township:	GLOUCESTER	**Completion Date:**	11/30/1950
County:	OTTAWA-CARLETON	**Received Date:**	12/6/1951
Street:		**Tag:**	
City:		**Audit No:**	
Site:		**Contractor License:**	3504
Elevation:	87.74 *masl.*		
UTM:	18 E 456431 N 5017092 **Long/Lat:** -75.556 , 45.306		

DETAILS

Primary Use: Livestock **Secondary Use:** Livestock **Final Status:** Water Supply

Well Depth: 17.4 m **Depth to Bedrock:** 8.2 m **Static Level:** 4 m **Well Type:** Bedrock

Pump Rate: 1 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	12.70		8.23
OPEN HOLE	12.70		17.37

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
	PREV. DRILLED	0.00	8.23
	SANDSTONE	8.23	17.37

Lot:	LOT 26	**Well ID:**	7115790
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1002782563
Township:	GLOUCESTER	**Completion Date:**	7/14/2008
County:	OTTAWA-CARLETON	**Received Date:**	11/26/2008
Street:	HAWTHORNE ROAD AT RIDEAU ROAD	**Tag:**	A074584
City:	Ottawa	**Audit No:**	M02897
Site:		**Contractor License:**	1844
Elevation:	84.01 *masl.*		
UTM:	18 E 456622 N 5017219 **Long/Lat:** -75.553 , 45.307		

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 3.6 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	FINE SAND	0.00		0.27
BROWN	TILL	1.83		2.32
BROWN	FILL	0.27		1.43
GREY	SAND	1.43		1.83

Lot: LOT 25
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa
Site:
Elevation: 84.01 *masl.*
UTM: 18 E 456206 N 5017303 **Long/Lat:** -75.559 , 45.308

Well ID: 7115790
Borehole ID: 1002782590
Completion Date: 7/15/2008
Received Date: 11/26/2008
Tag: A074584
Audit No: M02897
Contractor License: 1844

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 1.6 m **Well Type:**

Pump Rate: **Boring Method:**

CASING DETAILS — DEPTH IN METERS

H.S.A.

Material	Diameter (cm)	Top	-	Bottom
OPEN HOLE	15.24			30.48
STEEL	15.24			11.89

FORMATION DETAILS		DEPTH IN METERS		
Colour	Material	Top	-	Bottom
GREY	SANDSTONE	8.53		30.48
GREY	HARDPAN	1.52		8.53
BROWN	SAND	0.00		1.52

Lot:	LOT 26	**Well ID:**	1527383
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	10049033
Township:	GLOUCESTER	**Completion Date:**	8/16/1993
County:	OTTAWA-CARLETON	**Received Date:**	9/21/1993
Street:		**Tag:**	
City:		**Audit No:**	135946
Site:		**Contractor License:**	1558
Elevation:	82.18 *masl.*		
UTM:	18 E 457162 N 5017453	**Long/Lat:**	-75.546 , 45.309

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 30.5 m **Depth to Bedrock:** 8.5 m **Static Level:** 2.1 m **Well Type:** Bedrock

Pump Rate: 20 GPM **Boring Method:** Air Percussion

CASING DETAILS		DEPTH IN METERS		
Material	Diameter (cm)	Top	-	Bottom
STEEL	15.24			11.89
OPEN HOLE	15.24			30.48

FORMATION DETAILS		DEPTH IN METERS		
Colour	Material	Top	-	Bottom
BROWN	SAND	0.00		1.52

GREY	HARDPAN	1.52	8.53
GREY	SANDSTONE	8.53	30.48

Lot:	LOT 26	**Well ID:**	1527048
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	10048727
Township:	GLOUCESTER	**Completion Date:**	4/19/1993
County:	OTTAWA-CARLETON	**Received Date:**	5/6/1993
Street:		**Tag:**	
City:		**Audit No:**	130025
Site:		**Contractor License:**	1558

Elevation: 82.18 *masl.*

UTM: 18 E 457162 N 5017453 **Long/Lat:** -75.546 , 45.309

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 41.1 m **Depth to Bedrock:** 0 m **Static Level:** 9.4 m **Well Type:** Bedrock

Pump Rate: 15 GPM **Boring Method:** Air Percussion

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
OPEN HOLE	15.24		22.86
STEEL	15.24		9.45
OPEN HOLE	15.24		41.15

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
WHITE	SANDSTONE	10.06	41.15
GREY	HARDPAN	2.74	4.57
BROWN	CLAY	0.00	2.74
GREY	LIMESTONE	4.57	10.06

Lot:	LOT 26	**Well ID:**	1527384
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	10049034
Township:	GLOUCESTER	**Completion Date:**	8/16/1993
County:	OTTAWA-CARLETON	**Received Date:**	9/21/1993
Street:		**Tag:**	
City:		**Audit No:**	135944
Site:		**Contractor License:**	1558

Elevation: 82.18 *masl.*

UTM: 18 E 457162 N 5017453 **Long/Lat:** -75.546 , 45.309

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 30.5 m **Depth to Bedrock:** 0 m **Static Level:** 6.7 m **Well Type:** Bedrock

Pump Rate: 15 GPM **Boring Method:** Air Percussion

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	15.24		6.71
OPEN HOLE	15.24		30.48

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
GREY	SANDSTONE	0.00	30.48

Ministry of the Environment
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 1527383 | MUNICIP 15002 | CON. CON 06

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
[redacted]	[redacted]ucester	6	26

[redacted] Box 4208 stn. "E" Ottawa,Ontario K1S 5B2 — DATE COMPLETED 48-53: DAY 16 MO 8 YR 93

RC | ELEVATION | RC | BASIN CODE | II | III | IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Sand	Stone		0	5
Gray	Hardpan	Boulders		5	28
Gray	Sandstone		Hard	28	100

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
58	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
88	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	NOT TESTED — 1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6 1/4	1 ☐ STEEL 2 ☒ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	39
5 15/16	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		39	100
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
37.5	0	Cement - Grouted

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 20 GPM
DURATION OF PUMPING: 1 HOURS MINS

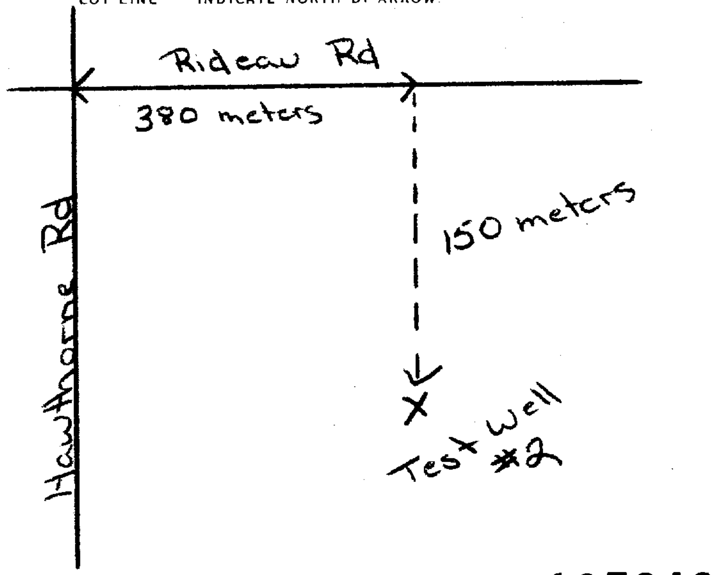
STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
7'6" FEET	14'6" FEET	13'11" FEET	14 FEET	14'4" FEET	14'6" FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 50 FEET
RECOMMENDED PUMPING RATE: 5 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



135946

DRILLERS REMARKS

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED
☐ DEWATERING

WATER USE

1 ☒ DOMESTIC
2 ☒ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☒ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING
☐ DIGGING
☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd.
WELL CONTRACTOR'S LICENCE NUMBER: 1558
ADDRESS: Box 490 Stittsville, Ontario K2S 1A6
NAME OF WELL TECHNICIAN: S.Miller/T. Harrison
WELL TECHNICIAN'S LICENCE NUMBER: T0097/T2251
SIGNATURE OF TECHNICIAN/CONTRACTOR: [signature]
SUBMISSION DATE: DAY 18 MO 8 YR 93

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 1558 | DATE RECEIVED SEP 21 1993
DATE OF INSPECTION | INSPECTOR
REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Appendix C
Certificates of Analysis – Water Supply

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Scott Wallis
Project: 11220832
Custody: 50734

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020

Order #: 2047521

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2047521-01	TW2-1hr

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	23-Nov-20	23-Nov-20
Ammonia, as N	EPA 351.2 - Auto Colour	20-Nov-20	20-Nov-20
Anions	EPA 300.1 - IC	20-Nov-20	20-Nov-20
Colour, apparent	SM2120 - Spectrophotometric	20-Nov-20	20-Nov-20
Conductivity	EPA 9050A- probe @25 °C	23-Nov-20	23-Nov-20
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	20-Nov-20	20-Nov-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Nov-20	20-Nov-20
pH	EPA 150.1 - pH probe @25 °C	23-Nov-20	23-Nov-20
Phenolics	EPA 420.2 - Auto Colour, 4AAP	25-Nov-20	25-Nov-20
Hardness	Hardness as CaCO3	20-Nov-20	20-Nov-20
Sulphide	SM 4500SE - Colourimetric	20-Nov-20	20-Nov-20
Tannin/Lignin	SM 5550B - Colourimetric	23-Nov-20	23-Nov-20
Total Dissolved Solids	SM 2540C - gravimetric, filtration	20-Nov-20	23-Nov-20
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	20-Nov-20	20-Nov-20
Turbidity	SM 2130B - Turbidity meter	20-Nov-20	20-Nov-20

PARACEL LABORATORIES LTD.

Order #: 2047521

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020

Order Date: 19-Nov-2020

Project Description: 11220832

	Client ID:	TW2-1hr	-	-	-
	Sample Date:	19-Nov-20 12:00	-	-	-
	Sample ID:	2047521-01	-	-	-
	MDL/Units	Water	-	-	-
General Inorganics					
Alkalinity, total	5 mg/L	269	-	-	-
Ammonia as N	0.01 mg/L	0.25	-	-	-
Dissolved Organic Carbon	0.5 mg/L	2.4	-	-	-
Colour, apparent	2 ACU	67	-	-	-
Conductivity	5 uS/cm	1390	-	-	-
Hardness	0.824 mg/L	633	-	-	-
pH	0.1 pH Units	7.8	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-
Total Dissolved Solids	10 mg/L	930	-	-	-
Sulphide	0.02 mg/L	<0.02	-	-	-
Tannin & Lignin	0.1 mg/L	<0.1	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.3	-	-	-
Turbidity	0.1 NTU	10.0	-	-	-
Anions					
Chloride	1 mg/L	91	-	-	-
Fluoride	0.1 mg/L	0.3	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-
Sulphate	1 mg/L	378	-	-	-
Metals					
Calcium	100 ug/L	154000	-	-	-
Iron	100 ug/L	739	-	-	-
Magnesium	200 ug/L	60600	-	-	-
Manganese	5 ug/L	176	-	-	-
Potassium	100 ug/L	9550	-	-	-
Sodium	200 ug/L	69200	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour, apparent	ND	2	ACU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	100	ug/L						
Iron	ND	100	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Potassium	ND	100	ug/L						
Sodium	ND	200	ug/L						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	93.6	1	mg/L	91.4			2.3	10	
Fluoride	0.33	0.1	mg/L	0.33			1.5	10	
Nitrate as N	ND	0.1	mg/L	ND			NC	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	352	1	mg/L	378			7.1	10	
General Inorganics									
Alkalinity, total	302	5	mg/L	265			13.0	14	
Ammonia as N	9.63	0.20	mg/L	8.78			9.1	18	
Dissolved Organic Carbon	3.2	0.5	mg/L	3.9			20.4	37	
Colour, apparent	67	2	ACU	67			0.0	12	
Conductivity	904	5	uS/cm	921			1.9	5	
pH	7.9	0.1	pH Units	7.9			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	566	10	mg/L	570			0.7	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	5.22	0.2	mg/L	5.40			3.3	16	
Turbidity	8.6	0.1	NTU	8.1			5.9	10	
Metals									
Calcium	31700	100	ug/L	31000			2.2	20	
Iron	ND	100	ug/L	ND			NC	20	
Magnesium	8220	200	ug/L	8150			0.9	20	
Manganese	ND	5	ug/L	ND			NC	20	
Potassium	1820	100	ug/L	1810			0.4	20	
Sodium	15400	200	ug/L	15300			0.7	20	

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020

Order Date: 19-Nov-2020

Project Description: 11220832

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	100	1	mg/L	91.4	85.8	77-123			
Fluoride	1.18	0.1	mg/L	0.33	85.2	79-121			
Nitrate as N	1.02	0.1	mg/L	ND	102	79-120			
Nitrite as N	0.952	0.05	mg/L	ND	95.2	84-117			
Sulphate	9.24	1	mg/L	ND	92.4	86-114			
General Inorganics									
Ammonia as N	0.390	0.01	mg/L	0.126	106	81-124			
Dissolved Organic Carbon	15.1	0.5	mg/L	3.9	112	60-133			
Phenolics	0.021	0.001	mg/L	ND	83.6	69-132			
Total Dissolved Solids	90.0	10	mg/L	ND	90.0	75-125			
Sulphide	0.46	0.02	mg/L	ND	93.0	79-115			
Tannin & Lignin	0.9	0.1	mg/L	ND	89.9	71-113			
Total Kjeldahl Nitrogen	1.99	0.1	mg/L	ND	99.4	81-126			
Metals									
Calcium	10600	100	ug/L	ND	106	80-120			
Iron	2130	100	ug/L	ND	84.5	80-120			
Magnesium	9570	200	ug/L	ND	95.7	80-120			
Manganese	48.4	5	ug/L	ND	94.6	80-120			
Potassium	10900	100	ug/L	1810	91.2	80-120			
Sodium	9510	200	ug/L	ND	95.1	80-120			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

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1-800-749-1947
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Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Robert Neck
Project: 11220832
Custody: 57054

Report Date: 18-Jan-2021
Order Date: 19-Nov-2020

Revised Report

Order #: 2047519

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2047519-01	TW2-END

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: **GHD Limited (Kingston)**

Client PO: 73522033 - Robert Neck

Report Date: 18-Jan-2021

Order Date: 19-Nov-2020

Project Description: 11220832

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	23-Nov-20	23-Nov-20
Ammonia, as N	EPA 351.2 - Auto Colour	20-Nov-20	20-Nov-20
Anions	EPA 300.1 - IC	20-Nov-20	20-Nov-20
Colour, apparent	SM2120 - Spectrophotometric	20-Nov-20	20-Nov-20
Conductivity	EPA 9050A- probe @25 °C	23-Nov-20	23-Nov-20
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	20-Nov-20	20-Nov-20
Hardness	Hardness as CaCO3	20-Nov-20	20-Nov-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Nov-20	20-Nov-20
pH	EPA 150.1 - pH probe @25 °C	23-Nov-20	23-Nov-20
Phenolics	EPA 420.2 - Auto Colour, 4AAP	25-Nov-20	25-Nov-20
Sulphide	SM 4500SE - Colourimetric	20-Nov-20	20-Nov-20
Tannin/Lignin	SM 5550B - Colourimetric	23-Nov-20	23-Nov-20
Total Dissolved Solids	SM 2540C - gravimetric, filtration	20-Nov-20	23-Nov-20
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	20-Nov-20	20-Nov-20
Turbidity	SM 2130B - Turbidity meter	20-Nov-20	20-Nov-20

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Robert Neck

Report Date: 18-Jan-2021

Order Date: 19-Nov-2020

Project Description: 11220832

	MDL/Units				
Client ID:		TW2-END	-	-	-
Sample Date:		19-Nov-20 15:30	-	-	-
Sample ID:		2047519-01	-	-	-
		Water	-	-	-
General Inorganics					
Alkalinity, total	5 mg/L	267	-	-	-
Hardness	mg/L	632	-	-	-
Ammonia as N	0.01 mg/L	0.25	-	-	-
Dissolved Organic Carbon	0.5 mg/L	2.2	-	-	-
Colour, apparent	2 ACU	68	-	-	-
Conductivity	5 uS/cm	1380	-	-	-
pH	0.1 pH Units	7.7	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-
Total Dissolved Solids	10 mg/L	940	-	-	-
Sulphide	0.02 mg/L	<0.02	-	-	-
Tannin & Lignin	0.1 mg/L	<0.1	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.4	-	-	-
Turbidity	0.1 NTU	9.5	-	-	-
Anions					
Chloride	1 mg/L	94	-	-	-
Fluoride	0.1 mg/L	0.3	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-
Sulphate	1 mg/L	389	-	-	-
Metals					
Calcium	100 ug/L	153000	-	-	-
Iron	100 ug/L	699	-	-	-
Magnesium	200 ug/L	60900	-	-	-
Manganese	5 ug/L	180	-	-	-
Potassium	100 ug/L	9770	-	-	-
Sodium	200 ug/L	68600	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour, apparent	ND	2	ACU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	100	ug/L						
Iron	ND	100	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Potassium	ND	100	ug/L						
Sodium	ND	200	ug/L						

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Robert Neck

Report Date: 18-Jan-2021

Order Date: 19-Nov-2020

Project Description: 11220832

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	93.6	1	mg/L	91.4			2.3	10	
Fluoride	0.33	0.1	mg/L	0.33			1.5	10	
Nitrate as N	ND	0.1	mg/L	ND			NC	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	352	1	mg/L	378			7.1	10	
General Inorganics									
Alkalinity, total	302	5	mg/L	265			13.0	14	
Ammonia as N	9.63	0.20	mg/L	8.78			9.1	18	
Dissolved Organic Carbon	3.2	0.5	mg/L	3.9			20.4	37	
Colour, apparent	67	2	ACU	67			0.0	12	
Conductivity	904	5	uS/cm	921			1.9	5	
pH	7.9	0.1	pH Units	7.9			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	566	10	mg/L	570			0.7	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	5.22	0.2	mg/L	5.40			3.3	16	
Turbidity	8.6	0.1	NTU	8.1			5.9	10	
Metals									
Calcium	31700	100	ug/L	31000			2.2	20	
Iron	ND	100	ug/L	ND			NC	20	
Magnesium	8220	200	ug/L	8150			0.9	20	
Manganese	ND	5	ug/L	ND			NC	20	
Potassium	1820	100	ug/L	1810			0.4	20	
Sodium	15400	200	ug/L	15300			0.7	20	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	100	1	mg/L	91.4	85.8	77-123			
Fluoride	1.18	0.1	mg/L	0.33	85.2	79-121			
Nitrate as N	1.02	0.1	mg/L	ND	102	79-120			
Nitrite as N	0.952	0.05	mg/L	ND	95.2	84-117			
Sulphate	9.24	1	mg/L	ND	92.4	86-114			
General Inorganics									
Ammonia as N	0.390	0.01	mg/L	0.126	106	81-124			
Dissolved Organic Carbon	15.1	0.5	mg/L	3.9	112	60-133			
Phenolics	0.021	0.001	mg/L	ND	83.6	69-132			
Total Dissolved Solids	90.0	10	mg/L	ND	90.0	75-125			
Sulphide	0.46	0.02	mg/L	ND	93.0	79-115			
Tannin & Lignin	0.9	0.1	mg/L	ND	89.9	71-113			
Total Kjeldahl Nitrogen	1.99	0.1	mg/L	ND	99.4	81-126			
Metals									
Calcium	10600	100	ug/L	ND	106	80-120			
Iron	2130	100	ug/L	ND	84.5	80-120			
Magnesium	9570	200	ug/L	ND	95.7	80-120			
Manganese	48.4	5	ug/L	ND	94.6	80-120			
Potassium	10900	100	ug/L	1810	91.2	80-120			
Sodium	9510	200	ug/L	ND	95.1	80-120			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1 - Hardness is now included in this report.

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

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Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Scott Wallis
Project: 11220832
Custody: 57054

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020

Order #: 2047519

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2047519-01	TW2-END

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: GHD Limited (Kingston)
Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020
Project Description: 11220832

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
E. coli	MOE E3407	20-Nov-20	20-Nov-20
Fecal Coliform	SM 9222D	20-Nov-20	20-Nov-20
Heterotrophic Plate Count	SM 9215C	21-Nov-20	21-Nov-20
Total Coliform	MOE E3407	20-Nov-20	20-Nov-20

PARACEL LABORATORIES LTD.

Order #: 2047519

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020

Order Date: 19-Nov-2020

Project Description: 11220832

	Client ID:	TW2-END	-	-	-
	Sample Date:	19-Nov-20 15:30	-	-	-
	Sample ID:	2047519-01	-	-	-
	MDL/Units	Water	-	-	-
Microbiological Parameters					
E. coli	1 CFU/100 mL	<10 [1]	-	-	-
Fecal Coliforms	1 CFU/100 mL	<10 [1]	-	-	-
Total Coliforms	1 CFU/100 mL	<10 [1]	-	-	-
Heterotrophic Plate Count	10 CFU/mL	<10	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL						
Fecal Coliforms	ND	1	CFU/100 mL						
Total Coliforms	ND	1	CFU/100 mL						
Heterotrophic Plate Count	ND	10	CFU/mL						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Microbiological Parameters									
E. coli	ND	10	CFU/100 mL	ND			NC	30	BAC13
Fecal Coliforms	ND	10	CFU/100 mL	ND			NC	30	BAC13
Total Coliforms	ND	10	CFU/100 mL	ND			NC	30	BAC13
Heterotrophic Plate Count	ND	10	CFU/mL	ND			NC	30	

Qualifier Notes:

Sample Qualifiers :

1 : Bacteria reporting limits are raised due to dilutions based on expected elevated concentrations based on source of water sample.

QC Qualifiers :

BAC13 : Bacteria reporting limits are raised due to dilutions based on expected elevated concentrations based on source of water sample.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : 11220832-01 Ottawa

15-December-2020

GHD Limited - 735
Attn : Jason Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8, Canada

Phone: 705-749-3317
Fax:705-749-9248

Date Rec. : 10 December 2020
LR Report: **CA15152-DEC20**
Reference: PO:73522265,
11220832-01 Jason Geraldi

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	**1: Analysis Start Date**	**2: Analysis Start Time**	**3: Analysis Completed Date**	**4: Analysis Completed Time**	**5: MAC**	**6: TW-2**
Sample Date & Time						10-Dec-20
Temp Upon Receipt [°C]	---	---	---	---	---	9.0
Total Coliform [cfu/100mL]	10-Dec-20	16:05	14-Dec-20	11:02		0
Ecoli [cfu/100mL]	10-Dec-20	16:05	14-Dec-20	11:02		0
Fecal Coliform [cfu/100mL]	10-Dec-20	16:05	14-Dec-20	11:02		0

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable drinking water regulations as per client.

Temperature of Sample upon Receipt: 9 degrees C
Cooling Agent Present:Yes
Custody Seal Present:YEs

Chain of Custody Number:011447

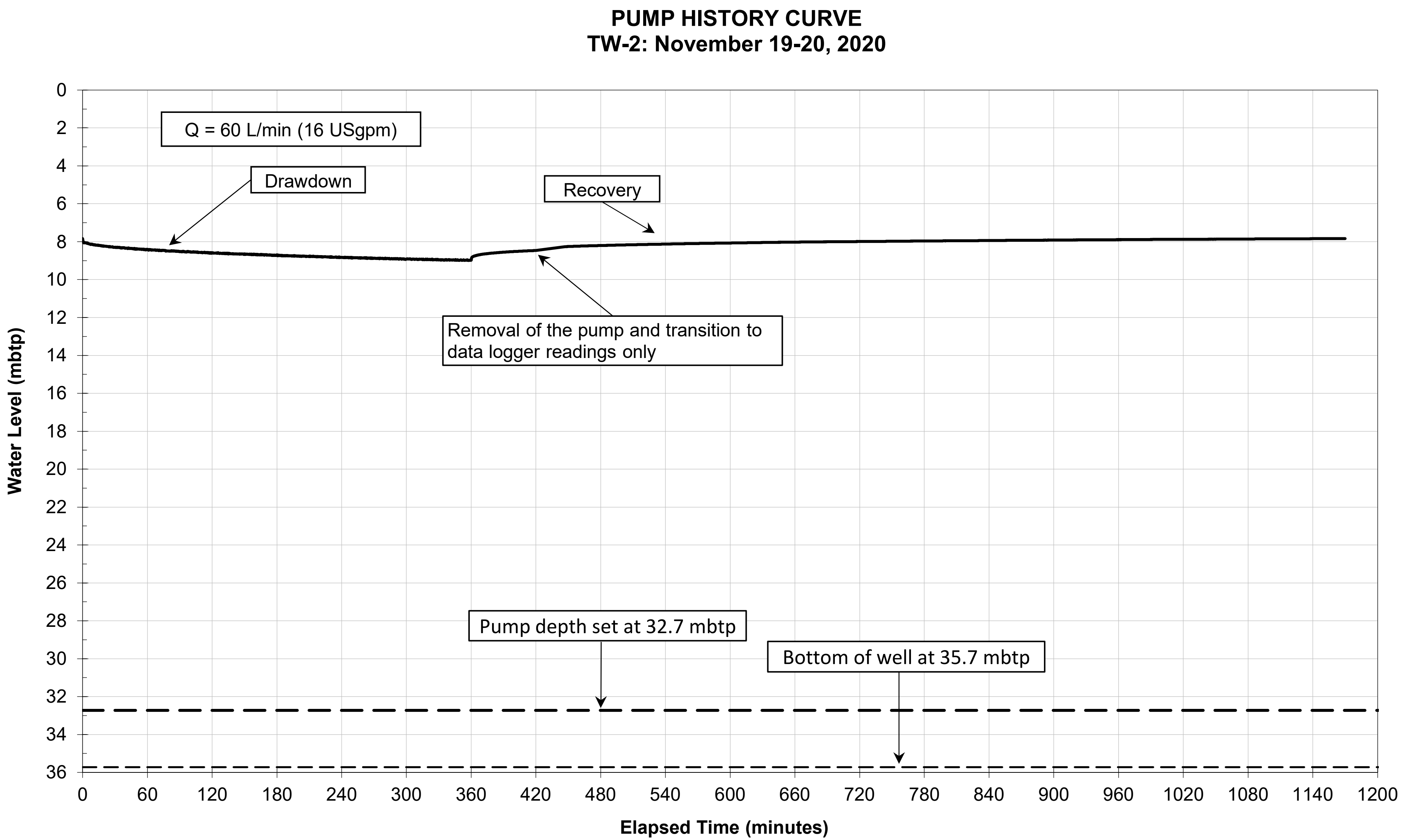
Jill Campbell

Jill Campbell, B.Sc.,GISAS
Project Specialist, Environment, Health & Safety

OnLine LIMS

0002350752

Appendix D
Aquifer Performance Testing Data



PUMP HISTORY CURVE

Drilled Test Well (TW-2)
MECP Well ID: 1527383
Static Level = 7.83 mbtp (6.90 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

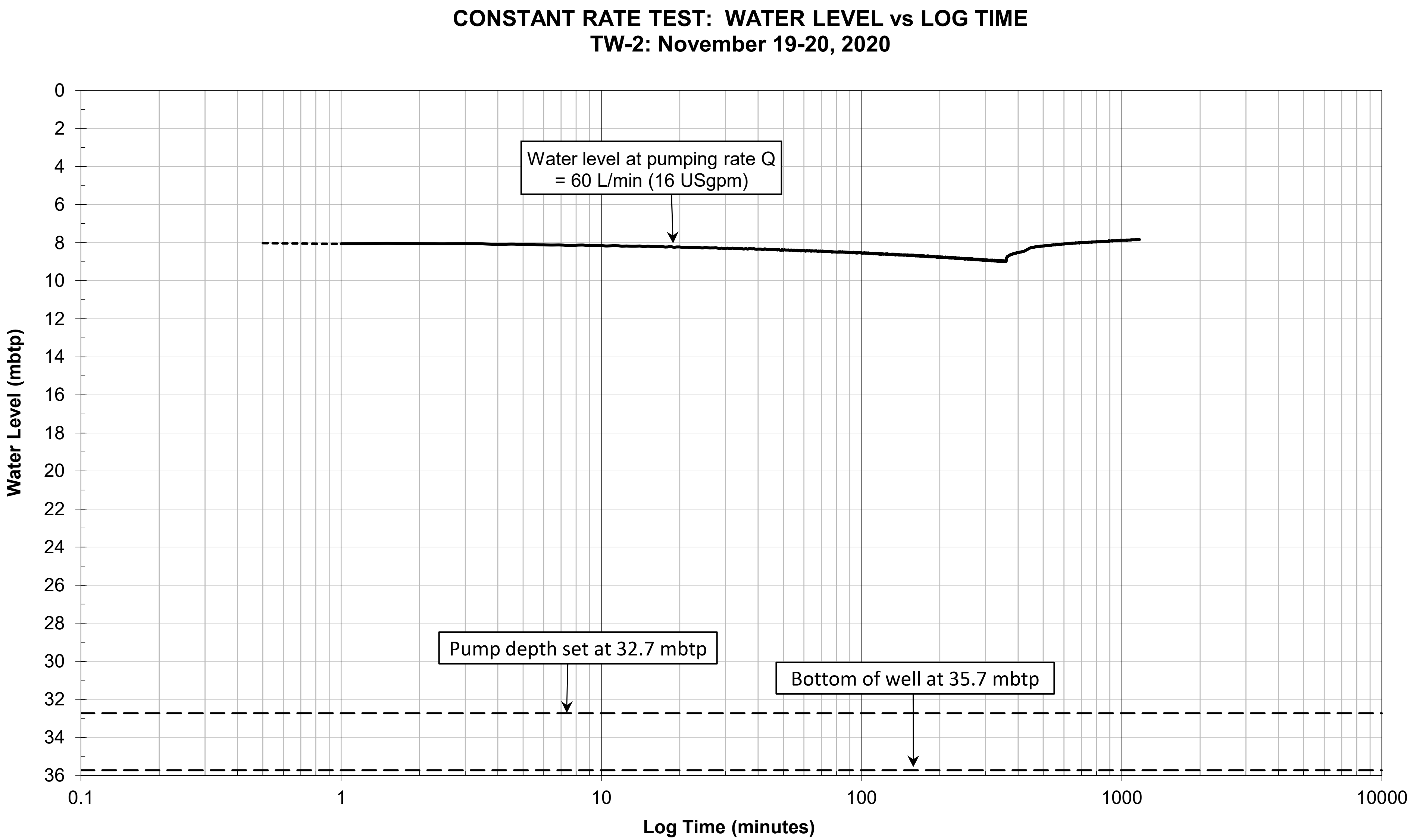
DATE: JANUARY 2021

LOCATION: Rideau & Somme St, Ottawa, ON

JOB NUMBER: 11220832-01

DRAWING NUMBER: D-1

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 www.ghd.com

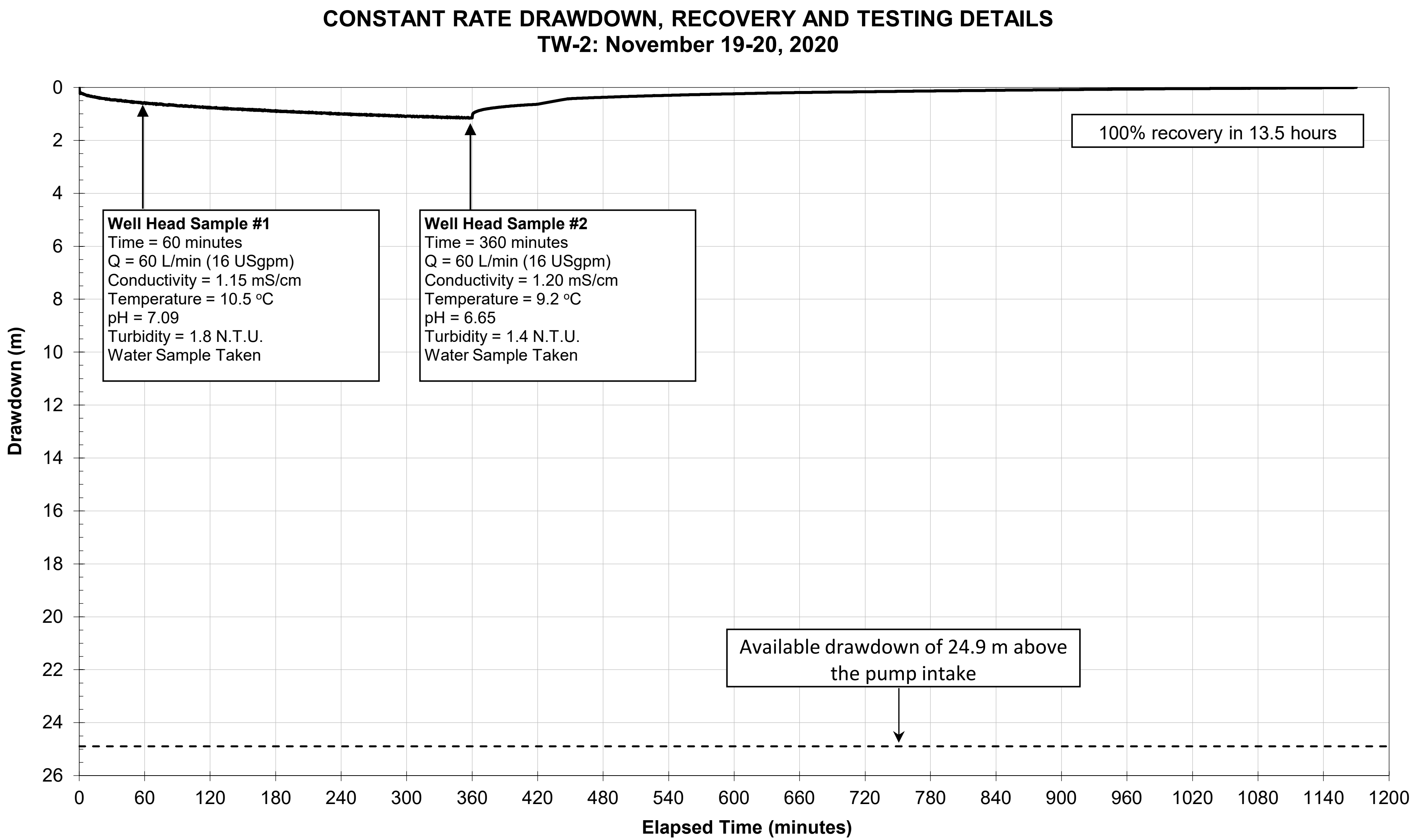


CONSTANT RATE

Drilled Test Well (TW-2)
MECP Well ID: 1527383
Static Level = 7.83 mbtp (6.90 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: JANUARY 2021	GHD
LOCATION: Rideau & Somme St, Ottawa, ON	
JOB NUMBER: 11220832-01	347 PIDO ROAD, UNIT 29
DRAWING NUMBER: D-2	PETERBOROUGH, ON K9J 6X7 (705) 749-3317 www.ghd.com



CONSTANT RATE DRAWDOWN

Drilled Test Well (TW-2)

MECP Well ID: 1527383

Static Level = 7.83 mbtp (6.90 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: JANUARY 2021

LOCATION: Rideau & Somme St, Ottawa, ON

JOB NUMBER: 11220832-01

DRAWING NUMBER: D-3

GHD

347 PIDO ROAD, UNIT 29

PETERBOROUGH, ON K9J 6X7

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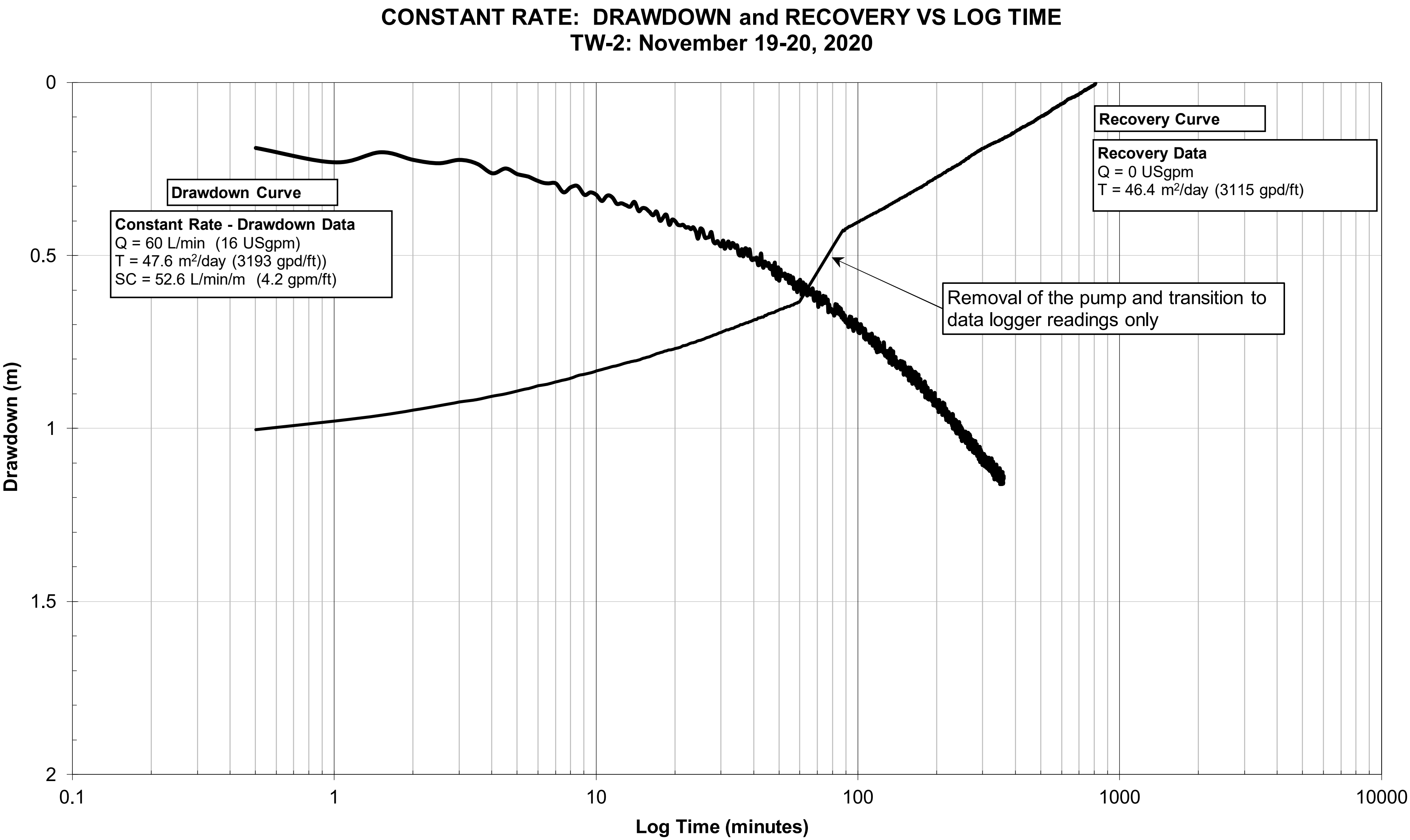


TRANSMISSIVITY

Drilled Test Well (TW-2)
MECP Well ID: 1527383
Static Level = 7.83 mbtp (6.90 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: JANUARY 2021

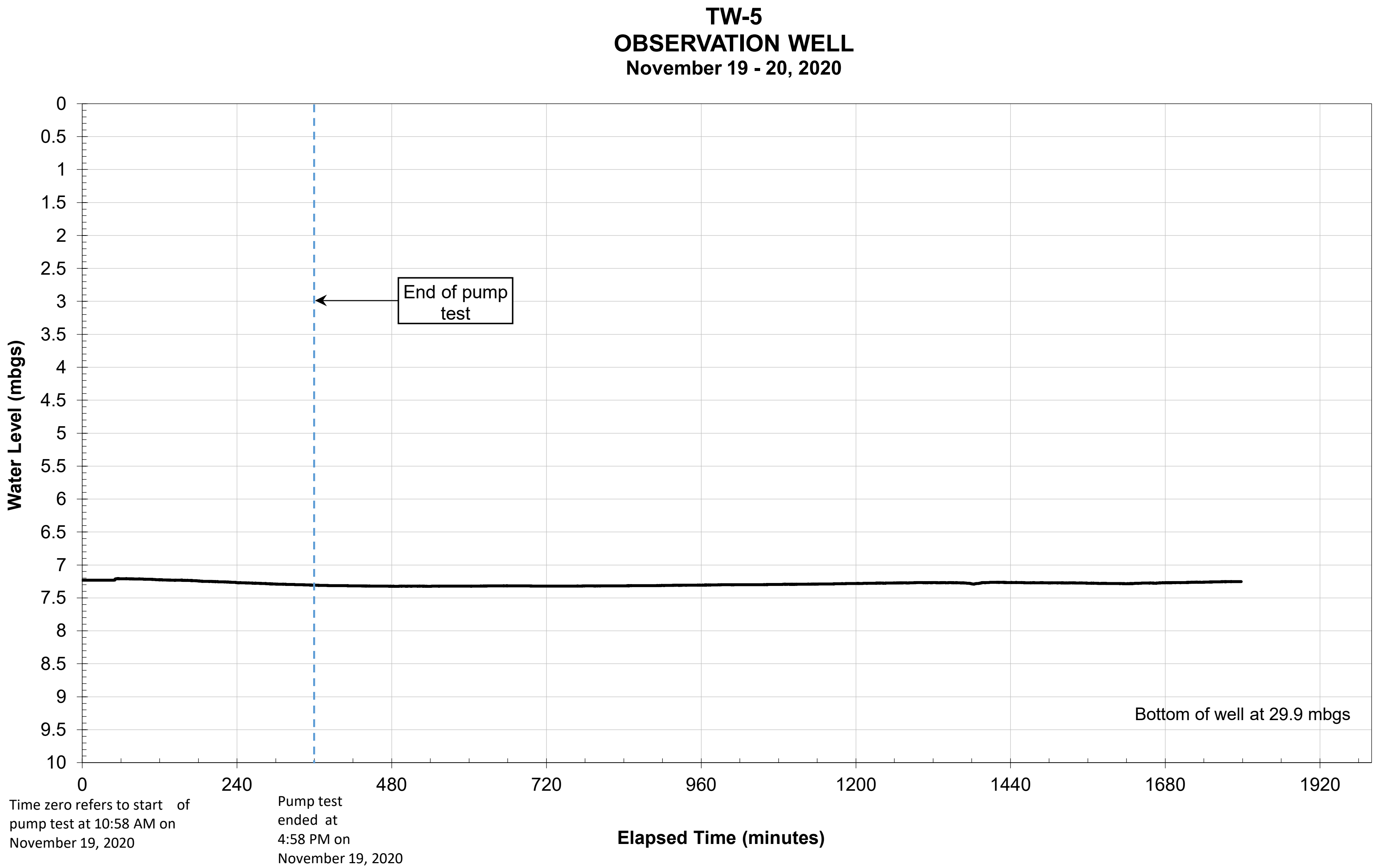
LOCATION: Rideau & Somme St., Ottawa ON

JOB NUMBER: 11220832-01

DRAWING NUMBER: B-4

GHD
347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 www.ghd.com

Appendix E
Observation Well Monitoring Data



OBSERVATION WELL

Drilled Observation Well - TW-5
MECP Well Tag No. A295342
Static Level = 7.2 mbgs

Note: mbgs = metres below ground surface

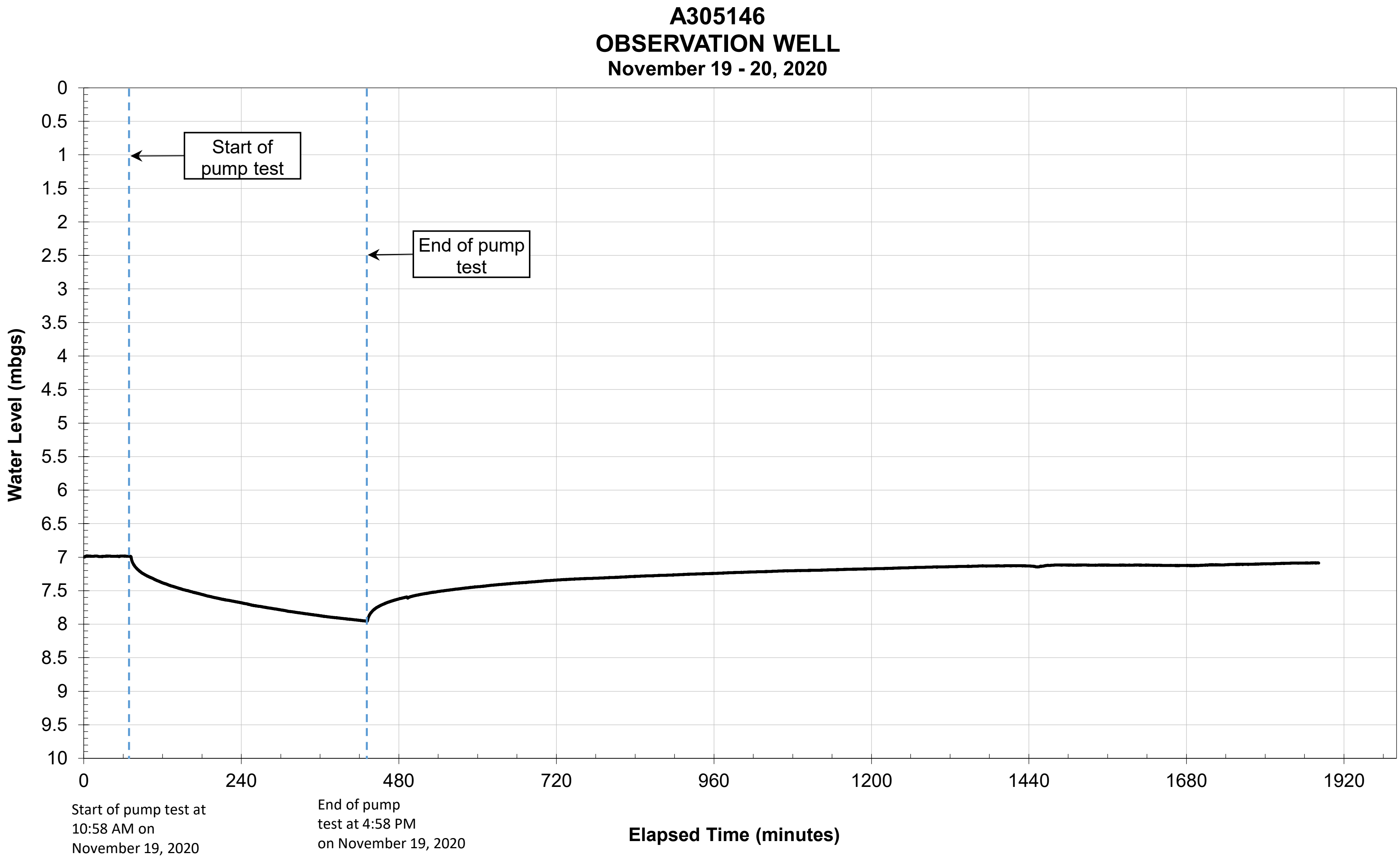
DATE: JANUARY 2021

LOCATION: Rideau Rd. & Somme St., Ottawa, ON

PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-1

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
www.ghd.com



OBSERVATION WELL

Drilled Well

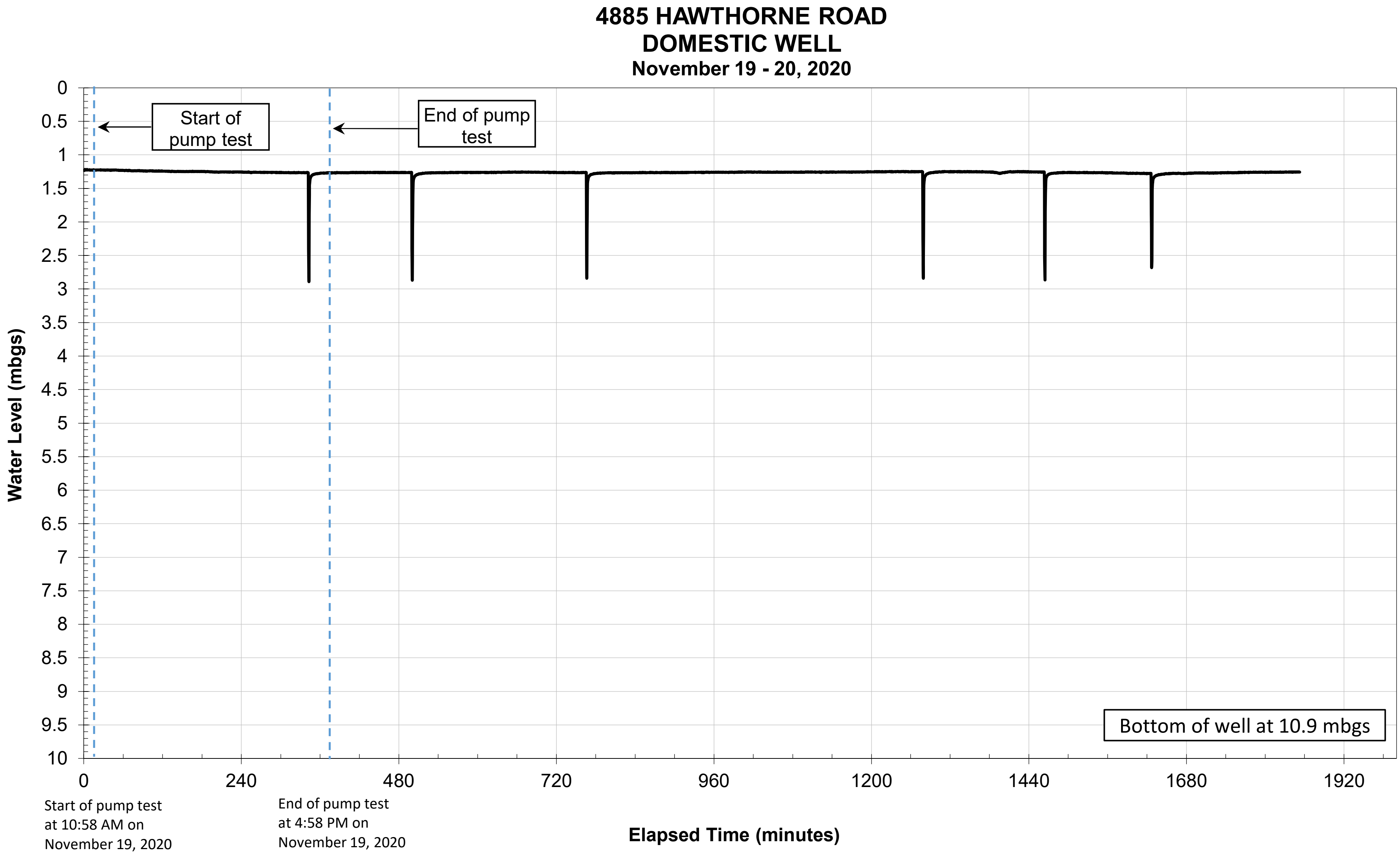
MECP Well Tag No. A305146

Static Level = 7.0 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021	
LOCATION: Rideau Rd. & Somme St., Ottawa, ON	
PROJECT NUMBER: 11220832-01	
DRAWING NUMBER: E-2	

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
www.ghd.com



DOMESTIC WELL

Drilled Domestic Well
4885 Hawthorne Road, Ottawa, ON
Static Level = 1.2 mbgs

Note: mbgs = metres below ground surface

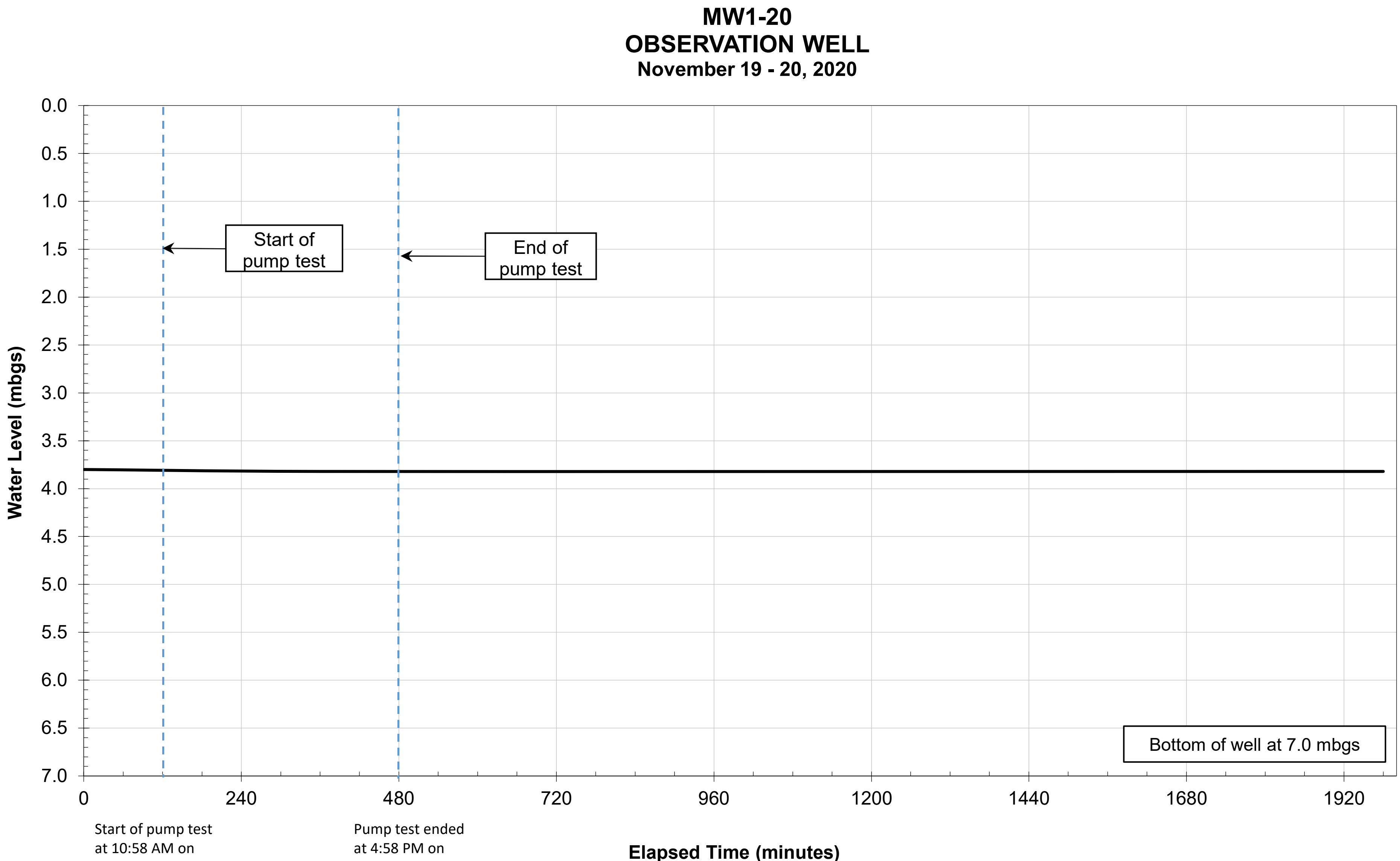
DATE: JANUARY 2021

LOCATION: Rideau Rd. & Somme St., Ottawa, ON

PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-3

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
www.ghd.com



Start of pump test at 10:58 AM on November 19, 2020

Pump test ended at 4:58 PM on November 19, 2020

OBSERVATION WELL

Observation Well - MW1-20
MECP Well Tag No. A290162
Static Level = 3.8 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021	
LOCATION: Rideau Rd. & Somme St., Ottawa, ON	
PROJECT NUMBER: 11220832-01	
DRAWING NUMBER: E-4	

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
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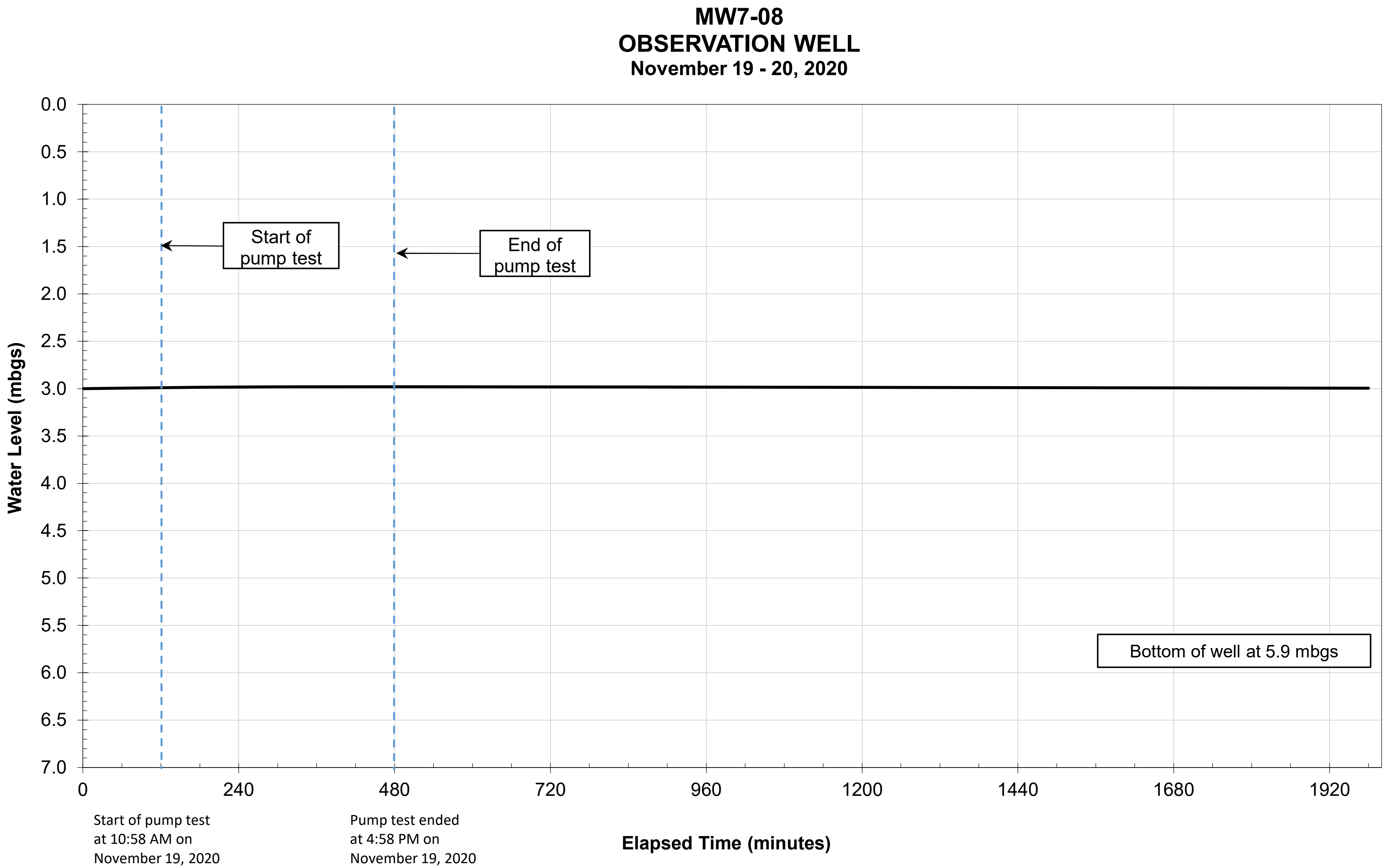

OBSERVATION WELL

Observation Well - MW7-08
Static Level = 3.0 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021	
LOCATION: Rideau Rd. & Somme St., Ottawa, ON	
PROJECT NUMBER: 11220832-01	
DRAWING NUMBER: E-5	

347 PIDO ROAD, UNIT 29
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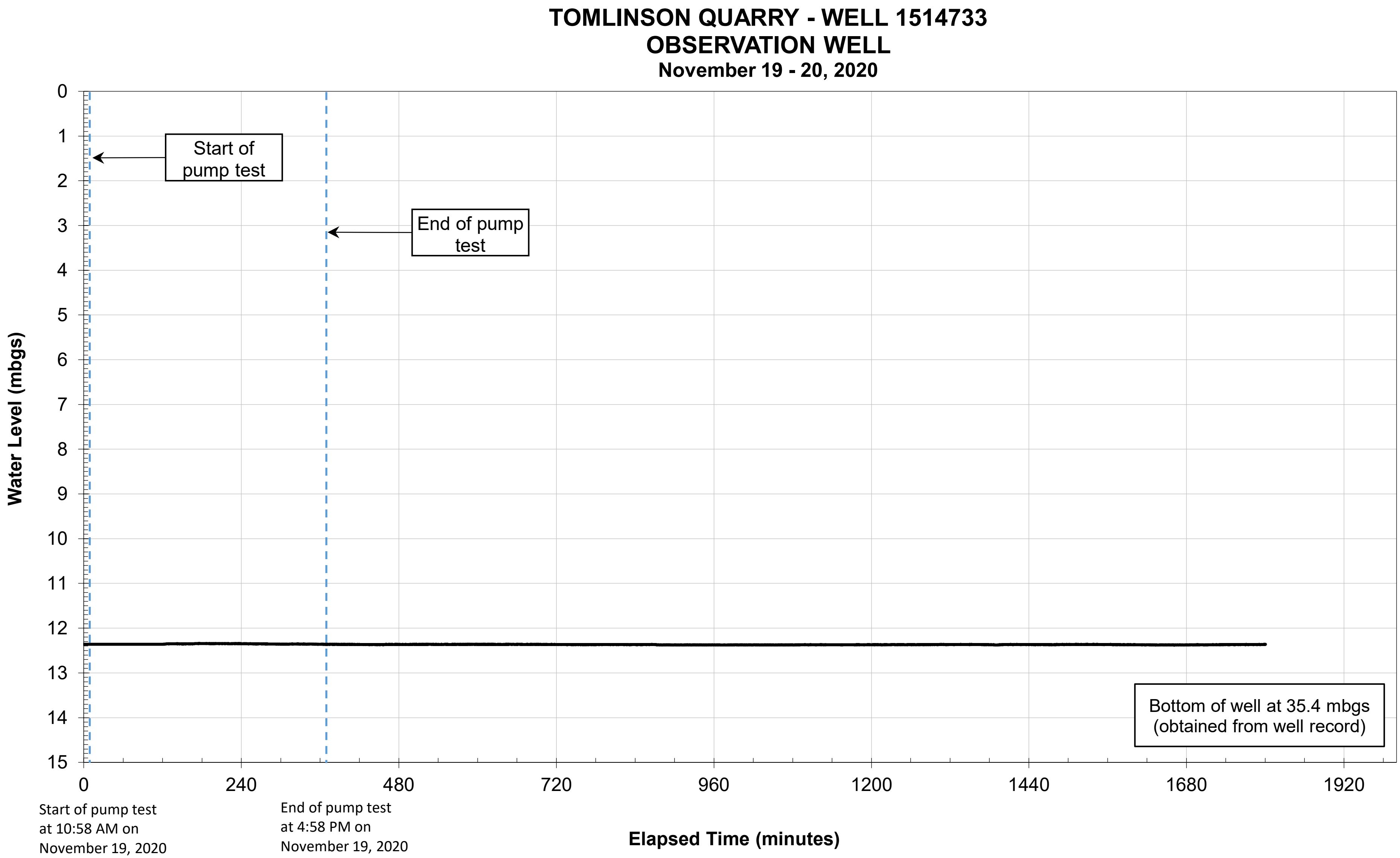

OBSERVATION WELL

Drilled Well - Tomlinson Quarry
MECP Well ID 1514733
Static Level = 12.4 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021	
LOCATION: Rideau Rd. & Somme St., Ottawa, ON	
PROJECT NUMBER: 11220832-01	
DRAWING NUMBER: E-6	

GHD
347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
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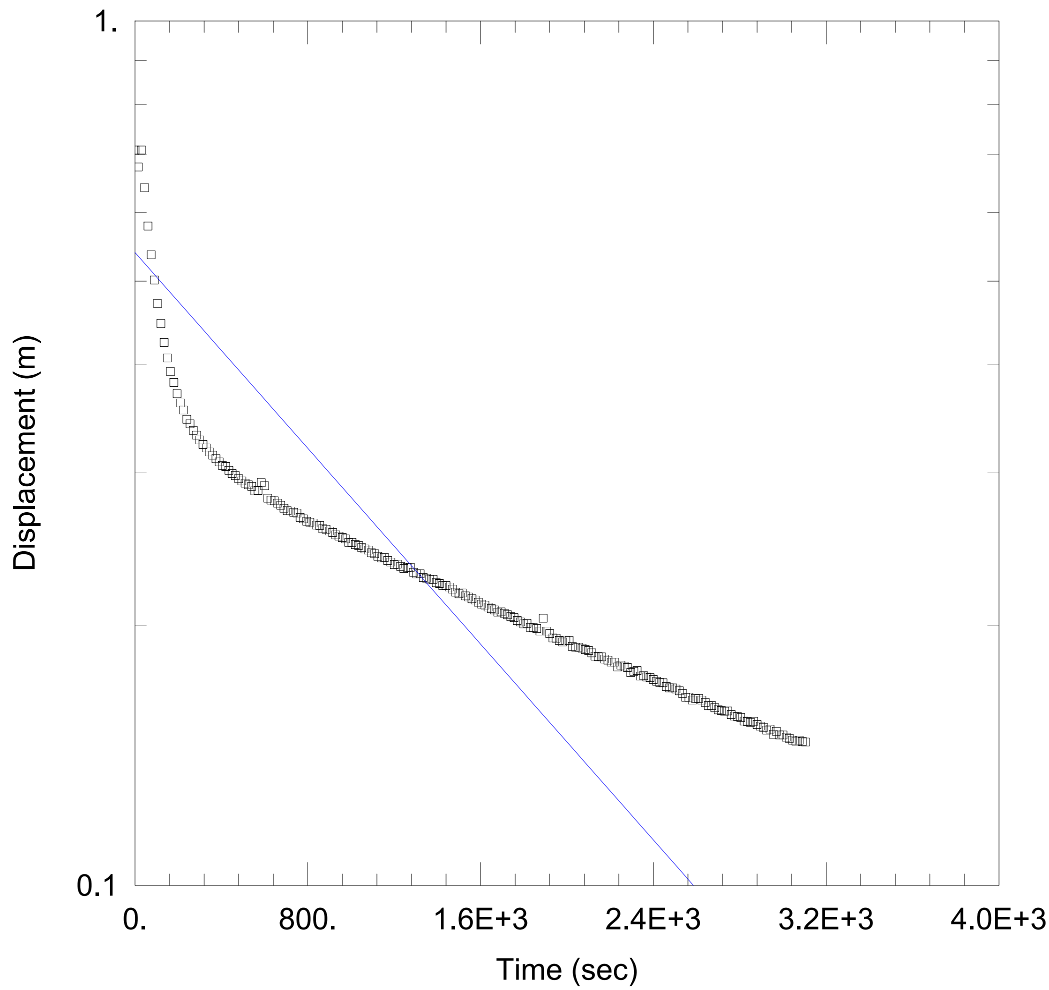
Appendix F
Single Well Response Testing



MW1-20 FALLING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH1-20 Falling Head Test.aqt
Date: 12/08/20 Time: 14:41:47

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH1-20
Test Date: November 23, 2020

AQUIFER DATA

Saturated Thickness: 3.15 m
Anisotropy Ratio (Kz/Kr): 1.

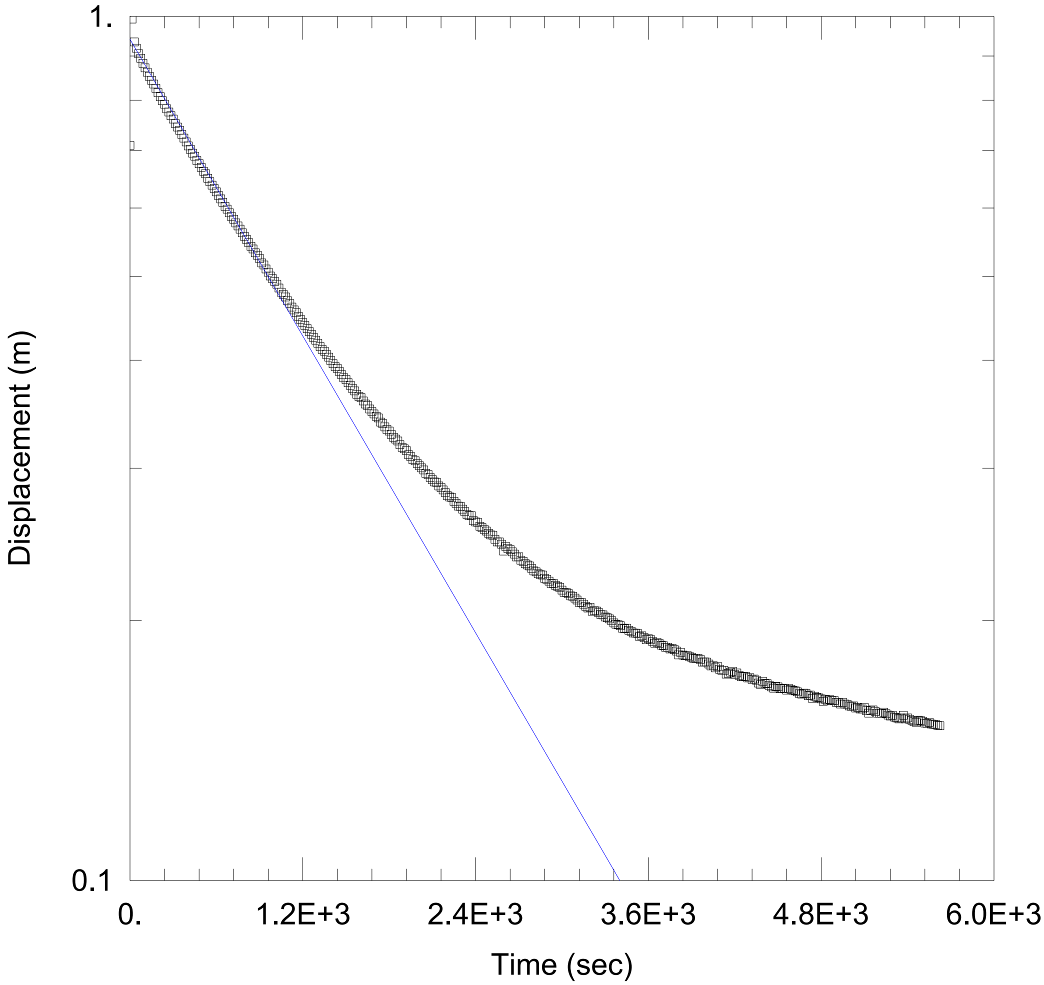
WELL DATA (BH1-20)

Initial Displacement: 0.7091 m
Static Water Column Height: 3.15 m
Total Well Penetration Depth: 6.99 m
Screen Length: 1.52 m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.632E-5 cm/sec
y0 = 0.5397 m



MW1-20 RISING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH1-20 Rising Head Test.aqt
Date: 12/08/20 Time: 14:42:19

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH1-20
Test Date: November 23, 2020

AQUIFER DATA

Saturated Thickness: 3.15 m
Anisotropy Ratio (Kz/Kr): 1.

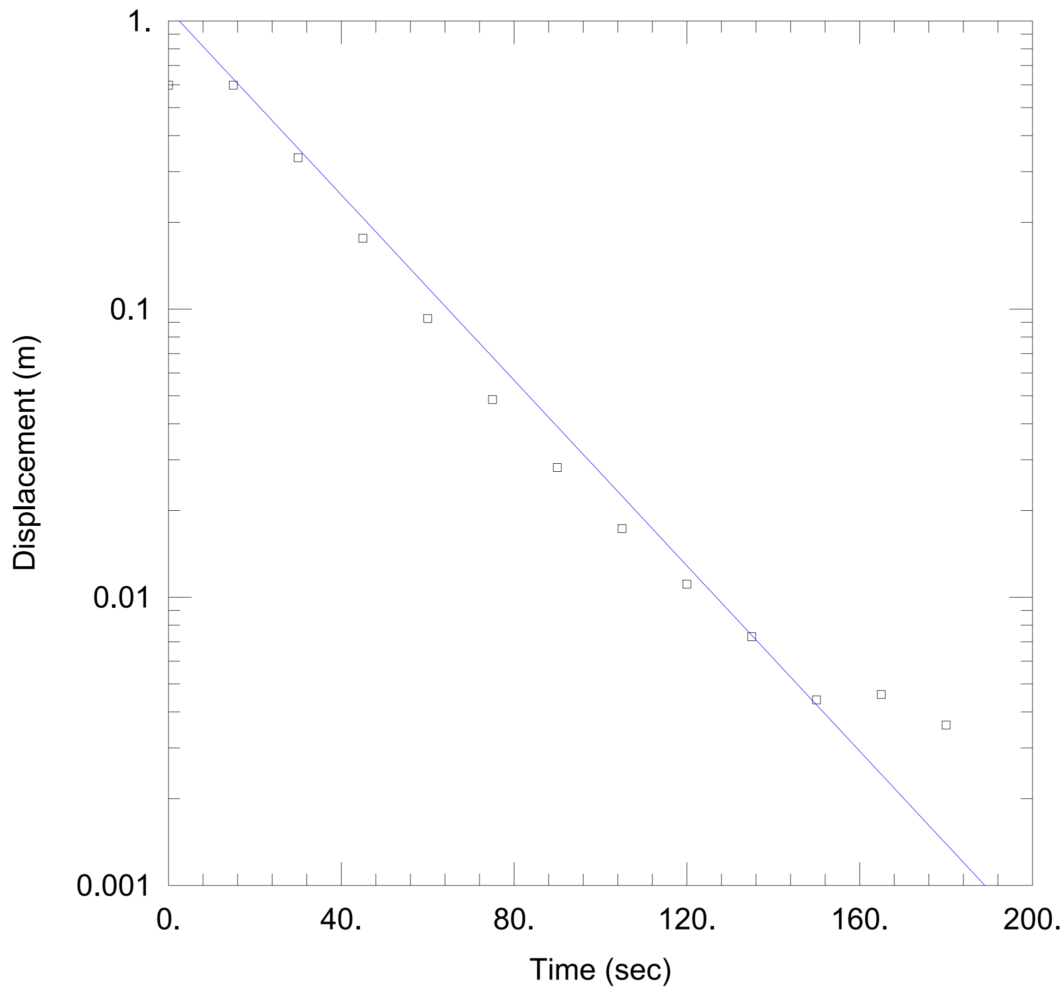
WELL DATA (BH1-20)

Initial Displacement: 0.7091 m
Static Water Column Height: 3.15 m
Total Well Penetration Depth: 6.99 m
Screen Length: 1.52 m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.694E-5 cm/sec
y0 = 0.941 m



MW7-08 FALLING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH7-08 Falling Head Test.aqt
Date: 12/08/20 Time: 14:56:02

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH7-08
Test Date: November 23, 2020

AQUIFER DATA

Saturated Thickness: 3.09 m
Anisotropy Ratio (Kz/Kr): 1.

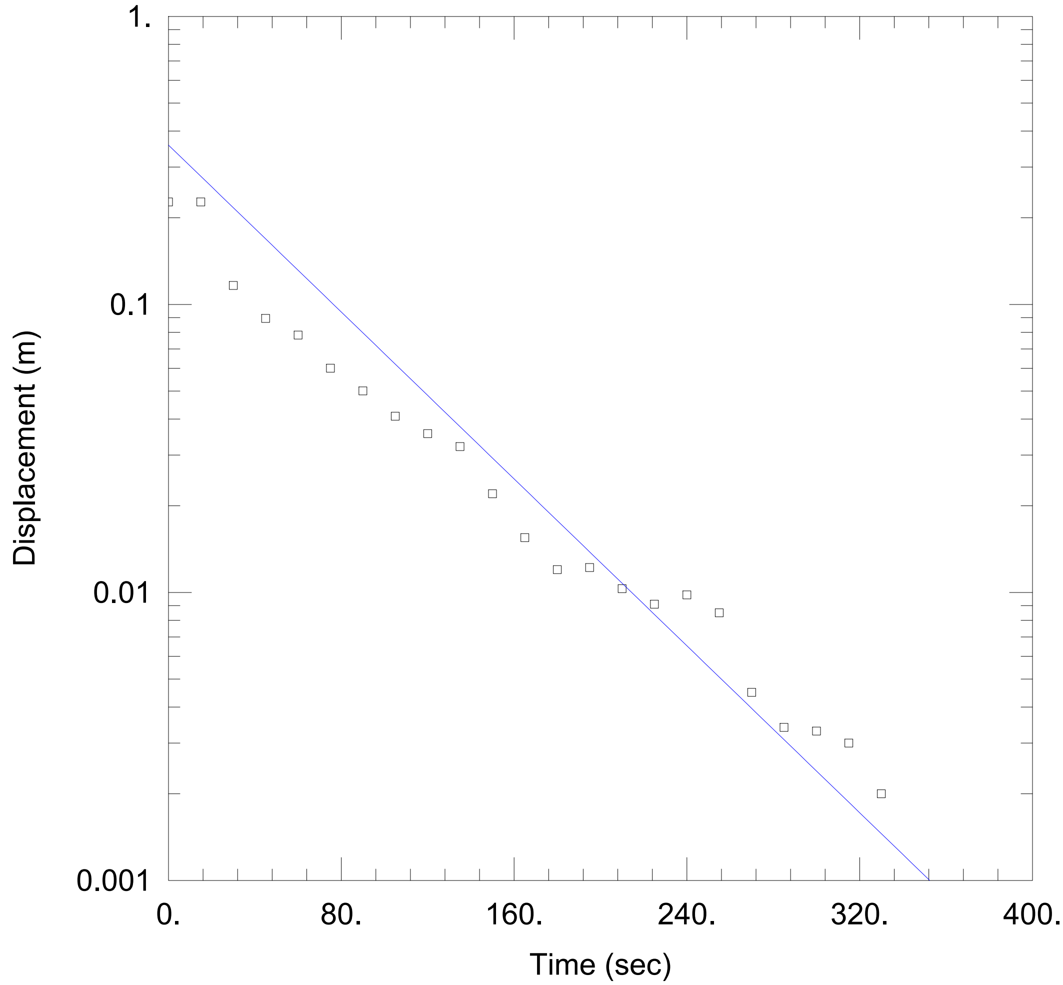
WELL DATA (BH7-08)

Initial Displacement: 0.5981 m
Static Water Column Height: 3.09 m
Total Well Penetration Depth: 6.1 m
Screen Length: 1.52 m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.003138 cm/sec
y0 = 1.097 m



MW7-08 RISING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH7-08 Rising Head Test.aqt
Date: 12/08/20 Time: 15:03:09

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH7-08
Test Date: November 23, 2020

AQUIFER DATA

Saturated Thickness: 3.09 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH7-08)

Initial Displacement: 0.2268 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.09 m
Screen Length: 1.52 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.001413 cm/sec
y0 = 0.3575 m

Appendix G
Certificates of Analysis – Construction Dewatering

Appendix G: Summary of Groundwater Sampling for Construction Dewatering

Parameter	Units	Storm Sewer ByLaw 2003-514 Schedule A Table 2 Limit		MW7-08
Biochemical Oxygen Demand	mg/L	25		<6
Cyanide (total)	mg/L	0.02		<0.01
Phenolics (4AAP)	mg/L	0.008		<0.001
Phosphorous (total)	mg/L	0.4		**1.83**
Suspended Solids (total)	mg/L	15		**1030**
pH		6-9		7.4
Arsenic (total)	mg/L	0.02		**0.03**
Cadmium (total)	mg/L	0.008		<0.001
Chromium (total)	mg/L	0.08		0.08
Copper (total)	mg/L	0.04		**0.191**
Lead (total)	mg/L	0.12		0.066
Manganese (total)	mg/L	0.05		**9.34**
Mercury (total)	mg/L	0.0004		<0.0001
Nickel (total)	mg/L	0.08		**0.099**
Selenium (total)	mg/L	0.02		0.007
Silver (total)	mg/L	0.12		<0.001
Zinc (total)	mg/L	0.04		**0.33**
Benzene	mg/L	0.002		<0.0005
Chloroform	mg/L	0.002		<0.0005
1,2.Dichlorobenzene / o	mg/L	0.0056		<0.0005
1,4-Dichlorobenzene / p	mg/L	0.0068		<0.0005
cis-1,2-dichloroethylene	mg/L	0.0056		<0.0005
trans-1,2-dichloroethylene	mg/L	0.0056		<0.0005
Ethylbenzene	mg/L	0.002		<0.0005
Methylene Chloride	mg/L	0.0052		<0.005
1,1,2,2-Tetrachloroethane	mg/L	0.017		<0.0005
Tetrachloroethylene	mg/L	0.0044		<0.0005
Toluene	mg/L	0.002		<0.0005
Trichloroethylene	mg/L	0.0076		<0.0005
Xylene (total)	mg/L	0.0044		<0.0005

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Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Scott Wallis
Project: 11220832
Custody: 55735

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020

Order #: 2047520

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2047520-01	MW7-08

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CBOD	SM 5210B - DO Probe	20-Nov-20	20-Nov-20
Cyanide, total	MOE E3015 - Auto Colour	20-Nov-20	20-Nov-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	20-Nov-20	20-Nov-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Nov-20	20-Nov-20
Ottawa - Storm: VOCs	EPA 624 - P&T GC-MS	20-Nov-20	22-Nov-20
pH	EPA 150.1 - pH probe @25 °C	23-Nov-20	23-Nov-20
Phenolics	EPA 420.2 - Auto Colour, 4AAP	25-Nov-20	25-Nov-20
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	20-Nov-20	20-Nov-20
Total Suspended Solids	SM 2540D - Gravimetric	20-Nov-20	20-Nov-20

PARACEL LABORATORIES LTD.

Order #: 2047520

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020

Order Date: 19-Nov-2020

Project Description: 11220832

	MDL/Units	MW7-08 19-Nov-20 10:00 2047520-01 Water	-	-	-
Client ID: / **Sample Date:** / **Sample ID:**					
General Inorganics					
CBOD	2 mg/L	<6 [1]	-	-	-
Cyanide, total	0.01 mg/L	<0.01	-	-	-
pH	0.1 pH Units	7.4	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-
Phosphorus, total	0.01 mg/L	1.83	-	-	-
Total Suspended Solids	2 mg/L	1030	-	-	-
Metals - Total					
Arsenic	0.01 mg/L	0.03	-	-	-
Cadmium	0.001 mg/L	<0.001	-	-	-
Chromium	0.05 mg/L	0.08	-	-	-
Copper	0.005 mg/L	0.191	-	-	-
Lead	0.001 mg/L	0.066	-	-	-
Manganese	0.05 mg/L	9.34	-	-	-
Mercury	0.0001 mg/L	<0.0001	-	-	-
Nickel	0.005 mg/L	0.099	-	-	-
Selenium	0.005 mg/L	0.007	-	-	-
Silver	0.001 mg/L	<0.001	-	-	-
Zinc	0.02 mg/L	0.33	-	-	-
Volatiles					
Benzene	0.0005 mg/L	<0.0005	-	-	-
Chloroform	0.0005 mg/L	<0.0005	-	-	-
1,2-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-
1,4-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-
cis-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	-
trans-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	-	-	-
Ethylbenzene	0.0005 mg/L	<0.0005	-	-	-
Methylene Chloride	0.005 mg/L	<0.005	-	-	-
1,1,2,2-Tetrachloroethane	0.0005 mg/L	<0.0005	-	-	-
Tetrachloroethylene	0.0005 mg/L	<0.0005	-	-	-
Toluene	0.0005 mg/L	<0.0005	-	-	-
Trichloroethylene	0.0005 mg/L	<0.0005	-	-	-
Xylenes, total	0.0005 mg/L	<0.0005	-	-	-
4-Bromofluorobenzene	Surrogate	93.1%	-	-	-
Dibromofluoromethane	Surrogate	119%	-	-	-
Toluene-d8	Surrogate	127%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
CBOD	ND	2	mg/L						
Cyanide, total	ND	0.01	mg/L						
Phenolics	ND	0.001	mg/L						
Phosphorus, total	ND	0.01	mg/L						
Total Suspended Solids	ND	2	mg/L						
Metals - Total									
Arsenic	ND	0.01	mg/L						
Cadmium	ND	0.001	mg/L						
Chromium	ND	0.05	mg/L						
Copper	ND	0.005	mg/L						
Lead	ND	0.001	mg/L						
Mercury	ND	0.0001	mg/L						
Manganese	ND	0.05	mg/L						
Nickel	ND	0.005	mg/L						
Selenium	ND	0.005	mg/L						
Silver	ND	0.001	mg/L						
Zinc	ND	0.02	mg/L						
Volatiles									
Benzene	ND	0.0005	mg/L						
Chloroform	ND	0.0005	mg/L						
1,2-Dichlorobenzene	ND	0.0005	mg/L						
1,4-Dichlorobenzene	ND	0.0005	mg/L						
cis-1,2-Dichloroethylene	ND	0.0005	mg/L						
trans-1,3-Dichloropropylene	ND	0.0005	mg/L						
Ethylbenzene	ND	0.0005	mg/L						
Methylene Chloride	ND	0.005	mg/L						
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L						
Tetrachloroethylene	ND	0.0005	mg/L						
Toluene	ND	0.0005	mg/L						
Trichloroethylene	ND	0.0005	mg/L						
Xylenes, total	ND	0.0005	mg/L						
Surrogate: 4-Bromofluorobenzene	*0.0948*		*mg/L*		*119*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0656*		*mg/L*		*82.0*	*50-140*			
Surrogate: Toluene-d8	*0.0863*		*mg/L*		*108*	*50-140*			

Certificate of Analysis
Client: GHD Limited (Kingston)
Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020
Project Description: 11220832

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
CBOD	ND	6	mg/L	ND			NC	20	BOD01
Cyanide, total	ND	0.01	mg/L	ND			NC	11	
pH	7.9	0.1	pH Units	7.9			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Phosphorus, total	ND	0.01	mg/L	ND			NC	15	
Total Suspended Solids	6.0	2	mg/L	6.0			0.0	10	
Metals - Total									
Arsenic	ND	0.01	mg/L	ND			NC	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.05	mg/L	ND			NC	20	
Copper	0.007	0.005	mg/L	0.007			0.1	20	
Lead	0.003	0.001	mg/L	0.003			0.5	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	4.14	0.05	mg/L	4.16			0.4	20	
Nickel	0.012	0.005	mg/L	0.013			1.5	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Zinc	0.023	0.02	mg/L	0.023			0.6	20	
Volatiles									
Benzene	ND	0.0005	mg/L	ND			NC	30	
Chloroform	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Methylene Chloride	ND	0.005	mg/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
Tetrachloroethylene	ND	0.0005	mg/L	ND			NC	30	
Toluene	ND	0.0005	mg/L	ND			NC	30	
Trichloroethylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*0.0952*		*mg/L*		*119*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0763*		*mg/L*		*95.4*	*50-140*			
Surrogate: Toluene-d8	*0.0852*		*mg/L*		*107*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
CBOD	109	2	mg/L	ND	54.6	62-129			QS-02
Cyanide, total	0.090	0.01	mg/L	ND	90.0	53-130			
Phenolics	0.021	0.001	mg/L	ND	83.6	69-132			
Phosphorus, total	0.492	0.01	mg/L	ND	98.4	80-120			
Total Suspended Solids	24.0	2	mg/L	ND	120	75-125			
Metals - Total									
Arsenic	50.5	0.01	mg/L	0.472	100	80-120			
Cadmium	41.8	0.001	mg/L	0.035	83.5	80-120			
Chromium	55.7	0.05	mg/L	0.946	110	80-120			
Copper	48.6	0.005	mg/L	0.727	95.8	80-120			
Lead	43.8	0.001	mg/L	0.268	87.0	80-120			
Mercury	0.0031	0.0001	mg/L	ND	103	70-130			
Manganese	453	0.05	mg/L	416	75.1	80-120			QM-4X
Nickel	50.0	0.005	mg/L	1.27	97.6	80-120			
Selenium	40.0	0.005	mg/L	0.126	79.7	80-120			QM-01
Silver	40.1	0.001	mg/L	0.032	80.2	80-120			
Zinc	44.9	0.02	mg/L	2.25	85.2	80-120			
Volatiles									
Benzene	0.043	0.0005	mg/L	ND	107	60-130			
Chloroform	0.040	0.0005	mg/L	ND	98.8	60-130			
1,2-Dichlorobenzene	0.040	0.0005	mg/L	ND	100	60-130			
1,4-Dichlorobenzene	0.041	0.0005	mg/L	ND	103	60-130			
cis-1,2-Dichloroethylene	0.046	0.0005	mg/L	ND	115	60-130			
trans-1,3-Dichloropropylene	0.041	0.0005	mg/L	ND	102	60-130			
Ethylbenzene	0.035	0.0005	mg/L	ND	86.8	60-130			
Methylene Chloride	0.045	0.005	mg/L	ND	112	60-130			
1,1,2,2-Tetrachloroethane	0.036	0.0005	mg/L	ND	90.4	60-130			
Tetrachloroethylene	0.040	0.0005	mg/L	ND	100	60-130			
Toluene	0.035	0.0005	mg/L	ND	87.7	60-130			
Trichloroethylene	0.042	0.0005	mg/L	ND	105	60-130			
Surrogate: 4-Bromofluorobenzene	*0.0961*		*mg/L*		*120*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0945*		*mg/L*		*118*	*50-140*			
Surrogate: Toluene-d8	*0.0724*		*mg/L*		*90.5*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1 : Raised Reporting Limits for BOD due to dilutions based on preliminary COD screening results.

QC Qualifiers :

BOD01 : Raised Reporting Limits for BOD due to dilutions based on preliminary COD screening results.

QM-01 : The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.

QM-4X : The spike recovery was outside of QC acceptance limits due to elevated analyte concentration.

QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

about GHD

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Nyle McIlveen, P.Eng.
nyle.mcilveen@ghd.com
705-875-6106

Robert Neck, P.Geo. (Limited)
robert.neck@ghd.com
705-761-9694

www.ghd.com

D

Appendix D -
Septic Assessment and Percolation Rate Evaluation

347 Pido Road
Peterborough, Ontario K9J 6X7
Canada
www.ghd.com

Our ref: 11220832-01

12 April 2021

Consolidated Fastfrate (Ottawa) Holdings Inc.
c/o Pierre Courteau
CBRE Limited
333 Preston Street, 7th Floor
Ottawa, Ontario K1S 5N4

Re: Septic Assessment and Percolation Rate Evaluation
Proposed Commercial Development
Rideau Road and Somme Street
Gloucester Con 6 from Rideau River, Lot 26
Ottawa, Ontario

Dear Mr. Courteau:

1. Introduction

GHD Limited (GHD) is pleased to provide you (the Client) with the following letter documenting excavation activities completed in the general locations of a proposed septic tile bed and stormwater pond. The locations were requested by CIMA. This letter also provides a summary of approximate percolation rate (T-time) values based upon soil collected from the test pit locations.

The general location is illustrated on the Site Location Plan, Figure 1. The test pit locations are illustrated on the Test Pit Location Plan, Figure 2.

2. Field Activities

Test pits were advanced under the supervision of GHD on March 31, 2021. The test pits were excavated at five (5) locations to depths ranging from 2.4 to 3.4 m. The soil stratigraphy consisted of fill at each location 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. The fill also included a mix of asphalt, bricks and concrete at each location. Refusal was encountered at 2.4 m at TP-1 due to asphalt. Test pit logs are provided in Appendix A.

Soil samples were collected from each test pit. Hydrometer testing was conducted at GHD's laboratory. The grain size data, included in Appendix A, indicated:

– 18 – 41% gravel; 36 – 47% sand; 12 – 23% silt; and, 4 – 12% clay size particles by weight.

Groundwater seepage was encountered at each test pit. The shallow groundwater was observed between 1.8 and 2.4 metres below ground surface (mbgs). Test pits TP-2, TP-3, TP-4 and TP-5 encountered groundwater at 1.8 mbgs.

Based upon the Supplementary Guidelines to the Ontario Building Code 1997, the percolation rate is estimated (based upon the gradation test results only) to have an average value of 12 to 20 min/cm with a medium permeability.

3. Conclusions and Recommendations

Due to the inconsistency of the fill materials observed and shallow groundwater seepage encountered it is recommended the septic disposal system be a fully raised bed absorption trench leaching bed. It is recommended prior to placement if the imported fill that any surficial organics be removed from the tile bed and mantle area. It is also suggested that that the existing fill material be compacted to ensure uneven settlement of the tiles does not occur.

The waste disposal system should meet Ontario Regulation 350/06 made under the Building Code Act, 1992 and incorporate the following design features:

1. Organics should be stripped from the area of the leaching bed and downgradient mantle.
2. The exposed subgrade below the tile bed should be trimmed and scarified, and provided with a gentle slope of 0.5% in the direction of the mantle.
3. The tile bed should be constructed as a fully raised leaching type bed up to the full height of at least 1 m above existing grade. The raised bed should consist of clean, granular fill capable of providing an in-place T-time of 4 to 8 min/cm.
4. The mantle should be constructed along the downgradient margin of the raised bed. Each mantle should extend along the full width of the bed and for a minimum of 15 m downgradient from the bed. The mantle should consist of similar granular fill raised to a minimum of 250 mm above the surrounding grade. Surface runoff should be diverted away from the leaching bed by means of proper site drainage.
5. The waste disposal system should be kept clear of surface drainage swales, roof leader drains, and other sources of surface water.
6. The tile bed should be kept away from shade trees and a healthy cover of vegetation should be developed and maintained over the bed to promote evapotranspiration.
7. When sighting a tile bed on sloping ground, it is recommended that procedures outlined in the Building Code be followed closely.
8. Minimum set back distances from septic tank (plus 2 times height raised):
   - Building – 1.5 m
   - Drilled well – 15 m
   - Property line – 3 m
   - Open water course – 15 m
9. Minimum set back distances from septic tile bed (plus 2 times height raised):
   - Building – 5 m
   - Drilled well, properly sealed – 15 m
   - Open water course – 15 m
   - Property line – 3 m
   - Shallow well – 30 m
10. The layout, design and construction of the waste disposal bed should be subject to inspection by experienced hydrogeologic personnel.

We trust that this report meets your immediate requirements. Should you have any questions, please contact our office.

Regards

GHD

PROFESSIONAL GEOSCIENTIST
LIMITED MEMBER
ROBERT W. NECK
2262
ONTARIO

LICENSED PROFESSIONAL ENGINEER
N. C. McILVEEN
PROVINCE OF ONTARIO

Robert Neck, M.Eng., P.Geo. (Limited)
Project Manager

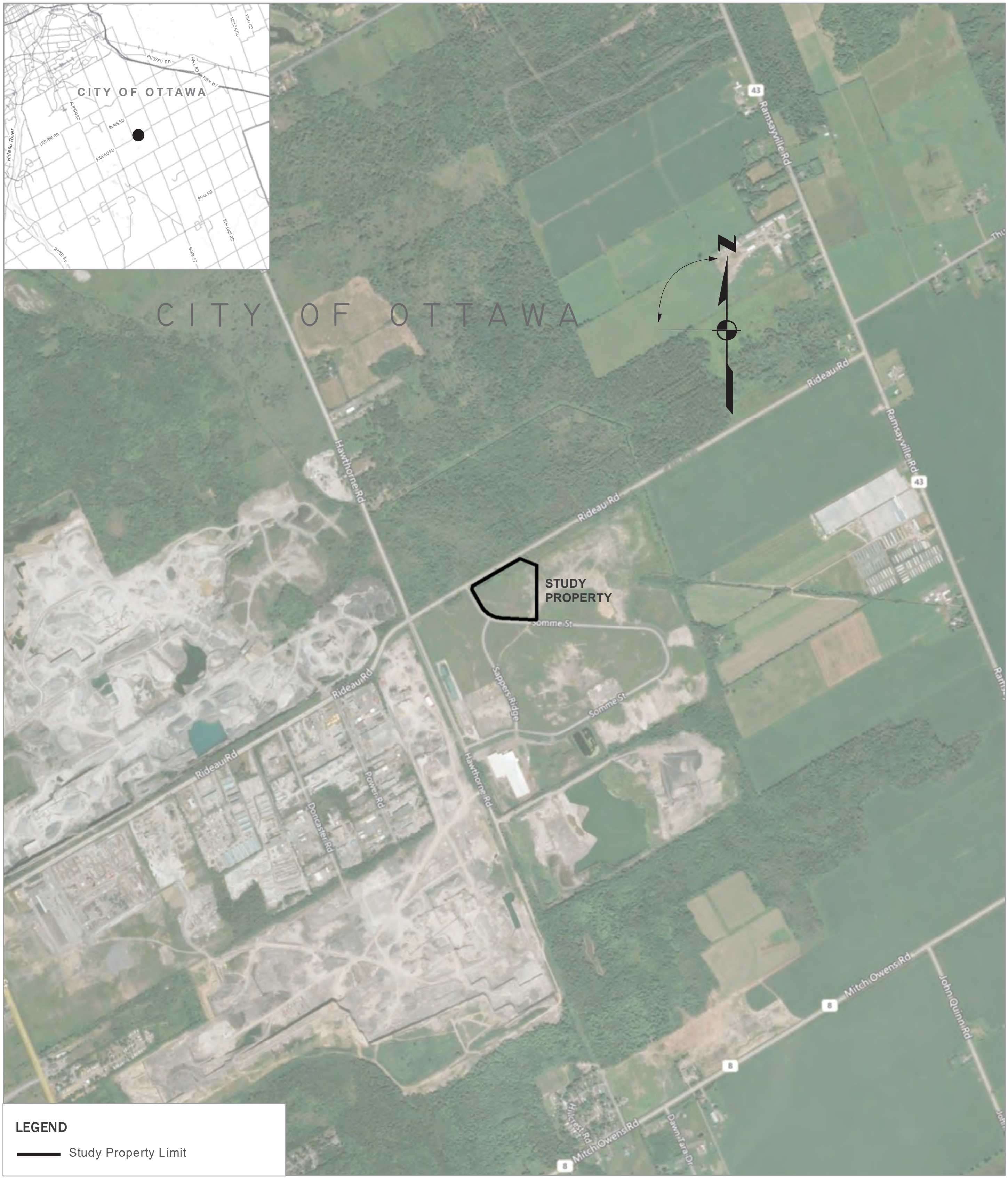
Nyle McIlveen, P. Eng
Senior Engineer

Encl.: Appendix A (Test Pit Logs and Gradation Results)

Email to Pierre Courteau
Cc: Christian Lavoie-Lebel (Christian.Lavoie-Lebel@cima.ca)

Attachment 1

Figures



NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

SEPTIC ASSESSMENT
SITE LOCATION PLAN

Project No. 11220832-01
Revision No. 1
Date Apr 2021

FIGURE 1

ATTRIBUTION STATEMENTS

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NAD83, MTM Zone 9
1 cm : 16 meters
Meters
0 15 30 60

Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

SEPTIC ASSESSMENT
TEST HOLE LOCATION PLAN

Project No. 11220832-01
Revision No. 1
Date Apr 2021

FIGURE 2

ATTRIBUTION STATEMENTS

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Appendix A

Test Pit Logs and Gradation Results

REFERENCE No.: 11220832

ENCLOSURE No.: A-1

TEST HOLE No.: TP-1

ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott

DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd.

METHOD: Backhoe

NOTES: 18T E: 456548 N: 5017167

LEGEND

- GS - GRAB SAMPLE
- WATER LEVEL

m Below Existing Grade	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	COMMENTS
0.0	GROUND SURFACE			
0.0	**TOPSOIL** (178mm)			
0.2	**SM** - Gravelly sand (fill), with silt, trace clay, concrete, brick, asphalt, compact, brown, moist	GS-1	--	- Test pit open upon completion - GS-1 37% Gravel 47% Sand 12% Silt 4% Clay
1.8	With clay, loose	GS-2	--	- GS-2 41% Gravel 36% Sand 16% Silt 7% Clay
2.1	Wet			- Groundwater infiltration observed at approximately 2.1 mbgs
2.4	END OF TEST HOLE			- Refusal at 2.4m (asphalt)

Shear test (Cu) / Sensitivity (S): △ Field, □ Lab; ○ Water content (%); w_p w_l Atterberg limits (%): 10 20 30 40 50 60 70 80 90

Depth scale: ft 1–14; m 0.5–4.5

REFERENCE No.: 11220832

ENCLOSURE No.: A-2

GHD	**TEST HOLE No.:** TP-2 **ELEVATION:** Existing grade	**TEST HOLE REPORT** Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott

DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd.

METHOD: Backhoe

NOTES: 18T E: 456572 N: 5017175

LEGEND

GS - GRAB SAMPLE

- WATER LEVEL

Depth (m Below Existing Grade)	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	COMMENTS
0.0	GROUND SURFACE			
0.0	**TOPSOIL** (102mm)			
0.1	**SM** - Gravelly sand (fill), with silt, concrete, brick, asphalt, brown, moist	GS-1	--	- Test pit open upon completion
1.8	Wet			- Groundwater infiltration observed at approximately 1.8 mbgs
2.7	END OF TEST HOLE			

Shear test (Cu) / Sensitivity (S): △ Field, □ Lab

○ Water content (%)

W_p W_l Atterberg limits (%)

10 20 30 40 50 60 70 80 90

Depth scale: ft 1–14; m 0.5–4.5

TEST HOLE LOG GEOTECH 11220832 TEST PIT GINT LOGS.GPJ GEOLOGIC.GDT 12/4/21

REFERENCE No.: 11220832 ENCLOSURE No.: A-3

GHD	**TEST HOLE No.:** TP-3 **ELEVATION:** Existing grade	**TEST HOLE REPORT** Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd. METHOD: Backhoe

NOTES: 18T E: 456599 N: 5017156

LEGEND

GS - GRAB SAMPLE

- WATER LEVEL

m Below Existing Grade	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	COMMENTS
0.0	GROUND SURFACE			
0.0	**TOPSOIL** (152 mm)			
0.2	**SM** - Gravelly sand (fill), with silt, concrete, asphalt, brown, moist			- Test pit open upon completion
1.2	Grey, cobbles	GS-1	--	
1.8	Wet			- Groundwater infiltration observed at approximately 1.8 mbgs
		GS-2	--	- 50 mm diameter monitoring well installed to 2.7 mbgs
3.0	END OF TEST HOLE			

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
w_p w_l Atterberg limits (%)

10 20 30 40 50 60 70 80 90

— 0.2 m

Depth: ft 1 2 3 4 5 6 7 8 9 10 11 12 13 14; m 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

REFERENCE No.: 11220832 ENCLOSURE No.: A-4

	TEST HOLE No.: TP-4 ELEVATION: Existing grade	TEST HOLE REPORT Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd. METHOD: Backhoe

NOTES: 18T E: 456656 N: 5017172

LEGEND

GS - GRAB SAMPLE
- WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) (△ Field, □ Lab); ○ Water content (%); w_p w_l Atterberg limits (%) — 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL (102mm)				
		0.1		**SM** - Gravelly sand (fill), with silt, with clay, concrete, asphalt, brown, moist				
1	0.5							- Test pit open upon completion
3	1.0				GS-1	--		- GS-1 32% Gravel 44% Sand 17% Silt 7% Clay
6	1.8	1.8		Wet				- Groundwater infiltration observed at approximately 1.8 mbgs
10	3.0				GS-2	--		
11		3.4		END OF TEST HOLE				

REFERENCE No.: 11220832 ENCLOSURE No.: A-5

TEST HOLE No.: TP-5

ELEVATION: Existing grade

TEST HOLE REPORT

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd. METHOD: Backhoe

NOTES: 18T E: 456601 N: 5017160

LEGEND

GS - GRAB SAMPLE

- WATER LEVEL

Shear test (Cu) / Sensitivity (S): △ Field, □ Lab; ○ Water content (%); w_p – w_l Atterberg limits (%): 10 20 30 40 50 60 70 80 90

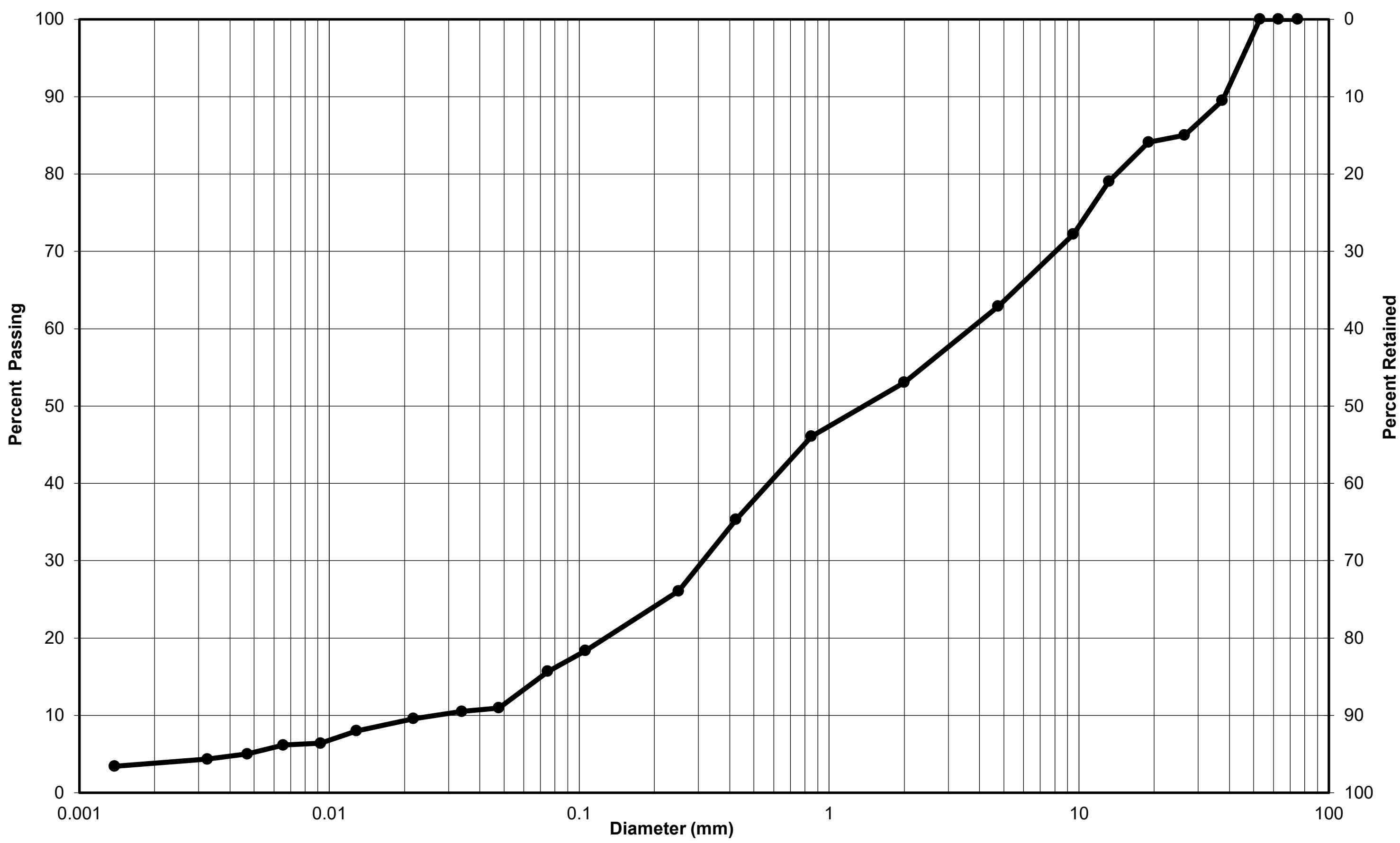
Depth (ft)	Depth (m)	m Below Existing Grade	Description of Soil and Bedrock	Type and Number	Moisture Content (%)	Comments
		0.0	GROUND SURFACE			
			TOPSOIL (102mm)			
		0.1	**SM** - Silty sand (fill), with gravel, with clay, with asphalt, concrete, brown, moist			- Test pit open upon completion
3–4	1.0			GS-1	--	
4		1.2	Grey			
6		1.8	Wet			- Groundwater infiltration observed at approximately 1.8 mbgs
9–10	3.0			GS-2	--	- GS2 18% Gravel 47% Sand 23% Silt 12% Clay
10		3.0	END OF TEST HOLE			

Depth scale: ft 1–14; m 0.5–4.5

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832

Borehole no.:	TP1	Sample no.:	GS1
Depth:	0.6 - 0.9 m	Enclosure:	A-6



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	37	47	16
Silt-size particles (%):	12		
Clay-size particles (%) (<0.002mm):	4		

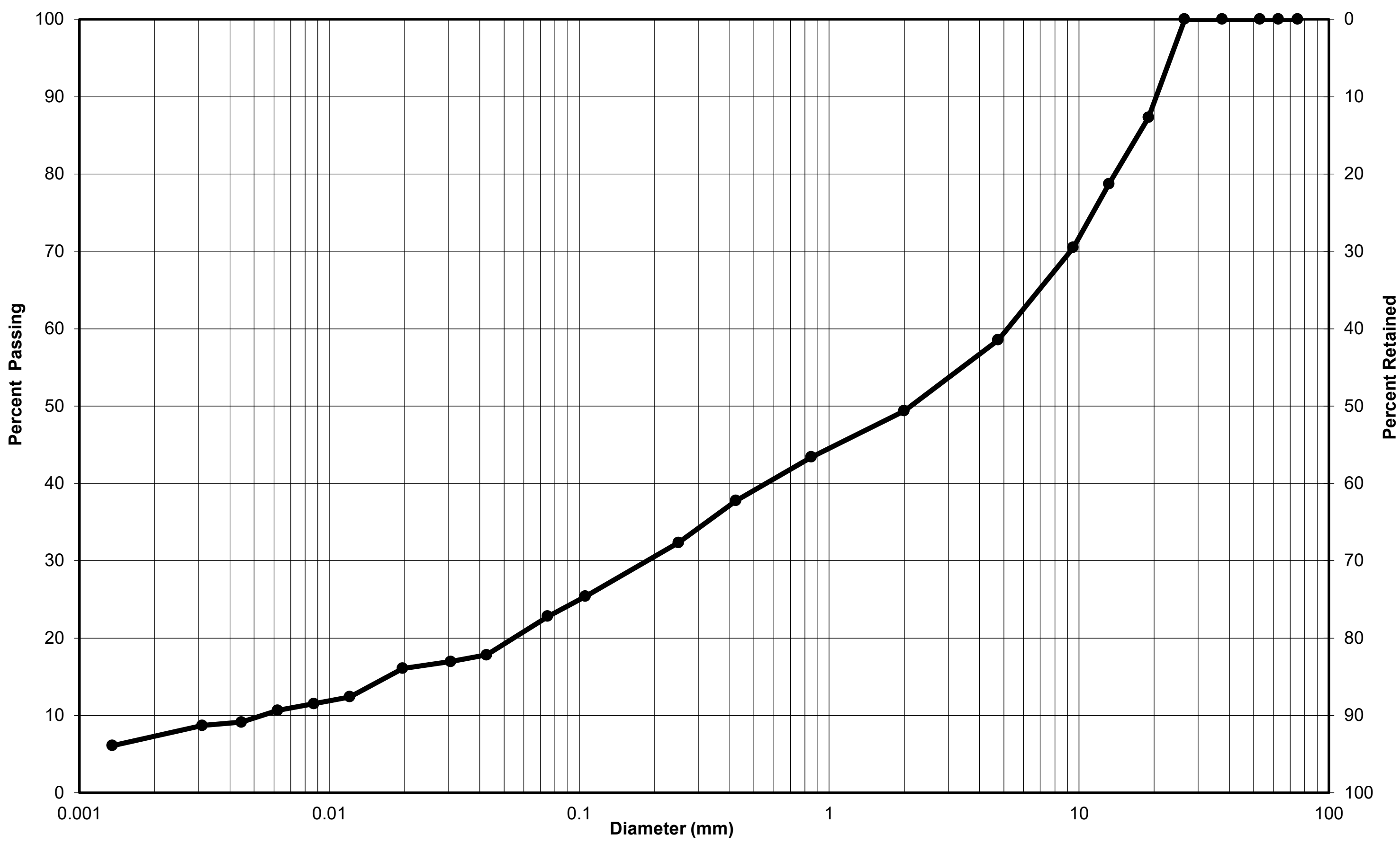
Remarks: Moisture Content = 7.1% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832

Borehole no.:	TP1	Sample no.:	GS2
Depth:	1.8 - 2.1 m	Enclosure:	A-7



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	41	36	23
Silt-size particles (%):	16		
Clay-size particles (%) (<0.002mm):	7		

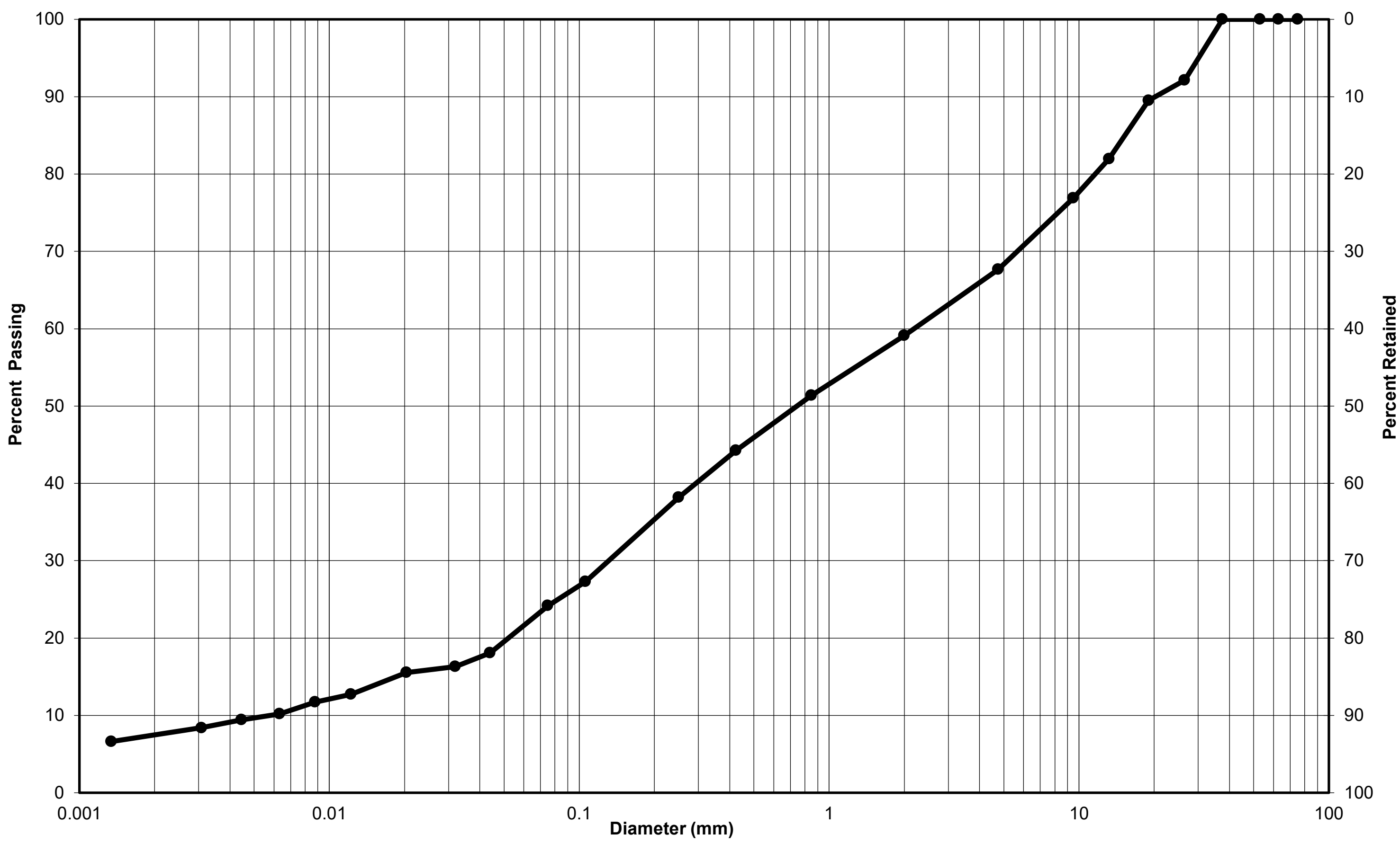
Remarks: Moisture Content = 8.7% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

Particle-Size Analysis of Soils (Geotechnical)
(USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832

Borehole no.:	TP4	Sample no.:	GS1
Depth:	0.9 - 1.2 m	Enclosure:	A-8



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

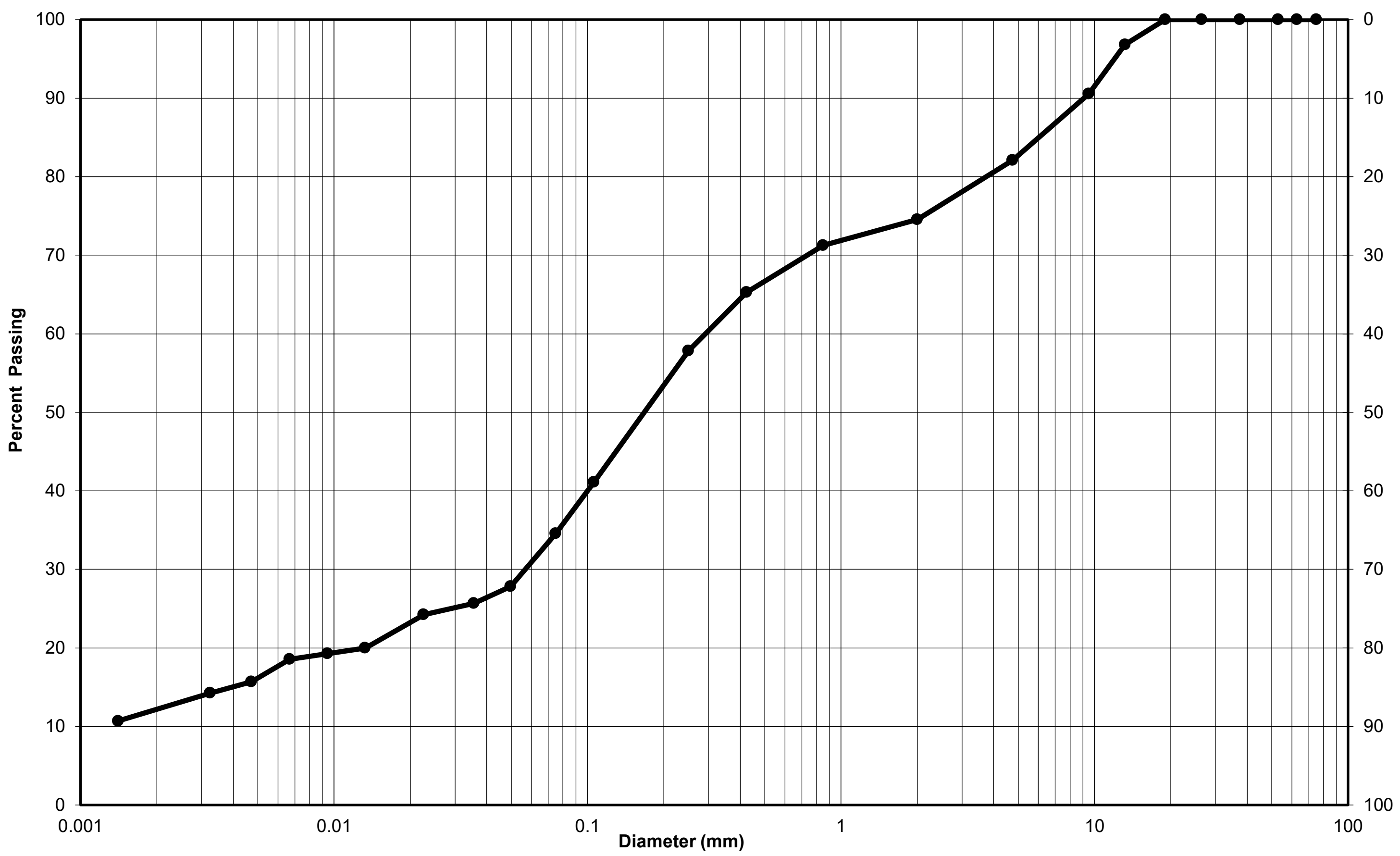
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	32	44	24
Silt-size particles (%):	17		
Clay-size particles (%) (<0.002mm):	7		

Remarks: Moisture Content = 10.6% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832
Borehole no.:	TP5	Sample no.:	GS2
Depth:	2.75 - 3.05 m	Enclosure:	A-9



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	18	47	35
Silt-size particles (%):	23		
Clay-size particles (%) (<0.002mm):	12		

Remarks: Moisture Content = 22.4% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

ghd.com

→ The Power of Commitment

E

Appendix E - Geotechnical Report

347 Pido Road
Peterborough, Ontario K9J 6X7
Canada
www.ghd.com

Our ref: 11220832-01

12 April 2021

Consolidated Fastfrate (Ottawa) Holdings Inc.
c/o Pierre Courteau
CBRE Limited
333 Preston Street, 7th Floor
Ottawa, Ontario K1S 5N4

Re: Septic Assessment and Percolation Rate Evaluation
Proposed Commercial Development
Rideau Road and Somme Street
Gloucester Con 6 from Rideau River, Lot 26
Ottawa, Ontario

Dear Mr. Courteau:

1. Introduction

GHD Limited (GHD) is pleased to provide you (the Client) with the following letter documenting excavation activities completed in the general locations of a proposed septic tile bed and stormwater pond. The locations were requested by CIMA. This letter also provides a summary of approximate percolation rate (T-time) values based upon soil collected from the test pit locations.

The general location is illustrated on the Site Location Plan, Figure 1. The test pit locations are illustrated on the Test Pit Location Plan, Figure 2.

2. Field Activities

Test pits were advanced under the supervision of GHD on March 31, 2021. The test pits were excavated at five (5) locations to depths ranging from 2.4 to 3.4 m. The soil stratigraphy consisted of fill at each location 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. The fill also included a mix of asphalt, bricks and concrete at each location. Refusal was encountered at 2.4 m at TP-1 due to asphalt. Test pit logs are provided in Appendix A.

Soil samples were collected from each test pit. Hydrometer testing was conducted at GHD's laboratory. The grain size data, included in Appendix A, indicated:

– 18 – 41% gravel; 36 – 47% sand; 12 – 23% silt; and, 4 – 12% clay size particles by weight.

Groundwater seepage was encountered at each test pit. The shallow groundwater was observed between 1.8 and 2.4 metres below ground surface (mbgs). Test pits TP-2, TP-3, TP-4 and TP-5 encountered groundwater at 1.8 mbgs.

Based upon the Supplementary Guidelines to the Ontario Building Code 1997, the percolation rate is estimated (based upon the gradation test results only) to have an average value of 12 to 20 min/cm with a medium permeability.

3. Conclusions and Recommendations

Due to the inconsistency of the fill materials observed and shallow groundwater seepage encountered it is recommended the septic disposal system be a fully raised bed absorption trench leaching bed. It is recommended prior to placement if the imported fill that any surficial organics be removed from the tile bed and mantle area. It is also suggested that that the existing fill material be compacted to ensure uneven settlement of the tiles does not occur.

The waste disposal system should meet Ontario Regulation 350/06 made under the Building Code Act, 1992 and incorporate the following design features:

1. Organics should be stripped from the area of the leaching bed and downgradient mantle.
2. The exposed subgrade below the tile bed should be trimmed and scarified, and provided with a gentle slope of 0.5% in the direction of the mantle.
3. The tile bed should be constructed as a fully raised leaching type bed up to the full height of at least 1 m above existing grade. The raised bed should consist of clean, granular fill capable of providing an in-place T-time of 4 to 8 min/cm.
4. The mantle should be constructed along the downgradient margin of the raised bed. Each mantle should extend along the full width of the bed and for a minimum of 15 m downgradient from the bed. The mantle should consist of similar granular fill raised to a minimum of 250 mm above the surrounding grade. Surface runoff should be diverted away from the leaching bed by means of proper site drainage.
5. The waste disposal system should be kept clear of surface drainage swales, roof leader drains, and other sources of surface water.
6. The tile bed should be kept away from shade trees and a healthy cover of vegetation should be developed and maintained over the bed to promote evapotranspiration.
7. When sighting a tile bed on sloping ground, it is recommended that procedures outlined in the Building Code be followed closely.
8. Minimum set back distances from septic tank (plus 2 times height raised):
   - Building – 1.5 m
   - Drilled well – 15 m
   - Property line – 3 m
   - Open water course – 15 m
9. Minimum set back distances from septic tile bed (plus 2 times height raised):
   - Building – 5 m
   - Drilled well, properly sealed – 15 m
   - Open water course – 15 m
   - Property line – 3 m
   - Shallow well – 30 m
10. The layout, design and construction of the waste disposal bed should be subject to inspection by experienced hydrogeologic personnel.

We trust that this report meets your immediate requirements. Should you have any questions, please contact our office.

Regards

GHD

R. Neck.

PROFESSIONAL GEOSCIENTIST
Apr. 12/21
LIMITED MEMBER
ROBERT W. NECK
2262
R.N.
ONTARIO

Robert Neck, M.Eng., P.Geo. (Limited)
Project Manager

LICENSED PROFESSIONAL ENGINEER
April 12/21
N. C. McILVEEN
PROVINCE OF ONTARIO

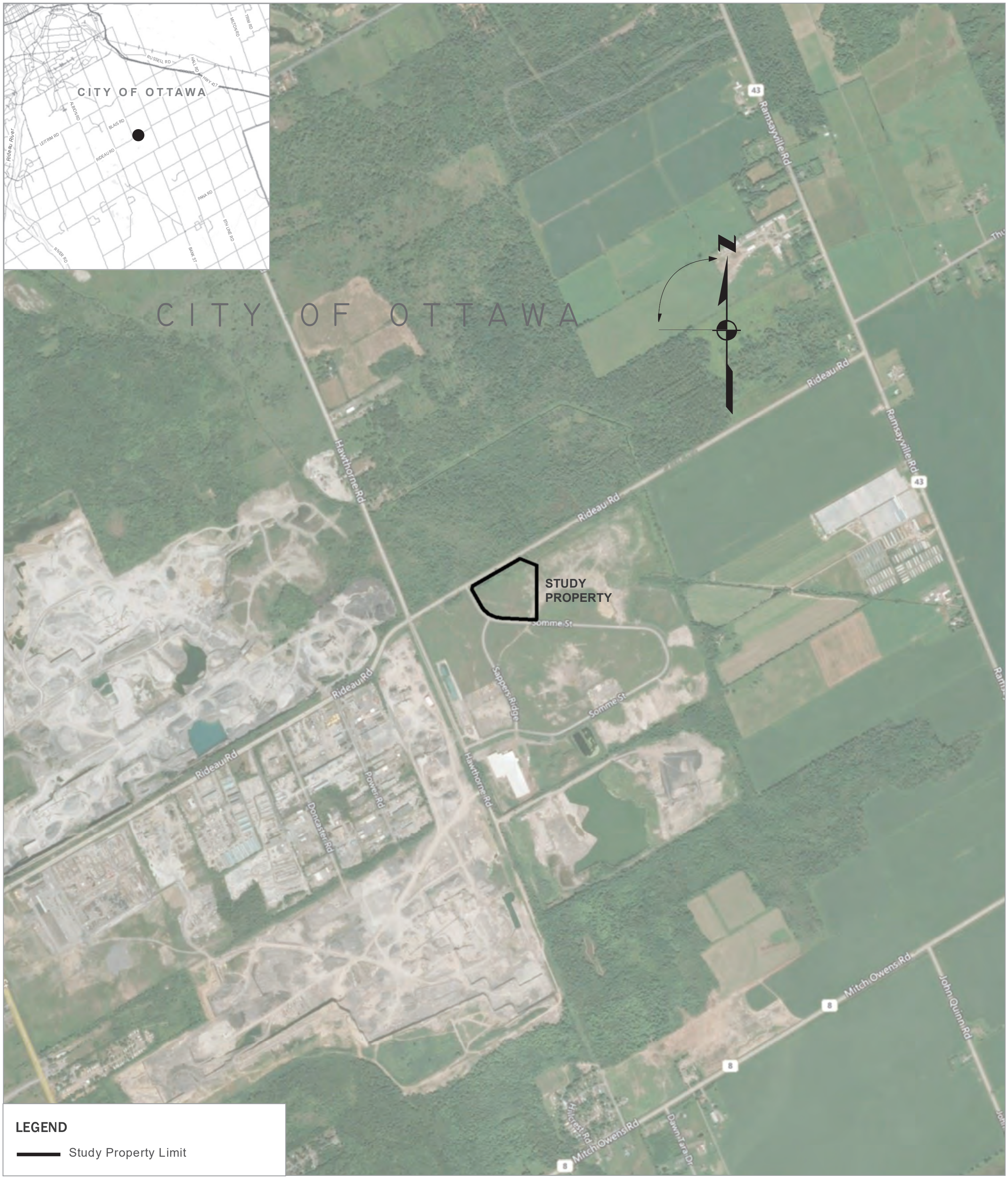
Nyle McIlveen, P. Eng
Senior Engineer

Encl.: Appendix A (Test Pit Logs and Gradation Results)

Email to Pierre Courteau
Cc: Christian Lavoie-Lebel (Christian.Lavoie-Lebel@cima.ca)

Attachment 1

Figures



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NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

SEPTIC ASSESSMENT
SITE LOCATION PLAN

Project No. 11220832-01
Revision No. 1
Date Apr 2021

FIGURE 1

ATTRIBUTION STATEMENTS

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NAD83, MTM Zone 9
1 cm : 16 meters
Meters
0 15 30 60

Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

SEPTIC ASSESSMENT
TEST HOLE LOCATION PLAN

Project No. 11220832-01
Revision No. 1
Date Apr 2021

FIGURE 2

ATTRIBUTION STATEMENTS

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Appendix A

Test Pit Logs and Gradation Results

REFERENCE No.: 11220832

ENCLOSURE No.: A-1

TEST HOLE No.: TP-1

ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott

DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd.

METHOD: Backhoe

NOTES: 18T E: 456548 N: 5017167

LEGEND

GS - GRAB SAMPLE

- WATER LEVEL

Depth (m Below Existing Grade)	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	COMMENTS
0.0	GROUND SURFACE			
0.0	**TOPSOIL** (178mm)			
0.2	**SM** - Gravelly sand (fill), with silt, trace clay, concrete, brick, asphalt, compact, brown, moist	GS-1	--	- Test pit open upon completion - GS-1 37% Gravel 47% Sand 12% Silt 4% Clay
1.8	With clay, loose	GS-2	--	- GS-2 41% Gravel 36% Sand 16% Silt 7% Clay
2.1	Wet			- Groundwater infiltration observed at approximately 2.1 mbgs
2.4	END OF TEST HOLE			- Refusal at 2.4m (asphalt)

Shear test (Cu) Sensitivity (S) △ Field ☐ Lab; ○ Water content (%); w_p w_l Atterberg limits (%): 10 20 30 40 50 60 70 80 90

Depth scale: ft 1–14; m 0.5–4.5

REFERENCE No.: 11220832

ENCLOSURE No.: A-2

GHD

TEST HOLE No.: **TP-2**

ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott

DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd.

METHOD: Backhoe

NOTES: 18T E: 456572 N: 5017175

LEGEND

GS - GRAB SAMPLE

- WATER LEVEL

Shear test (Cu) △ Field; Sensitivity (S) □ Lab; ○ Water content (%); w_p w_l Atterberg limits (%)

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL (102mm)				
		0.1		**SM** - Gravelly sand (fill), with silt, concrete, brick, asphalt, brown, moist				- Test pit open upon completion
3–4	1.0				GS-1	--		
6		1.8		Wet				- Groundwater infiltration observed at approximately 1.8 mbgs
9		2.7		END OF TEST HOLE				

REFERENCE No.: 11220832

ENCLOSURE No.: A-3

GHD

TEST HOLE No.: TP-3

ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott

DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd.

METHOD: Backhoe

NOTES: 18T E: 456599 N: 5017156

LEGEND

GS - GRAB SAMPLE

- WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	COMMENTS
		0.0	GROUND SURFACE			
			TOPSOIL (152 mm)			
		0.2	**SM** - Gravelly sand (fill), with silt, concrete, asphalt, brown, moist			- Test pit open upon completion
4		1.2	Grey, cobbles	GS-1	--	
6		1.8	Wet			- Groundwater infiltration observed at approximately 1.8 mbgs
				GS-2	--	- 50 mm diameter monitoring well installed to 2.7 mbgs
10		3.0	END OF TEST HOLE			

Shear test (Cu) / Sensitivity (S) — Field / Lab; Water content (%); Atterberg limits (%) w_p w_l: 10 20 30 40 50 60 70 80 90

Well stickup: 0.2 m

Depth scale: ft 1–14; m 0.5–4.5

TEST HOLE LOG GEOTECH 11220832 TEST PIT GINT LOGS.GPJ GEOLOGIC.GDT 12/4/21

REFERENCE No.: 11220832

ENCLOSURE No.: A-4

	TEST HOLE No.: TP-4	TEST HOLE REPORT
GHD	ELEVATION: Existing grade	Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd. METHOD: Backhoe

NOTES: 18T E: 456656 N: 5017172

LEGEND

GS - GRAB SAMPLE

▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) △ Field □ Lab; ○ Water content (%); W_p–W_l Atterberg limits (%) — 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL (102mm)				
		0.1		**SM** - Gravelly sand (fill), with silt, with clay, concrete, asphalt, brown, moist				
1								
	0.5							- Test pit open upon completion
2								
3	1.0				GS-1	--		- GS-1 32% Gravel 44% Sand 17% Silt 7% Clay
4								
5	1.5							
6		1.8		Wet				- Groundwater infiltration observed at approximately 1.8 mbgs
7	2.0							
8	2.5							
9								
10	3.0				GS-2	--		
11		3.4		END OF TEST HOLE				
	3.5							
12								
13	4.0							
14								
	4.5							

REFERENCE No.: 11220832

ENCLOSURE No.: A-5

TEST HOLE No.: **TP-5**

ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastfrate

PROJECT: Septic Assessment

LOGGED BY: J. Scott

DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd.

METHOD: Backhoe

NOTES: 18T E: 456601 N: 5017160

LEGEND

GS - GRAB SAMPLE

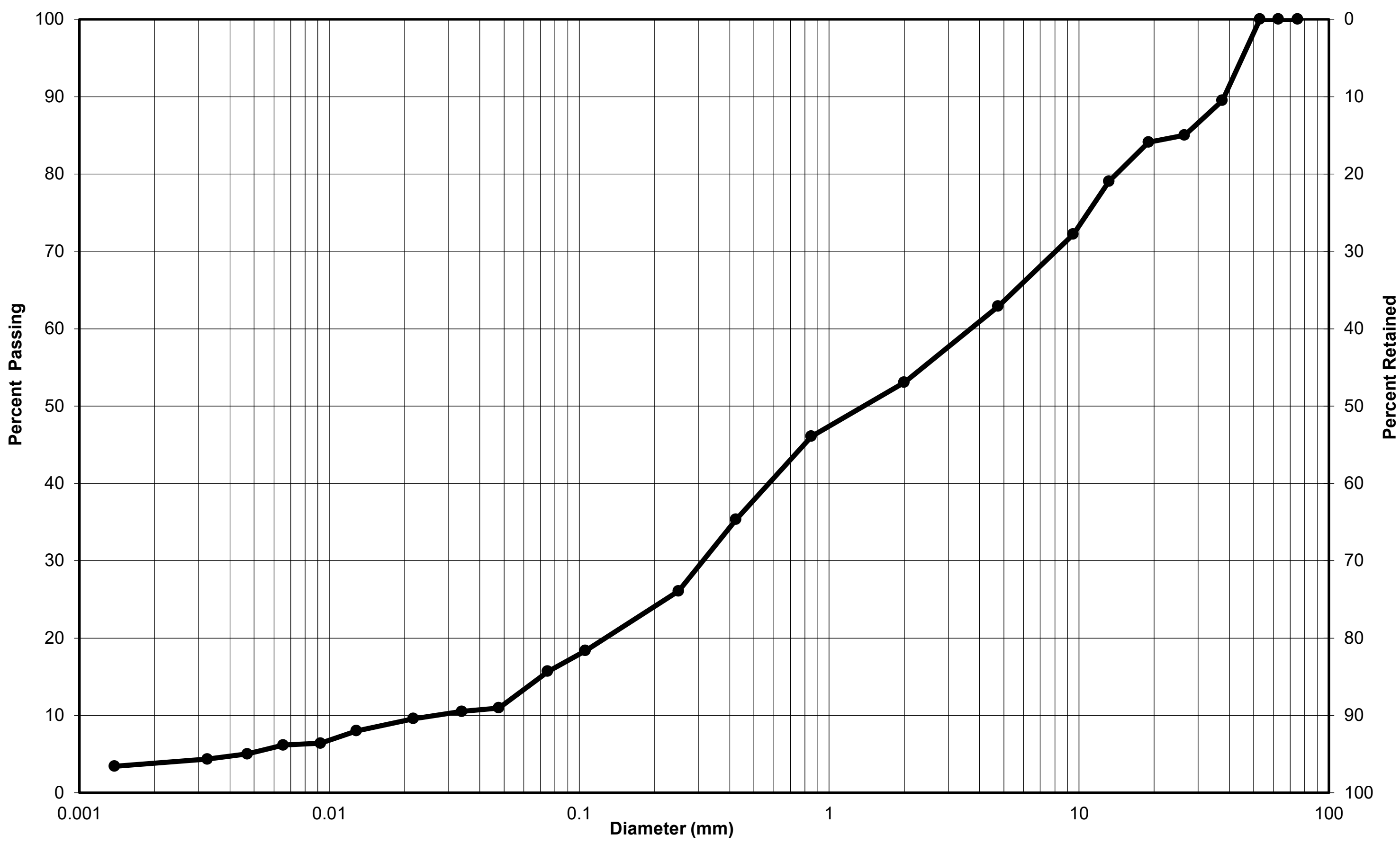
- WATER LEVEL

Depth (m)	m Below Existing Grade	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) △ Field ☐ Lab; Sensitivity (S); ○ Water content (%); w_p w_l Atterberg limits (%) (10 20 30 40 50 60 70 80 90)	COMMENTS
0.0	0.0	GROUND SURFACE				
0.0–0.1		**TOPSOIL** (102mm)				
0.1–1.2	0.1	**SM** - Silty sand (fill), with gravel, with clay, with asphalt, concrete, brown, moist	GS-1	--		- Test pit open upon completion
1.2–1.8	1.2	Grey				
1.8–3.0	1.8	Wet	GS-2	--		- Groundwater infiltration observed at approximately 1.8 mbgs - GS2 18% Gravel 47% Sand 23% Silt 12% Clay
3.0	3.0	END OF TEST HOLE				

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832

Borehole no.:	TP1	Sample no.:	GS1
Depth:	0.6 - 0.9 m	Enclosure:	A-6



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

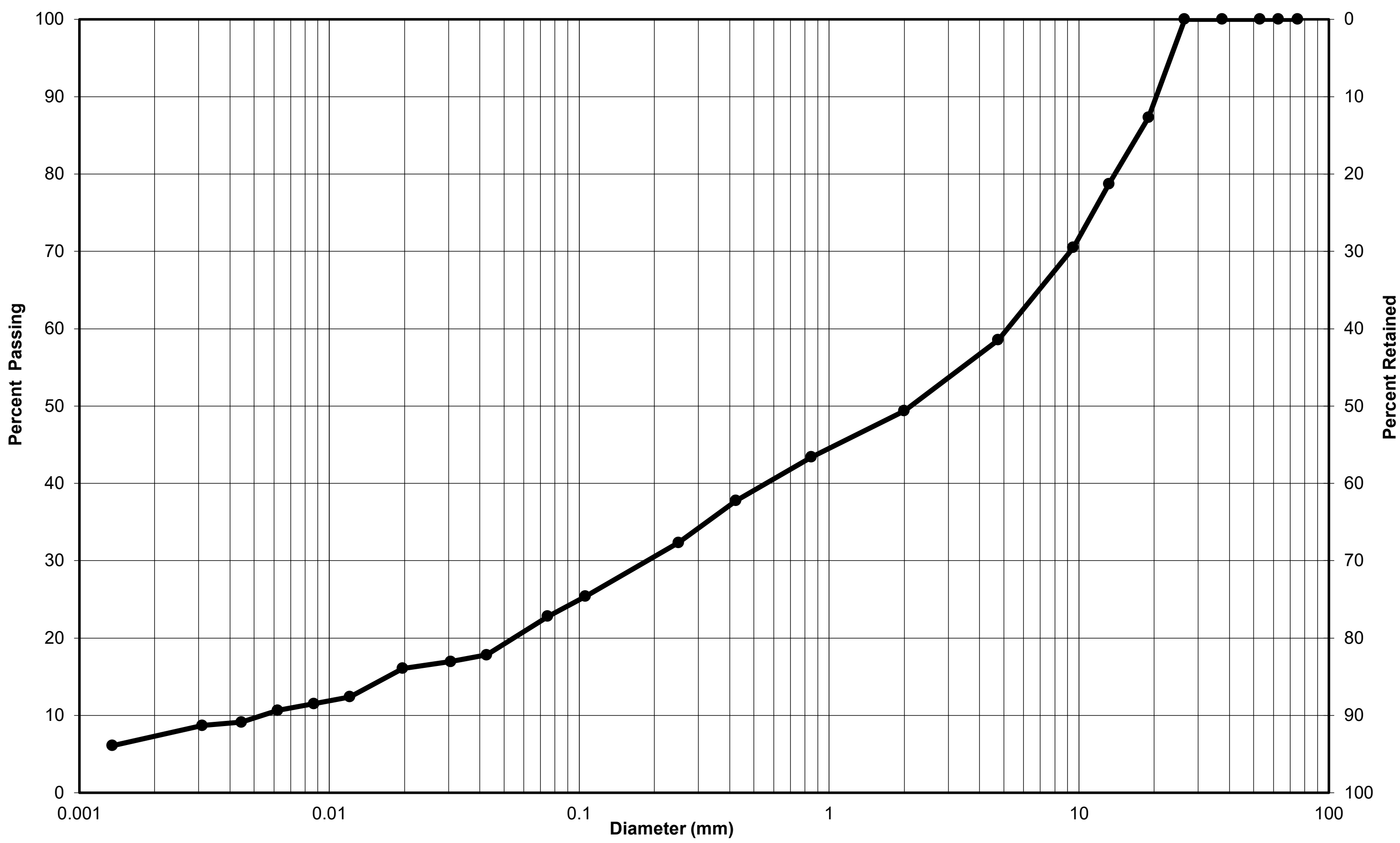
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	37	47	16
Silt-size particles (%):	12		
Clay-size particles (%) (<0.002mm):	4		

Remarks: Moisture Content = 7.1% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832
Borehole no.:	TP1	Sample no.:	GS2
Depth:	1.8 - 2.1 m	Enclosure:	A-7



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	41	36	23
Silt-size particles (%):	16		
Clay-size particles (%) (<0.002mm):	7		

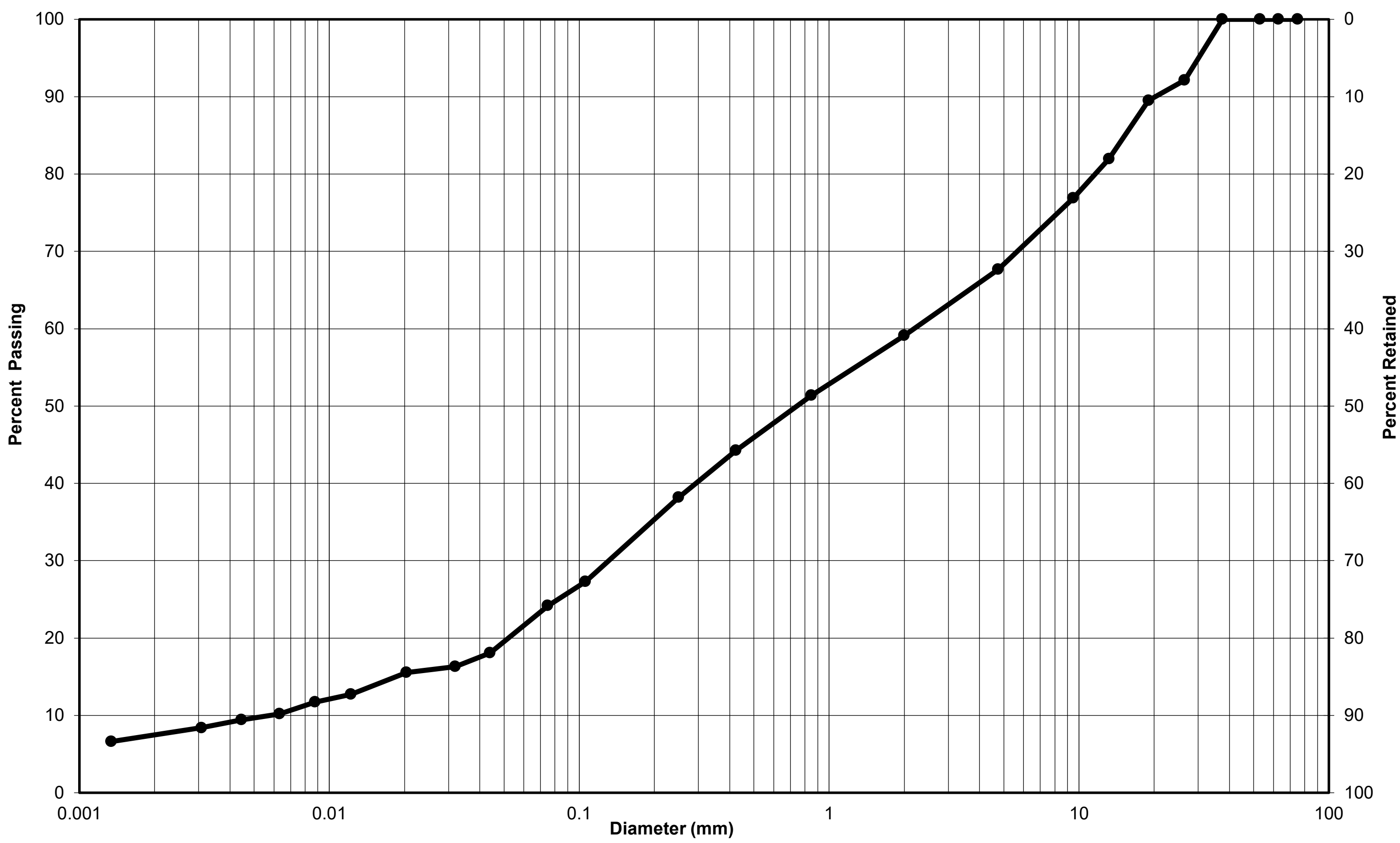
Remarks: Moisture Content = 8.7% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832

Borehole no.:	TP4	Sample no.:	GS1
Depth:	0.9 - 1.2 m	Enclosure:	A-8



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

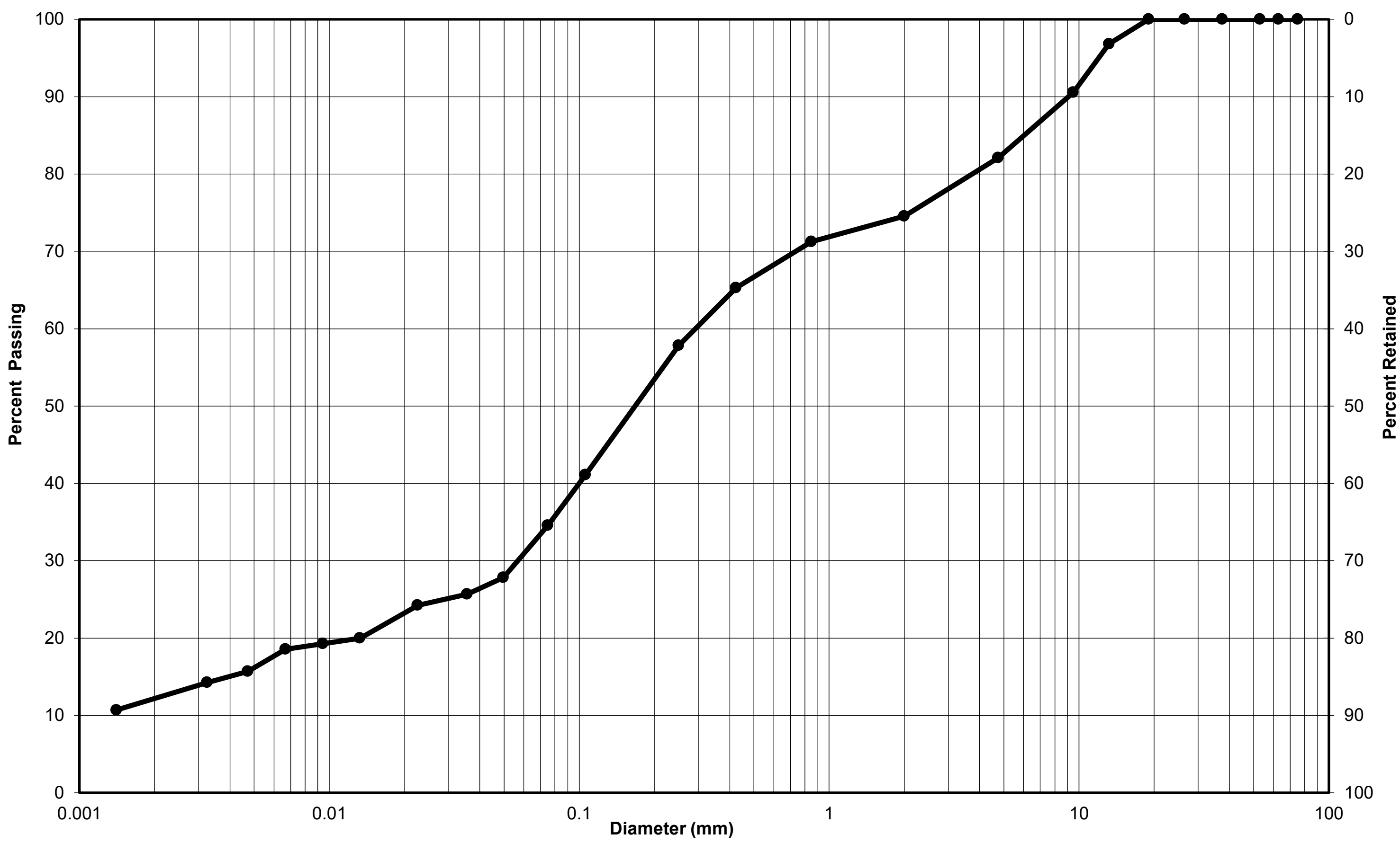
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	32	44	24
Silt-size particles (%):	17		
Clay-size particles (%) (<0.002mm):	7		

Remarks: Moisture Content = 10.6% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Consolidated Fastfrate	**Lab No.:**	SS-21-25
Project/Site:	Rideau Street & Somme Street, Ottawa, ON	**Project No.:**	11220832
Borehole no.:	TP5	Sample no.:	GS2
Depth:	2.75 - 3.05 m	Enclosure:	A-9



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	18	47	35
Silt-size particles (%):	23		
Clay-size particles (%) (<0.002mm):	12		

Remarks: Moisture Content = 22.4% as per, ASTM D2216.

Performed by:	Josh Sullivan	**Date:**	April 7, 2021
Verified by:	Joe Sullivan	**Date:**	April 7, 2021

ghd.com

→ The Power of Commitment

F

Appendix F - Drawings

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SOMME STREET, OTTAWA, ONTARIO

LIST OF DRAWINGS

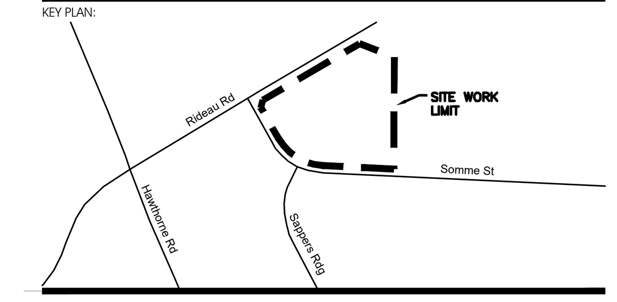
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SOMME STREET, OTTAWA, ONTARIO
SITE PLAN APPROVAL - AUGUST 13th, 2021

C001

CLIENT LOGO:

FASTFRATE

KEY PLAN:



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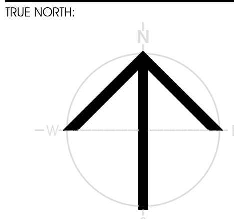


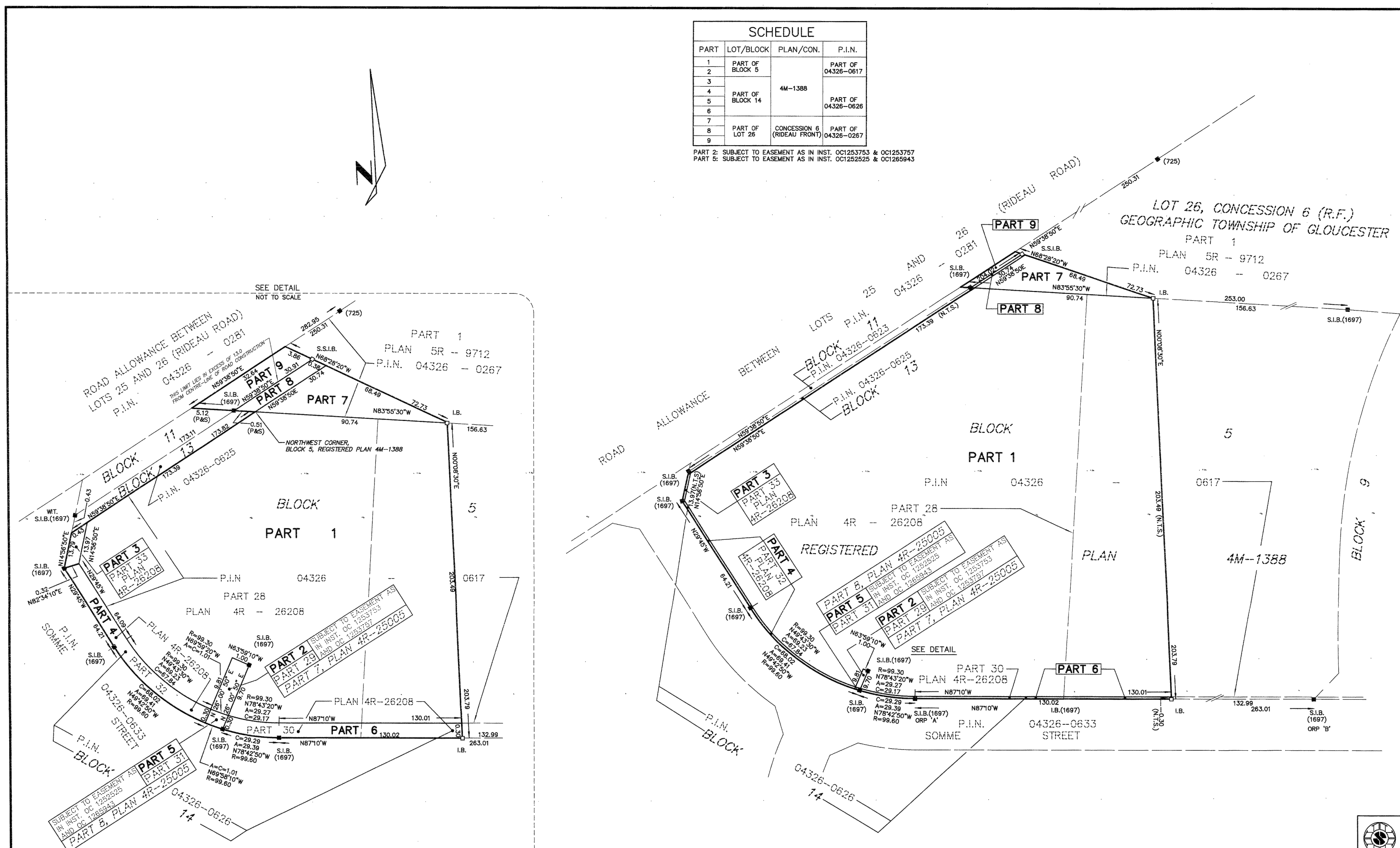
PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NUMBER:	REVISION:	DATE: (MM/DD/YY)
	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP: PROFESSIONAL STAMP:



SCHEDULE

PART	LOT/BLOCK	PLAN/CON.	P.I.N.
1	PART OF BLOCK 5	4M-1388	PART OF 04326-0617
2			
3	PART OF BLOCK 14		PART OF 04326-0626
4			
5			
6			
7	PART OF LOT 26	CONCESSION 6 (RIDEAU FRONT)	PART OF 04326-0267
8			
9			

PART 2: SUBJECT TO EASEMENT AS IN INST. OC1253753 & OC1253757
PART 5: SUBJECT TO EASEMENT AS IN INST. OC1252525 & OC1265943

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE SEPTEMBER 16, 2020

J.P. SHIPMAN

PLAN 4R-33406
RECEIVED AND DEPOSITED

DATE Dec. 22 / 2020

REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON (No.4)

PLAN OF SURVEY OF
PART OF LOT 26 CONCESSION 6 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER and
PART OF BLOCKS 5 AND 14 REGISTERED PLAN 4M-1388
CITY OF OTTAWA
SCALE 1:1000

0 10 20 30 40 50 75 100
METRES

METRIC

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

NOTES

BEARINGS HEREON ARE GRID BEARINGS, DERIVED FROM ISCM 019871768 (N 5016745.786, E 379008.599) AND ISCM 019871769 (N 5016468.145, E 378560.015) AND ARE REFERRED TO THE CENTRAL MERIDIAN 76° 30'W LONGITUDE OF THE 3° M.T.M. ONTARIO CO-ORDINATE SYSTEM (NAD 83).

DISTANCES SHOWN ON THIS PLAN ARE HORIZONTAL GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999955

BEARINGS AND DISTANCES SHOWN ON THIS PLAN AGREE WITH UNDERLYING AND ABUTTING PLANS UNLESS OTHERWISE NOTED.

S.I.B.	DENOTES 0.025 SQ., 1.2 LONG, STANDARD IRON BAR
S.S.I.B.	DENOTES 0.025 SQ., 0.6 LONG, SHORT STANDARD IRON BAR
I.B.	DENOTES 0.016 SQ., 0.6 LONG, IRON BAR
■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
WIT.	DENOTES WITNESS
1697	DENOTES J.P. SHIPMAN, O.L.S.
725	DENOTES R.W. ARNETT, O.L.S.
U.P.L.	DENOTES UTILITIES POLE LINE
N.T.S.	DENOTES NOT TO SCALE
P	DENOTES PLAN 4M-1388

OBSERVED REFERENCE POINTS (ORP): MTM ZONE 9, NAD 83 (ORIGINAL)		
POINT IDENTIFICATION	NORTHING	EASTING
ORP A	5018947.5	378970.6
ORP B	5018934.5	379233.2

COORDINATES SHOWN TO RURAL ACCURACY IN ACCORDANCE WITH O.REG 216/10, SECTIONS 14, AND 31 TO 35 (BOTH INCLUSIVE).

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM;

(2) THE SURVEY WAS COMPLETED ON THE 10th DAY OF DECEMBER, 2020.

DECEMBER 14, 2020
DATE

J.P. SHIPMAN
ONTARIO LAND SURVEYOR

H.A.KEN SHIPMAN SURVEYING LTD.
P.O. BOX 53, NORTH GOWER, ONT. K0A 2T0

REF No.: GL.-502
FILE No.: 19-11756

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

LEGAL PLAN

DRAWN BY:	D.CANN	DRAWING NUMBER:	C002
DATE:			
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083

SURVEY COMPLETED BY: ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
DATE OF SURVEY: OCTOBER 22nd 2020

ELEVATION NOTES

1. ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO THE CGVD28 GEODETIC DATUM, DERIVED FROM VERTICAL CONTROL MONUMENT NO. N – 11 HAVING AN ELEVATION OF 78.900 METRES.
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT IT'S RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.

UTILITY NOTES

1. THIS DRAWING CANNOT BE ACCEPTED AS A KNOWLEDGING ALL OF THE UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION.
2. ONLY VISIBLE SURFACE UTILITIES WERE LOCATED.
3. A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY BEFORE ANY WORK INVOLVING BREAKING GROUND, PROBING, EXCAVATING ETC.

EXISTING	LEGEND	PROPOSED
	SURVEY MONUMENT PLANTED	
	SURVEY MONUMENT FOUND	
SIB	STANDARD IRON BAR	
SSIB	SHORT STANDARD IRON BAR	
IB	IRON BAR	
CC	CUT CROSS	
CP	CONCRETE PIN	
IBø	ROUND IRON BAR	
SSIB*	SHORT STANDARD IRON BAR	
IB*	IRON BAR	
(WIT)	WITNESS	
Meas.	MEASURED	
(AOG)	ANNIS, O'SULLIVAN, VOLLEBEKK LTD.	
(P1)	REGISTERED PLAN 4M–1388	
(P2)	PLAN 4R–26208	
△	SIGN	
○ LS	LIGHT STANDARD	
○ UP	UTILITY POLE	
◦ AN	ANCHOR	
○	NATURAL GAS LINE	
CSP	CORRUGATED STEEL PIPE	
+ 65.00	LOCATION OF ELEVATIONS	
C/L	CENTRELINE	
	PROPERTY LINE	
TOS	TOP OF SLOPE	
BOS	BOTTOM OF SLOPE	
T/P	TOP OF PIPE	
T/G	TOP OF GRATE	
EOA	EDGE OF ASPHALT	
JB	JERSEY BARRIER	
OHW	OVERHEAD WIRES	
	WORK LIMIT	
BH-1	BOREHOLE	

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.

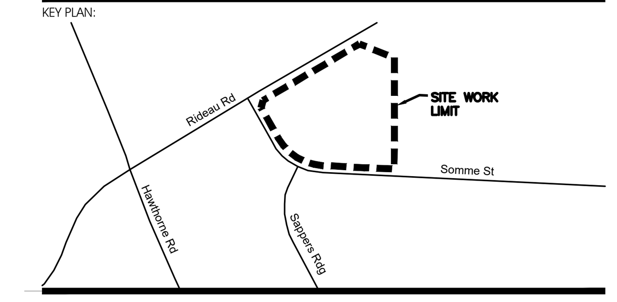
ANYONE WHO PROCEEDS WITH EXCAVATION WORK SHALL VERIFY THE EXACT LOCATION OF ALL UNDERGROUND FEATURES, BY EXPLORATORY EXCAVATIONS, AND SHALL ASSUME FULL RESPONSIBILITY IF THERE IS ANY DAMAGE THAT OCCURS DURING WORK.

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.

CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

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4		
3		
2		
1	**ISSUED FOR SITE PLAN APPROVAL**	**AUGUST 13, 2021**

ISSUE:

PROFESSIONAL STAMP:

PROFESSIONAL STAMP:

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

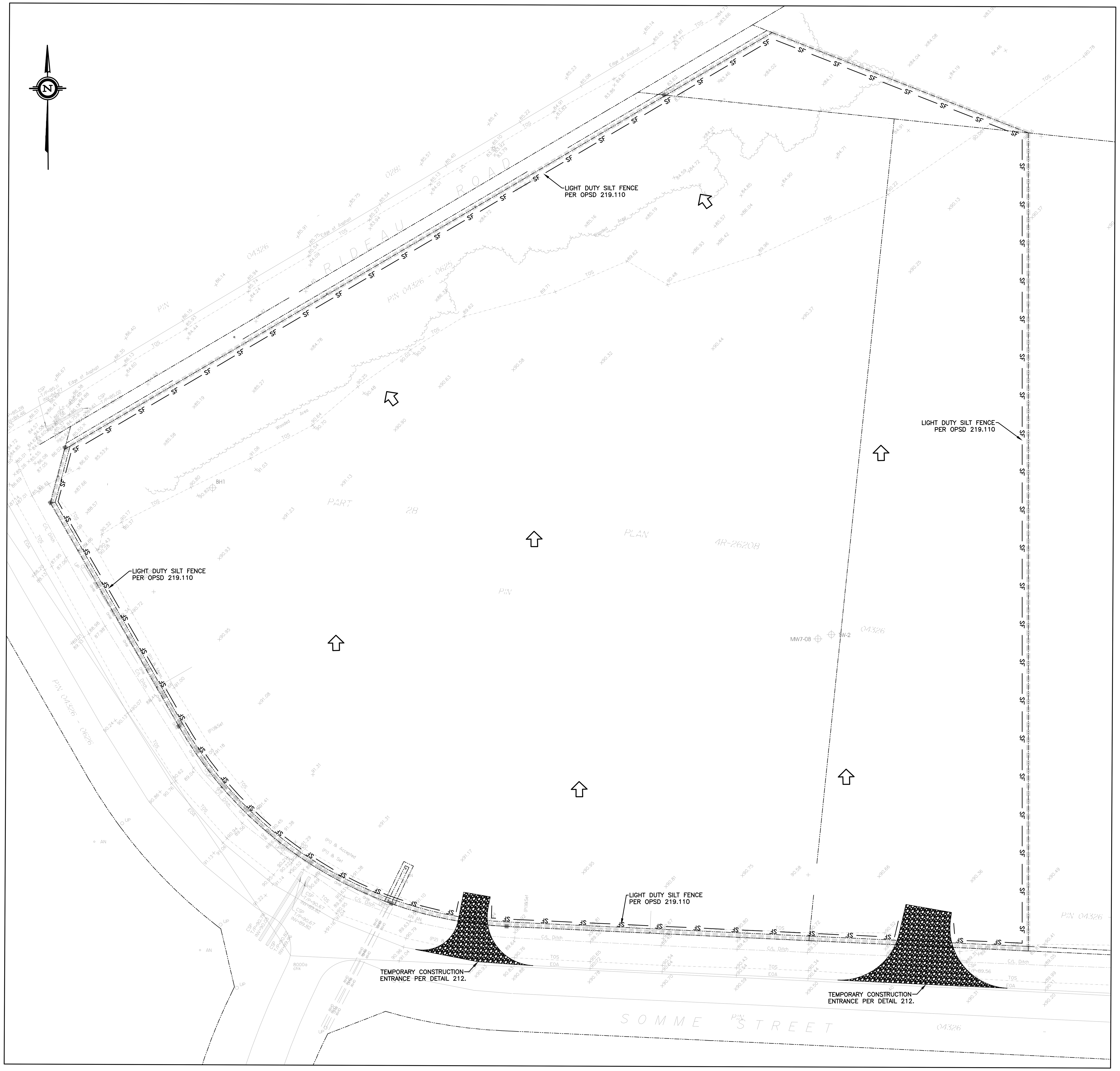
SCALE: 1:500

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

TOPOGRAPHICAL SURVEY PLAN

DRAWN BY:	D.CANN	DRAWING NUMBER:	C003
DATE:			
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083



LEGEND

EXISTING	LEGEND	PROPOSED
	SURVEY MONUMENT PLANTED	
	SURVEY MONUMENT FOUND	
SIB	STANDARD IRON BAR	
SSIB	SHORT STANDARD IRON BAR	
IB	IRON BAR	
CC	CUT CROSS	
CP	CONCRETE PIN	
IB#	ROUND IRON BAR	
SSIB*	SHORT STANDARD IRON BAR	
IB*	IRON BAR	
(WIT)	WITNESS	
Meas.	MEASURED	
(AOG)	ANNIS, O'SULLIVAN, VOLLEBEKK LTD.	
(P1)	REGISTERED PLAN 4M-1388	
(P2)	PLAN 4R-26208	
	SIGN	
LS	LIGHT STANDARD	
UP	UTILITY POLE	
AN	ANCHOR	
	NATURAL GAS LINE	
LS	LIGHT STANDARD	
CSP	CORRUGATED STEEL PIPE	
+ 65.00	LOCATION OF ELEVATIONS	
C/L	CENTRELINE	
	PROPERTY LINE	
TOS	TOP OF SLOPE	
BOS	BOTTOM OF SLOPE	
T/P	TOP OF PIPE	
T/G	TOP OF GRATE	
EOA	EDGE OF ASPHALT	
JB	JERSEY BARRIER	
OHW	OVERHEAD WIRES	
	WORK LIMIT	
BH-1	BOREHOLE	
	ELEVATION	+ 99,000
	DRAINAGE DIRECTION	
	OVERLAND FLOW	
	SILT FENCE	SF
	TEMPORARY CONSTRUCTION ENTRANCE	

SEDIMENT AND EROSION CONTROL - GENERAL NOTES

1.1. Unless otherwise indicated, all materials and construction methods to be in accordance with the requirements of the latest edition of the Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD), the Ontario Ministry of Environment, Conservation and Parks (MECP), applicable Conservation authorities, the municipal standard specifications and drawings, and all other governing authorities as they apply.

1.2. Wherever standards, laws and/or regulations are mentioned they refer to their current versions, modifications included.

1.3. Specifically, sediment and erosion control measures to be constructed as per OPSS.MUNI 805.

1.4. The Contractor must implement best management practices and provide adequate sediment and erosion control measures during construction:

1.5.
- Prevent soil erosion which can result from stormwater runoff or wind erosion during construction;
- Prevent sediment deposits in the storm sewer and/or collecting streams and;
- Prevent air pollution from dust and particulate matter.

1.6. Provisions must be made for sediment and erosion control measures prior to stripping the site of vegetation and other deleterious materials. Measures such as phase stripping, vegetation buffer zones, silt fences, straw bales, sediment traps/basins, rock checks, etc. must be constructed and maintained in order to control sediment, as required by the provincial and municipal governing authorities.

1.7 The Contractor must set up the measures shown on the plan, inspect them frequently and clean and repair or replace the deteriorated structures.

1.8 When the sediment and erosion control measures have to be removed in order to complete a portion of the work, these same measures must be reinstated.

1.9 When storing soil on site in piles the Contractor must cover each pile with tarps, straw or a geotextile fabric to avoid fine particle transport by wind and/or streaming rain water.

The light duty silt fence barrier must be installed as per OPSD 219.110.

1.10. At all times the Contractor must maintain the municipal access roads clean and free of sediments. When cleaning the access roads, the Contractor must take the necessary precautions to clear the surfaces covered with sediment prior to cleaning with water.

1.11. For dust control, Contractor to apply calcium chloride (Type I - OPSS 2501 and CAN/CGSB-15-1) and water with equipment approved by the Owner's representative at rate in accordance to OPSS.MUNI 506 when directed by Owner's representative.

1.12. At the end of the construction period, the Contractor is responsible for removal of the temporary sediment and erosion control measures and reconditioning the affected areas.

1.9. This plan is a "Living Document" which may be revised in the event that the control measures are not sufficient.

0 5 10 20 30 40 50

NOTE OF CAUTION

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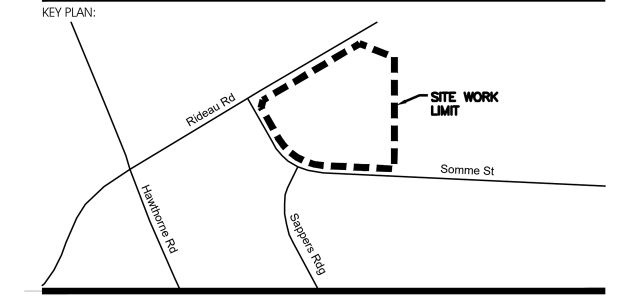
CLIENT LOGO:

FASTFRATE

KEY PLAN:



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NUMBER:	REVISION:	DATE: (MM/DD/YY)
6		
5		
4		
3		
2		
1	**ISSUED FOR SITE PLAN APPROVAL**	**AUGUST 13, 2021**

ISSUE:

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER
J. A. SAUVE
100200100
PROVINCE OF ONTARIO

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER
C. LAVOIE-LE BEL
100067842
PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: 1:500

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

SEDIMENT AND EROSION CONTROL PLAN

DRAWN BY: DATE:	D.CANN	DRAWING NUMBER:	**C004**
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CLIENT PROJECT #:		PROJECT #:	**A001083**

GRADING NOTES

1. GRADE CONTROL AND DRAINAGE - GENERAL

1.1. The Contractor must conform to all laws, codes, ordinances, and regulations adopted by federal, provincial or municipal government councils and government agencies, applying to work to be carried out.

1.2. Unless otherwise indicated, all materials and construction methods to be in accordance with the requirements of the latest edition of the Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD), the Ontario Ministry of Environment, Conservation and Parks (MECP), applicable Conservation Authorities, the municipal standard specifications and drawings, and all other governing authorities as they apply.

1.3. Wherever standards, laws and/or regulations are mentioned they refer to their current versions, modifications included.

1.4. The boreholes and test pits shown on the plan are for information purposes only. Their location on the plan is approximate. The Contractor must refer to the boreholes and test pit records to obtain information about observed stratigraphy on site.

1.5. The Contractor is responsible for obtaining all permits required to complete all works and bear cost of same, including road cut permit and water permit and their associated costs.

1.6. The Contractor is responsible for the coordination of his activities with others on site.

1.7. The location of existing underground municipal services, wells, and public utilities as shown on the plans are approximate. The Contractor must determine the exact location, size, material and elevation of all existing utilities (on-site and off-site) prior to any excavation work. Damage to any existing services, wells and/or existing utilities during construction, whether or not shown on the drawings must be repaired by the Contractor at his own expense.

1.8. Site preparation includes clearing, grubbing, stripping of topsoil, demolition, removal of unsuitable materials, cut, fill and rough grading of all areas to receive finished surfaces.

1.9. All material must be compacted as per the requirements of the governing authority and be approved by the Consultant prior to delivery to the site.

1.10. Compaction must conform to the following requirements:
- Exposed subgrade & building pad preparation:
  95% Standard Proctor maximum dry density (SPMDD)
- Granular subbase foundations:
  100% Standard Proctor maximum dry density (SPMDD)
- Granular base foundations:
  100% Standard Proctor maximum dry density (SPMDD)
- Asphalt pavement:
  As per OPSS.MUNI 310
- Roller compacted concrete pavement
  98% Mix Design Density
- Subgrade fill (pavement areas - OPSS Select Subgrade Material):
  98% Standard Proctor Maximum Dry Density (SPMDD)
- Structural fill (building footprints, foundation slabs, OPSS Granular 'A' or Granular 'B' Type II Material):
  100% Standard Proctor Maximum Dry Density (SPMDD)

1.11. If groundwater is encountered during construction, dewatering of excavations could be required as per OPSS.MUNI 518. It is assumed that groundwater may be controlled by sump and pumping methods. As required under the "Ontario Water Resources Act (OWRA)", the Contractor must register all water taking activities on Ontario's "Environmental Activity and Sector Registry (EASR)" if water taking exceeds 50,000 l/day, and obtain a "Permit to Take Water (PTTW)" if water taking exceeds 400,000 l/day. Furthermore, Contractor must provide all necessary measures required to ensure dewatering operations does not affect in any way the integrity of the existing surrounding buildings and must plan his work accordingly. Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16.

1.12. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements and as follows:

1.12.1. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials to within the required parameters of the receiving body before discharging to storm sewers, watercourses or drainage areas.

1.12.2. Before discharging to storm sewers, watercourses or drainage areas, discharge water must be sampled and tested to ensure quality requirements in accordance with City of Ottawa Sewer Use By-Law No. 2003-514 and the MECP are adhered to. The Contractor is to perform all additional sampling and testing as required by City of Ottawa. All associated fees to be paid by the Contractor.

1.12.3. Where water is not suitable for discharge into the adjacent storm sewers, watercourses or drainage areas it must be disposed of in the on-site sanitary sewer collection system, or disposed off-site at an approved disposal facility.

1.13. The Contractor must maintain benchmarks and landmark references as is. Otherwise, these references will be repositioned by a certified land surveyor at the Contractor's expense.

1.14. The Contractor is the only person in charge of safety on the building site. The Contractor is responsible for providing adequate protection of the workers, other personnel and the general public, protection of materials, as well as maintaining in good condition the completed works and works to be completed. The Contractor must supply, install and maintain an appropriate safety fence along the work perimeter until the work is complete.
The Contractor must provide at any time:
- A sufficient number of barriers, posters, guards and others to ensure safety;
- Necessary conveniences for the completion of the work such as heating, lighting, ventilation, etc.

1.15. Temporary excavations in the overburden must be completed as per the requirements of the Occupational Health and Safety Act (OHSA), O. Reg. 213/91, Part III - Excavations.
The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the star of the excavation until the structure is backfilled.
The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsurface soil is considered to be Type 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects. Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

1.16. The Contractor must pace deliveries and removals in order to minimize and control stockpiles.

1.17. Stockpile material must be stored away from excavations at a distance at least equal to the depth of the excavation. Construction traffic should be limited near open excavation.

1.18. Cleanliness on the site:
- The Contractor must clean roadways at his own cost as directed by the Owner's representative;
- All site roads and walkways to and from the construction zone must be kept clean at all times, from mud, dirt, granular material, debris, etc.;
- The Contractor must leave the work area clean at the end of each day;
- Materials and equipment must be laid out in an organized and safe manner;
- All material, equipment and temporary structures which are no longer necessary for the execution of the Contract must be removed from the site;
- If required the Contractor must use screens, bulkheads, or any other recognized means in order to reduce noise, dust, interference, obstruction, etc., in conformity with the requirements of the provincial and municipal authorities having jurisdiction.

1.19. During the construction period the Contractor is responsible for installing and maintaining temporary traffic signage, including traffic signs, traffic markings and temporary traffic lights, and flagmen, as required by the Owner, the Consultant, the Municipality, the MTO, and other governing authorities.

1.20. The Contractor must control surface runoff from precipitation during construction.

1.21. Where trees and other vegetation are proposed within close proximity to hard surfaces (i.e. sidewalks or pavement structures) it is recommended that the vegetation be panted in CU-Structural Soils or approved equivalent. Under the areas of hard surfaces, the CU soil should be compacted to 100% SPMDD using suitable compaction equipment. The CU-structural soil must extend at least 1.0 m below grade and extend to a 3.0 m radius around the trees/vegetation.

1.22. Protection of existing trees and shrubs:
- The contractor must ensure that the existing trees and shrubs that are to remain on site will be protected throughout the construction phase in order to minimize the risk of damaging the trunks and branches and to avoid the compaction of the roots.
- As required, the Contractor must coordinate his work with other professionals to ensure that the existing tree and shrub protection measures are in place prior to any other work and that these measures are maintained until the work is complete;"
- The Contractor must protect the existing trees in accordance with OPSS.MUNI 801 and OPSD 220.010.
- The Contractor must define paths for heavy machinery before construction to avoid compaction of the roots of existing trees and shrubs;
- The Contractor cannot store material at the base of trees and shrubs; The Contractor cannot backfill the trunk of existing trees and shrubs; Prune tree branches, shrubs and roots as needed to complete the work.
- The Contractor must perform any tree cutting prior to April 15 (i.e. outside of the core Migratory Birds sting period, which is April 15 to August 15).

1.23. The Contractor must ensure the following mitigation measures are implemented in order to reduce the risk of ground contamination from petroleum products:
- The list of persons and agencies to contact in the event of an emergency must be posted in plain sight on the work site for the duration of the construction period;
- Machinery must be clean and kept clean to limit any grease or oil deposits inside the work area;
- Frequent inspections must be performed to detect any oil, fuel, grease or other leaks. If a leak is detected, the necessary corrective action must be taken immediately;
- An emergency kit for the recovery of petroleum products must be kept on site at all times. The kit must include at least 30 m of absorbent booms, a box of absorbent pads and solid absorbent material (powder or granules). The kit must be stored near the location of work and machinery, and kept within easy reach at all times to ensure a rapid response;
- In the event of a spill the Contractor must immediately report to the Spills Action Centre of the MECP at 1-800-268-6060. Hydrocarbons and contaminated soils will be recovered by a specialized firm.

1.24. The Contractor must ensure the following measures are implemented regarding the handling of concrete:
- Concrete should either be mixed away from the site or should be prepared on paved surfaces if only small quantities are required (i.e. minor repairs);
- Excess concrete must be disposed off-site at a location that meets all regulatory requirements;
- The washing of concrete trucks and other equipment used for mixing concrete should not be carried out within 30 m of a watercourse or wetland and should take place outside of the work site;
- All concrete trucks should collect their wash water and recycle it back into their trucks for disposal off-site at a location meeting all regulatory requirements.

2. DEMOLITION AND REMOVALS

2.1. The Contractor must visit the premises in order to be fully aware of existing conditions on site, including all elements to be removed and demolished. No claim will be accepted due to a poor evaluation of the work to be completed.

2.2. The Contractor must protect and maintain in service the existing works which must remain in place. If they are damaged, the Contractor must immediately make the replacements and necessary repairs to the satisfaction of the Owner's representative and without additional expense to the Owner.

2.3. The Contractor must perform the nessessary clearing and grubbing in accordance with OPSS.MUNI 201.

2.4. The Contractor must carry out necessary saw cuts even if they are not shown on the drawings.

2.5. The Contractor must entirely remove the demolition wreckage from the construction site in accordance with the requirements of the MECP and in accordance with OPSS.MUNI 180 and OPSS.MUNI 510.
- The Contractor must discard recyclable demolition materials in collaboration with a regional recycling company. The Contractor must be able to provide proof, upon request, that the materials were properly recycled and that the chosen recycling company is recognized in the recycling field.
- All other demolition materials must be disposed off-site at authorized licensed landfills and in conformity with the applicable laws and regulations. The Contractor must be able to provide, upon request, copies of the disposal tickets.

2.6. The Contractor is responsible for locating existing public utilities and (if required) submit a request for the interruption of public utility services, such as gas, telephone, power, cable, sewers, watermain, etc.

2.7. The Contractor must conduct all removals required to make the work complete.

2.8. Unless otherwise specified, all materials, products and others coming from the demolition belong to the Contractor.

2.9. Surfaces and works located outside of the construction work limit must be reinstated as they were before beginning of work.
The existing Well will be abandoned in accordance with O.Reg 903.

3. GENERAL SUBGRADE PREPARATION

3.1. Earth removal must be inspected by an experienced Geotechnical Engineer to ensure that all unsuitable materials are removed prior to the placement of fill, including concrete and/or others, and to confirm the compaction degree and condition of the founding soils. All unsuitable materials must be hauled off site and disposed as per provincial and municipal regulations.

3.2. Subgrade must be approved by experienced geotechnical personnel before proceeding with placement of fill.

3.3. All granular fill must be placed in maximum 200 mm thick loose lifts and compacted using suitable methods as per the requirements.

3.4. All soft, wet or disturbed areas revealed under surface compaction must be removed to a minimum depth of 500 mm and replaced with compacted suitable subgrade fill (i.e. OPSS Granular 'B' Type II material) and an approved non-woven geotextile per OPSS 1860 as directed by the Geotechnical Engineer. Transition around sub-excavations where backfill and native material are not of similar nature, shall be sloped at 5 horizontal to 1 vertical, within 1.8 m of finished surface

3.5. If contaminated material is encountered during the work, the Contractor must retain a Qualified Person (QP, as per the definition under O.Reg 153/04), characterize the soil and dispose off-site all materials from the contaminated area in accordance with the requirements of the MECP O.Reg 406/09 and OPSS.MUNI 180. Prior to the start of work the Contractor must provide the name and location of the intended Receiving Site (s) where the contaminated materials will be disposed to the Consultant. The Contractor must obtain from the Receiving Sites QP documents confirming that the site has the right to accept the contaminated material. During the work, the Contractor must provide the Consultant copies of all reports signed by the Receiving Site's QP.

3.6. The Contractor is responsible for providing a confirmation that the imported material used as subgrade fill is free of any contaminants, as per O.Reg 153/04, such as Petroleum Hydrocarbons (C10-C50), Polycyclic Aromatic Hydrocarbons (PAH), and metals like mercury, silver, arsenic, cadmium, cobalt, chromium, copper, tin, manganese, molybdenum, nickel, lead and zinc.

4. EXCAVATION AND BACKFILL

4.1. Subgrade preparation must be completed as per Section "3.0 General Subgrade Preparation".

4.2. The management of excess materials to comply with OPSS.MUNI 180 and any excess soils with O.REG. 406/19.

4.3. Topsoil and deleterious fill, such as those containing organic materials, must be stripped from under any buildings, paved areas, pipe bedding, and other settlement sensitive structures.

4.4. Non-specified existing fill along with on-site excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 98% of their respective SPMDD.

4.5. Structural fill used for grading beneath the footings of buildings, building floor slabs, sidewalks, pavements and slab on gradesigns and light standards must consist of OPSS Granular 'A' or Granular 'B' Type II Material.

4.6. Construction operations could cause vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible must be incorporated in the construction operations to maintain a cooperative environment with the residents.
The following construction equipments could cause vibrations: piling equipment, hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, caused by blasting or construction operations could cause detrimental vibrations on the adjoining buildings and structures. Therefore, it is recommended that all vibrations be limited.
Two parameters determine the recommended vibration limit, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). These guidelines are for current construction standards.
Considering there are several sensitive buildings in close proximity to the subject site, consideration to lowering these guidelines is recommended. These guidelines are above perceptible human level and, in some cases, could be very disturbing to some people. A pre-construction survey is therefore required to minimize the risks of claims during or following the construction of the proposed building.

5. PAVEMENT STRUCTURES, CURBS, AND SIDEWALKS

5.1. Construction of granular foundation must conform to OPSS.MUNI 314.

5.2. Granular materials used on site must conform to the requirements of OPSS.MUNI 1010.

5.3. Road cut reinstatement as per City of Ottawa Detail R10 with surface course key.

5.4. Where the proposed pavement structure abuts the existing pavement, the pavement structure should match the existing pavement layers.

5.5. Construction of asphalt must conform to OPSS.MUNI 310 and OPSS.MUNI 313.

5.5.1. Paving must not be carried out if the roadbed is frozen or wet.

5.5.2. The granular grade must be free of standing water at the time of hot mix asphalt placement. The surface of a pavement upon which hot mix asphalt is to be placed must be dry at the time of hot mix asphalt placement. Following the final compaction of a hot mix asphalt course, a 4 hour minimum time laps must be respected before placing a new new hot mix asphalt course. Additionally, the temperature of the previous course must be 50 °C or less.

5.5.3. As per OPSS.310.07.06.02, the asphalt base course must not be placed unless the air temperature at the surface of the road is a minimum of 2°C and rising.

5.5.4. As per OPSS.310.07.06.02, the asphalt surface course must not be placed unless the air temperature at the surface of the road is a minimum of 7°C and rising.

5.6. Asphalt concrete material must conform to OPSS.MUNI 1150 for Hot Mix Asphalt and OPSS.MUNI 1151 for Superpave and Stone Mastic Asphalt Mixtures. Minimum Performance Graded (PG) 58-34 asphalt cement must be used for this project.

5.7. Asphalt mix design must be reviewed and approved by a Geotechnical Engineer before paving.

5.8. Concrete curbs must conform to OPSS 353.MUNI.

5.9. Concrete Toe-wall to be per OPSD 3120.100 Type I

5.10. Elevation at top of concrete curbs to be 150 mm above the asphalt, unless otherwise indicated on the drawings.

5.11. Concrete sidewalks must conform to OPSS.MUNI 351.

5.12. For all concrete placement during cold weather Contractor must place material in accordance to OPSS.904.MUNI.

5.12.1. When ambient air temperature is 5°C or less, forms for concrete work must be left in place for the duration of the curing period.

5.12.2. When the ambient air temperature is below 0°C at the time of placing, components must be cured with moisture vapour barrier.

5.12.3. Contractor must conform to OPSS.MUNI 904.07.11 for Control of Temperature when subjected to cold weather.

5.13. Construction of Roller-Compacted Concrete Pavement as follows:
- Subgrade to be prepared as specified, and contoured for efficient drainageConstruction of Roller-Compacted Concrete Pavement as follows:
- Subgrade to be prepared as specified, and contoured for efficient drainage
- Concrete should be transported in dump trucks and placed using asphalt pavers.
- If placed in more than one lift, subsequent lift should be placed within 60 minutes of placing the bottom lift.
- Roller compacted concrete must be compacted using 10 ton dual drum vibratory roller within 15 to 45 minutes of placement with 4 to 6 passes, until lift deflects uniformly under roller, and no pumping, shiny or pasty surface is observed.
- The desired density is 98% of the mix design density.
- Transverse saw joints must be placed at 5 m on centres.
- Longitudinal saw joints must be placed at 0.2 m from the edges, and every 8m subsequently.

6. BUILDING PAD PREPARATION

6.1. The Building Pad shall be prepared prior to Dynamic Compaction (DC) to a level that will allow the finished grade to be 450mm below the Finish Floor Elevation (FFE). The Contractor shall assume that the total settlement after DC will be 300mm. Therefore, the Building Pad finished grade Prior DC shall be 91.850m.

6.2. The Building Pad footprint shall extend 2m past the perimeter of the proposed building footprint.

6.3. The final layer of the building pad (Working Pad) shall consist of compacted 600 mm of Granular B Type II.

6.4. The Building Pad shall be excavated to 91.850m minus (-) 600mm = 91.250m in Cut areas and or raised to 91.250m plus (+) 600mm = 91.850m in Fill areas.

6.5. In addition to the 600mm Granular pad specified above, in fill areas, the Building Pad shall be raised using excavated surplus materials from the site as per the Excavated Materials Management specifications.

6.6. Fill must be place in lifts no greater than 200mm thick and compacted to the specified density using suitable compaction equipments.

6.7. The building pad preparation must include a 20 m wide temporary access road (up to the property line) around the building and, between the building and the access street. The contractor must be responsible for maintaining the temporary access roads in good and tidy condition at all times to the satisfaction of the Owner and / or Consultant.
All temporary access roads constructed within future pavement areas must consist of compacted granular materials as per pavement infrastructure details.
All temporary access roads constructed within future landscaped areas must consist of compacted OPSS Select Subgrade Material to allow heavy equipment traffic.

6.8. If the building is constructed during the winter period, the Contractor must be responsible for the snow removal and spreading of abrasive throughout the construction work by the building contractor and his sub-contractors.

7. EXCAVATED MATERIAL MANAGEMENT

7.1. During site preparation excavation work, the Contractor shall ensure that the excavated existing fill material remains on-site as much as possible and is incorporated within its work. All surplus excavation of existing Fill material shall be managed as per the following priorities

7.1.1. Surplus excavated materials may come from excavation required to construct the proposed ponds and parking areas at specified finished elevations.

7.1.2. First, surplus excavated materials shall be incorporated within the Building Pad Preparation to raise the Pad to the required elevation and allowing for the Working Pad layer mentioned at 6.3

7.1.3. Second, surplus materials shall be used to backfill the Vegetated Retaining wall.

7.1.4. The remaining surplus material shall be remove off-site as per the specification herein.

SERVICES NOTES

1. MUNICIPAL SERVICES - GENERAL

1.1. Unless otherwise indicated, all materials and construction methods to be in accordance with the requirements of the latest edition of the Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD), the Ontario Ministry of Environment, Conservation and Parks (MECP), applicable Conservation Authorities, the municipal standard specifications and drawings, and all other governing authorities as they apply.

1.2. Wherever standards, laws and/or regulations are mentioned they refer to their current versions, modifications included.

1.3. The boreholes and test pits shown on the plan are for information purposes only. Their location on the plan is approximate. The Contractor must refer to the boreholes and test pit records to obtain information about observed stratigraphy on site.

1.4. The location of existing underground municipal services and public utilities as shown on the plans are approximate. The Contractor must determine the exact location, size, material and elevation of all existing utilities (on-site and off-site) prior to any excavation work. Damage to any existing services and/or existing utilities during construction, whether or not shown on the drawings must be repaired by the Contractor at his own expense.

1.5. The Contractor is responsible for obtaining all permits required to complete all works and bear cost of same, including water permit and associated costs.

1.6. The Contractor is responsible for the coordination of his activities with others on-site.

1.7. Terminate and plug all service connections at 1.0 meter from edge of the building.

1.8. The Contractor must complete compaction as per OPSS.MUNI 501 and note the following requirements for service trenching:

MATERIALS	COMPACTION
Pipe bedding	95% Standard Proctor Maximum Dry Density
Trench backfill and pipe cover	95% Standard Proctor Maximum Dry Density

1.9. The Contractor is responsible for making or arranging all connections to the existing sewers as per municipal requirements. Prior to connection, the Contractor must provide, to the Engineer and the City for approval, all test results performed on the internal services. Test results must include C.C.T.V. inspection of sewers, infiltration/exfiltration tests for sewers and manholes, deformation tests of sewers, watermain hydrostatic leakage test, flushing and disinfecting operations, and bacteriological water analysis.

1.10. The Contractor must determine the exact invert (geodetic elevation), diameter and construction material of the existing conduits at the proposed connections. He must also carry out, if necessary, exploratory excavations in order to determine the exact location and inverts of existing duct banks. This information must immediately be provided to the Engineer prior to start undertaking any municipal services work and a 48 hour period must be allocated to the Engineer for design review.

1.11. The Contractor is responsible for all excavation, backfill and reinstatement of all areas disturbed during construction to existing conditions or better and all associated works to the satisfaction of the Engineer and municipal authorities.
- Asphalt reinstatement must be in accordance with OPSS.MUNI 310.
- Landscape areas to be reinstated with 150 mm of topsoil and sod in accordance with OPSS.MUNI 802 and OPSS.MUNI 803.

1.12. It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. Services are expected to be installed by "cut and cover" methods and excavations should not remain open for extended periods of time.

1.13. The pipe bedding for sewer and water pipes must consist of at least 150 mm of OPSS Granular A material. The material must be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its SPMDD. The bedding material should extend at least to the spring line of the pipe.

1.14. The cover material, which must consist of OPSS Granular A, will extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material must be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of its SPMDD.

1.15. Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) must match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill must be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD..

1.16. Dewatering of pipeline, utility and associated structure in rock excavations to be completed as per OPSS.MUNI 403.

1.17. Trenching, backfilling and compacting must conform to OPSS.MUNI 401.

2. WATERMAIN

2.1. Watermain, water service connections and associated appurtenances must be constructed in accordance with the Ontario Provincial Standard Specifications. Specifically watermains must conform to OPSS.MUNI 441.

2.2. Watermain must be constructed as per OPSS.MUNI 441 and specifically OPSD 802.010 for earth excavations and 802.013 for rock excavation. Bedding and cover material to be OPSS Granular 'A' compacted to 95% Standard Proctor Maximum Dry Density.

2.3. Watermain pipe materials must be class 150 PVC DR 18 or approved equivalent, unless otherwise shown on the Drawings. Materials must conform to OPSS 441.

2.4. All watermain must be installed with a minimum of 2.40 meters cover from finished grade. Where a minimum of 2.40 meters cover is not reached, thermal insulation is required as per City of Ottawa Details W22 and W23.

2.5. Watermain service connections must be installed a minimum of 2.40 meters from any catchbasin, manhole or object that may contribute to freezing. Thermal insulation must be installed as per City of Ottawa Details W22 and W23 where 2.40 meters of separation cannot be achieved.

2.6. Cathodic protection (if required) must be installed as per City of Ottawa Details W40 and W42.

2.7. Restraints must be as per City of Ottawa Details W25.5 and W25.6.

2.8. Valves to be installed as per OPSS 441 and conform to the following:
- All valves must open in a counter clockwise direction;
- Designed for cold water working pressure of 1035 kPa;
- Types must be one of the following:
- Valves less than 75 mm to be brass or bronze gate valves;
- Valves greater than or equal to 75 mm, and less than or equal to 300 mm, to be cast or ductile iron gate valves;
- Valves greater than 300 mm up to and including 500 mm to be gate or butterfly valves;
- Valves greater than 500 mm to be butterfly valves.

2.9. A continuous 12 gauge copper tracer wire must be installed over all watermains. Tracer wire must be tied to all fire hydrants.

2.10. Valve box assembly to be as per City of Ottawa Detail W24.

2.11. When a watermain pipe crosses a sewer pipe, installation must be as per City of Ottawa Detail W25.2.

2.12. Watermains must be thoroughly flushed and cleaned to remove all dirt and debris prior to the disinfection process.

2.13. All watermains must be hydrostatically and bacteriologically tested as per provincial and municipal regulations. It is the Contractor's responsibility to ensure that all requirements are followed.

2.14. Hydrostatic testing to be completed as per OPSS 441.07.24. Testing must be completed under the supervision of the Contract Administrator. The test section will be either a section between valves or the completed watermain. Test pressure to be 1035 KPa.

2.15. Flushing and Disinfecting to be completed as per OPSS 441.07.25 under the supervision of the Contract Administrator.

2.16. Contractor must coordinate the supply and installation of water meter and remote water meter for the building with the mechanical engineer.

3. STORM SEWER

3.1. Storm sewers, laterals and storm service connections must be constructed in accordance with the Ontario Provincial Standard Specifications. Specifically storm sewers must conform to OPSS.MUNI 410.

3.2. PVC storm sewer material to conform to OPSS.MUNI 1841. PVC storm sewers to be installed as per OPSD 802.010 for earth excavation and 802.013 for rock excavation. Bedding and cover material to be OPSS Granular 'A'.

3.3. The allowable deflected pipe diameter when using flexible pipe is as follows:
- Pipes 100 to 750 mm: 7.5% of the base inside diameter of the pipe
- Greater than 750 mm: 5.0% of the base inside diameter of the pipe

3.4 Final backfill material for storm sewers must be approved native material or select subgrade material in conformance with OPSS.MUNI 212.

Storm sewer pipes must be type PVC SDR-35, unless noted otherwise on the drawings.

3.5. Culverts, when double barreled, must be spaced laterally by 300mm between each barrel.

3.6. All storm sewers to be C.C.T.V. inspected by the Contractor as per OPSS.MUNI 409. Report must be provided to the Engineer in two (2) copies and the C.C.T.V. inspection in DVD format only.

3.7. Storm manholes, manhole/catchbasins, catchbasins, ditch inlets and valve chambers to be installed as per OPSS 407.

3.8. Adjustment or rebuilding of manholes, manhole/catchbasins, catchbasins, ditch inlets and valve chambers to be completed as per OPSS 408.

3.9. Excavating, backfilling, and compacting for manholes, manhole/catchbasins, catchbasins, ditch inlets and valve chambers to be completed as per OPSS 402.

3.10. Storm manhole, manhole/catchbasin and catchbasin excavations to be backfilled with OPSS Granular 'B' compacted to 99% Standard Proctor Maximum Dry Density (SPMDD). Joints between sections must be wrapped in a non-woven geotextile.

3.11. Storm manholes and manhole/catchbasins to be as per OPSD 701.010 and must be equipped with safety platform as per OPSD 404.020 when exceeding 5.0 m to the lowest invert.

3.12. Storm manhole frame and cover to be as per OPSD 401.010 Type "A" closed cover.

3.13. When a minimum cover of 1.5 meters is not reached, frost protection is required.

3.14. For building roof drain sizes and location refer to architectural and mechanical drawings.

3.15.

4. SANITARY SEWER

4.1. Sanitary sewers, laterals and service connections must be constructed in accordance with the Ontario Provincial Standard Specifications. Specifically sanitary sewers must conform to OPSS.MUNI 410.

4.2. PVC sanitary sewer pipe material to type PVC SDR-35, conforming to OPSS.MUNI 1841. PVC sanitary sewers to be installed as per OPSD 802.010 for earth excavation and 802.013 for rock excavation. Bedding and cover material to be OPSS Granular 'A'.

4.3. The allowable deflected pipe diameter when using flexible pipe is as follows:
- Pipes 100 to 750 mm: 7.5% of the base inside diameter of the pipe
- Greater than 750 mm: 5.0% of the base inside diameter of the pipe

4.4. Final backfill material for sanitary sewers must be approved native material or select subgrade material in conformance with OPSS.MUNI 212.

4.5. All sanitary sewers to be C.C.T.V. inspected by the Contractor as per OPSS.MUNI 409. Report must be provided to the Engineer in two (2) copies and the C.C.T.V. inspection in DVD format only.

4.6. Sanitary manholes to be installed as per OPSS 407.

4.7. Adjustment or rebuilding of sanitary manholes to be completed as per OPSS 408.

4.8. Excavating, backfilling, and compacting for sanitary manholes to be completed as per OPSS.MUNI 402.

4.9. Sanitary manholes to be backfilled with OPSS Granular 'B' compacted to 99% Standard Proctor Maximum Dry Density (SPMDD). Joints between sections must be wrapped in a non-woven geotextile.

4.10. Sanitary manholes to be as per OPSD 701.010 and must be equipped with safety platform as per OPSD 404.020 when exceeding 5.0 m to the lowest invert.

4.11. Sanitary manhole frame and cover to be as per OPSD 401.010 Type "A" closed cover.

4.12. A maintenance hole drop structure tee is to be used as per OPSD 1003.010 when the drop from the inlet invert to the outlet invert is greater than 600 mm and less than 1200 mm. A drop structure wye is to be used as per OPSD 1003.020 when the drop exceeds 1200 mm.

4.13. Sanitary service connections to rigid main sewer pipe to be as per City of Ottawa Detail S11. Connections to flexible main sewer pipe to be as per City of Ottawa Detail S11.1.

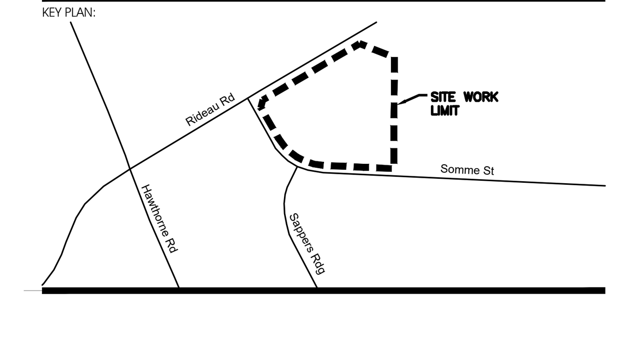
4.14. When a minimum cover of 1.8 meters is not reached, frost protection is required.

4.15. Benching is required inside the concrete bottom of sanitary manholes as per OPSD 701.021.

CLIENT LOGO:

FASTFRATE

KEY PLAN:



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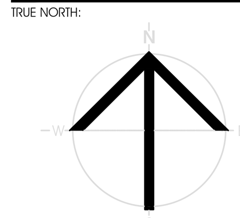

PRELIMINARY
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RECORD OF REVISIONS:

NUMBER	REVISION	DATE (MM/DD/YY)
6		
5		
4		
3		
2		
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER
J. A. SAUVE
100200100
PROVINCE OF ONTARIO

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER
C. LAVOIE-LEBEL
100067842
PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE
AND DISTRIBUTION FACILITY

SCALE: NONE

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

NOTES PLAN

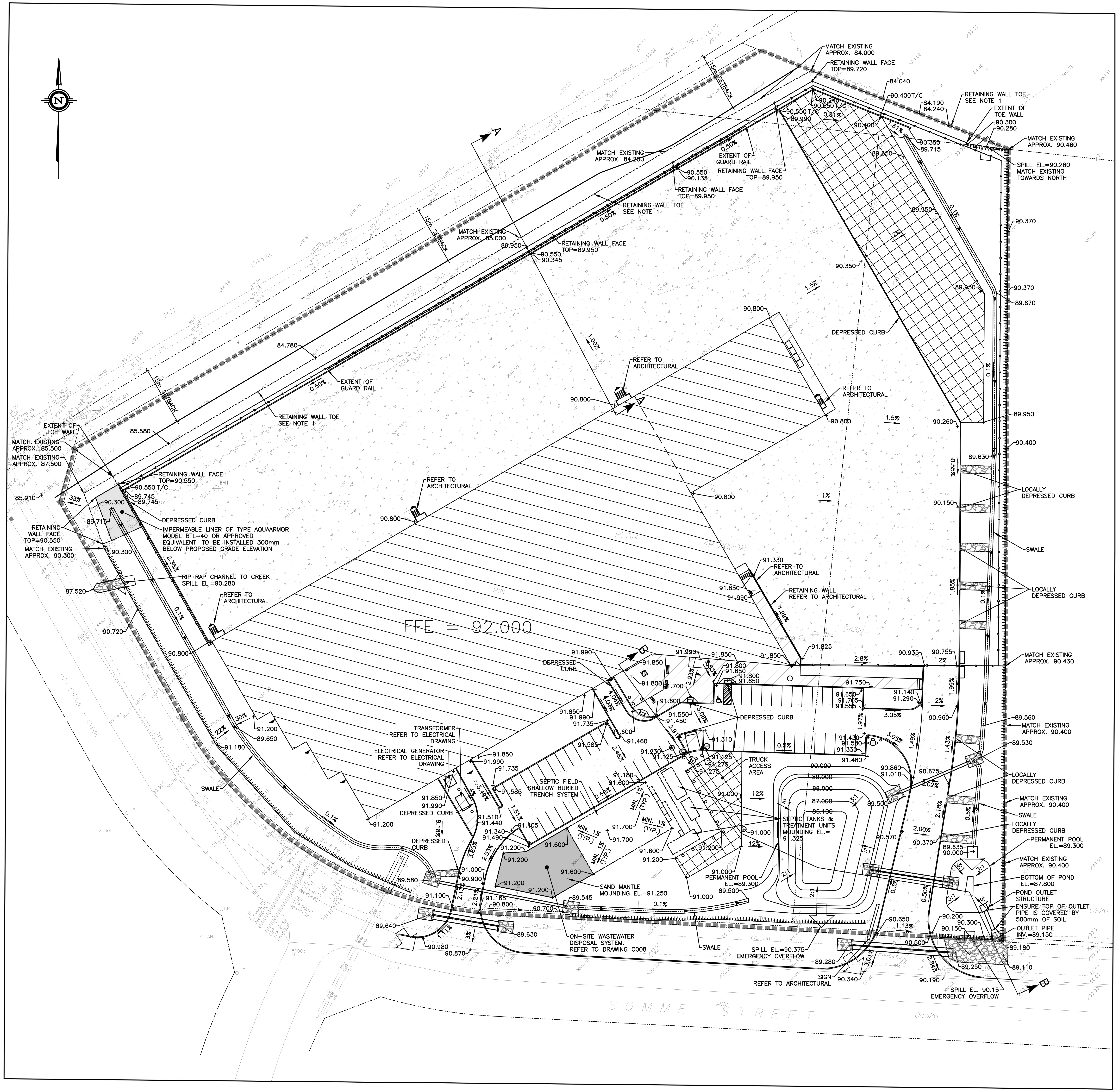
DRAWN BY: D.CANN
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PRINT DATE:
ISSUED DATE: AUGUST 13, 2021

DRAWING NUMBER: C005

REVISION NUMBER:

CLIENT PROJECT #:

PROJECT #: A001083



LEGEND

EXISTING — PROPOSED

- SURVEY MONUMENT PLANTED
- SURVEY MONUMENT FOUND
- SIB — STANDARD IRON BAR
- SSIB — SHORT STANDARD IRON BAR
- IB — IRON BAR
- CC — CUT CROSS
- CP — CONCRETE PIN
- IBø — ROUND IRON BAR
- SSIB* — SHORT STANDARD IRON BAR
- IB* — IRON BAR
- (WIT) — WITNESS
- Meas. — MEASURED
- (AOG) — ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
- (P1) — REGISTERED PLAN 4M-1388
- (P2) — PLAN 4R-26208
- SIGN
- LS — LIGHT STANDARD
- UP — UTILITY POLE
- AN — ANCHOR
- NATURAL GAS LINE
- CSP — CORRUGATED STEEL PIPE
- +65.00 — LOCATION OF ELEVATIONS
- C/L — CENTRELINE
- PROPERTY LINE
- TOS — TOP OF SLOPE
- BOS — BOTTOM OF SLOPE
- T/P — TOP OF PIPE
- T/G — TOP OF GRATE
- EOA — EDGE OF ASPHALT
- JB — JERSEY BARRIER
- OHW — OVERHEAD WIRES
- WORK LIMIT
- BH-1 — BOREHOLE
- A — WATERMAIN
- S — SANITARY SEWER
- P — STORM SEWER
- D — DRAIN
- G — GAS LINE (APPROX. LOC.)
- T — UNDERGROUND TELEPHONE (APPROX. LOC.)
- CA — UNDERGROUND CABLE (APPROX. LOC.)
- X — FENCE — X
- E — UNDERGROUND ELECTRICITY (APPROX. LOC.)
- OVERHEAD WIRES
- LOT LINE
- RIGHT-OF-WAY LIMITS
- EASEMENT
- WORK LIMITS AREA
- TOP OF SLOPE
- DITCH CENTER
- BOTTOM OF SLOPE
- WOOD AREA
- GRADE CROSSING
- FLAGPOLE
- CATCHBASIN
- MANHOLE/CATCHBASIN
- MANHOLE
- FIRE HYDRANT
- VALVE
- REDUCER
- TEE
- VALVE CHAMBER
- PRIVATE UTILITIES (WATERMAIN)
- EXTERIOR WATER FAUCET
- SLUICEWAY
- NATURAL GAS VALVE
- SIGN
- STOP SIGN
- TRAFFIC LIGHT
- E — ELECTRICITY POLE
- T — TELEPHONE POLE
- E,T — ELECT.-TEL.-STREET LIGHT POLE
- E,T — ELECT.-TEL.-TRANSFORMER POLE
- PRIVATE STREET LIGHT
- E — ELECTICITY MANHOLE
- T — TELEPHONE MANHOLE
- PK — SURVEY STATION
- ×136,000 — ELEVATION — + 99,000
- DRAINAGE DIRECTION
- SAMPLING LOCATION
- OVERLAND FLOW
- ROLLED CONCRETE (REFER TO DETAIL 203)
- HEAVY DUTY PAVEMENT (REFER TO DETAIL 202)
- CONCRETE SIDEWALK (REFER TO DETAIL 101, 102 & 103)
- GRANULAR PAD (REFER TO DETAIL 202)
- RIP RAP (REFER TO DETAIL)

RIP-RAP			
TYPE	CALIBER (mm)	d50 (mm)	THICKNESS (mm)
2	200–100	150	300
3	300–200	250	500

NOTES
1. TOE OF RETAINING WALL SHOWN AT WIDEST LOCATION. LOCATION VARIES WITH HEIGHT OF WALL.
2. RIP RAP SIZE IN MUNICIPAL ROW TO BE TYPE 3; RIP RAP SIZE ON SITE TO BE TYPE 2.

0 5 10 20 30 40 50

NOTE OF CAUTION

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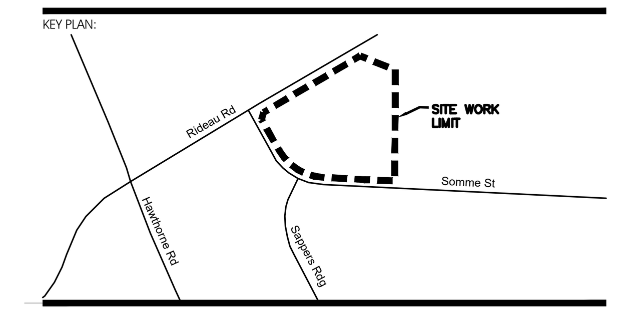
CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

PRELIMINARY
NOT FOR CONSTRUCTION

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NUMBER:	REVISION:	DATE: (MM/DD/YY)
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1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER J. A. SAUVE 100200100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LE BEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

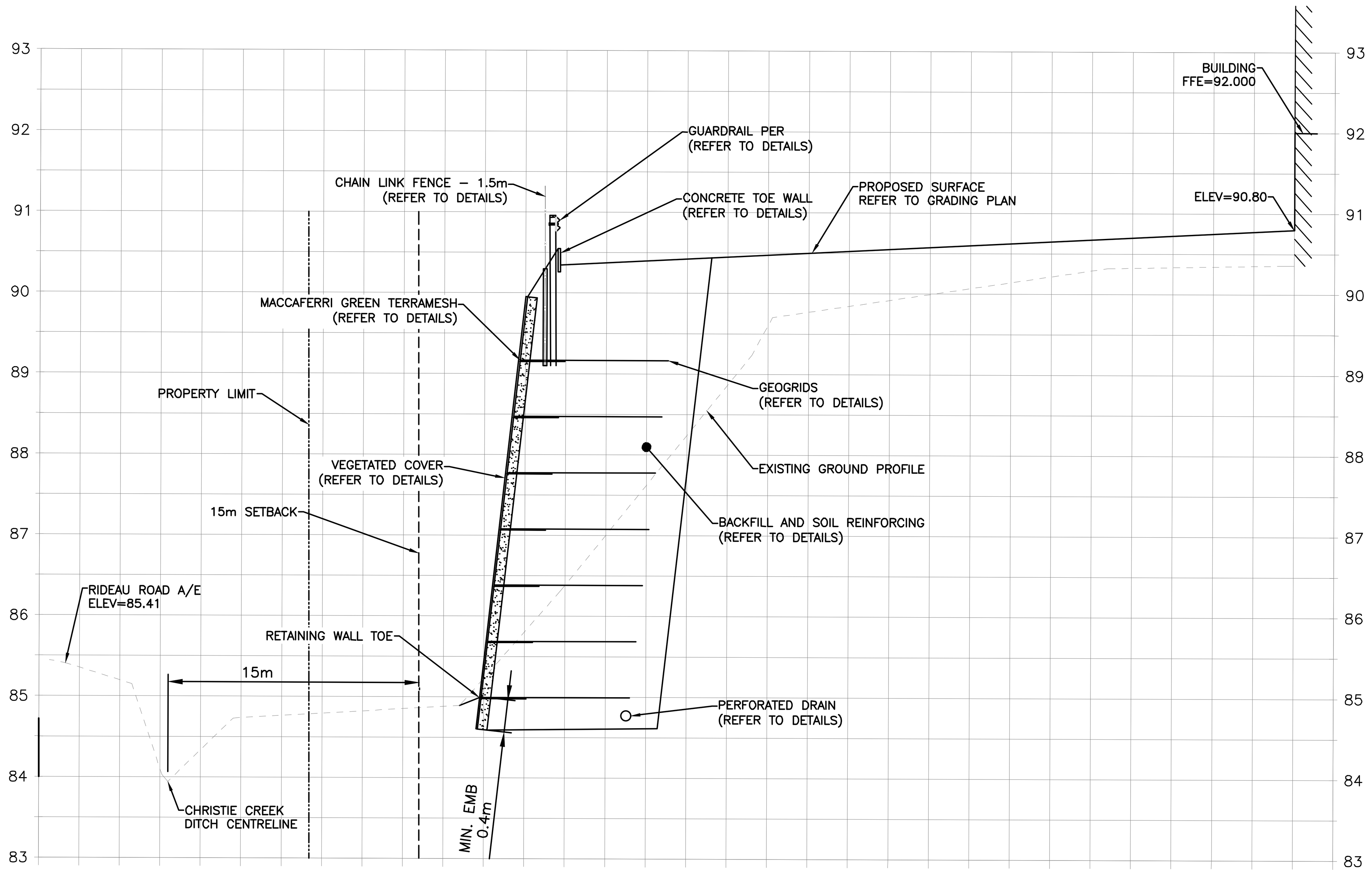
SCALE: 1:500

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

GRADING PLAN

DRAWN BY:	D.CANN	DRAWING NUMBER:	C006A
DATE:			
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083



SECTION A-A
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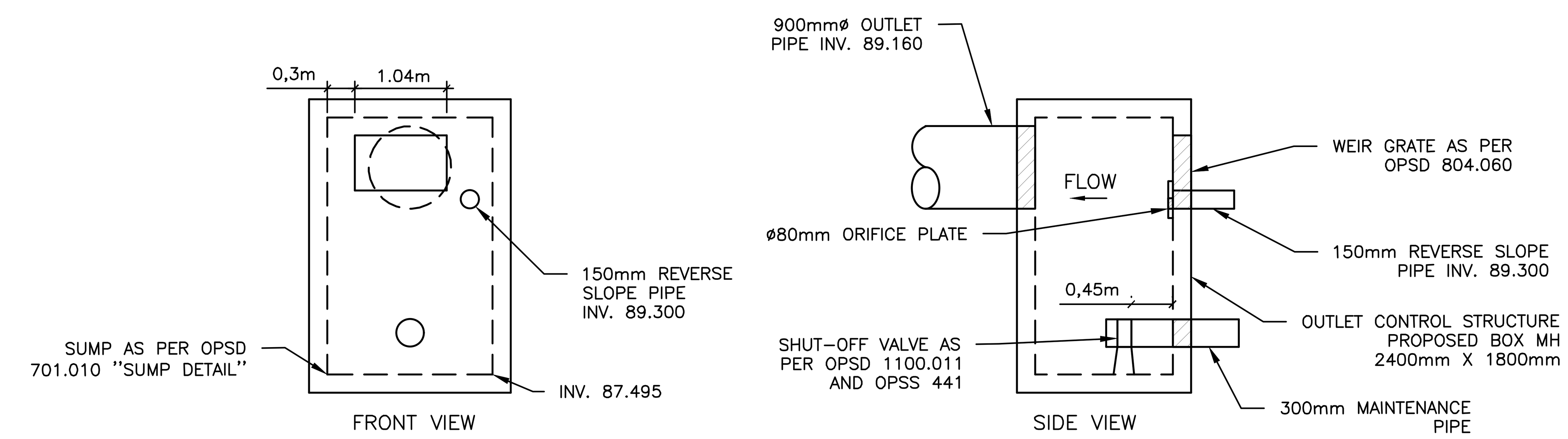
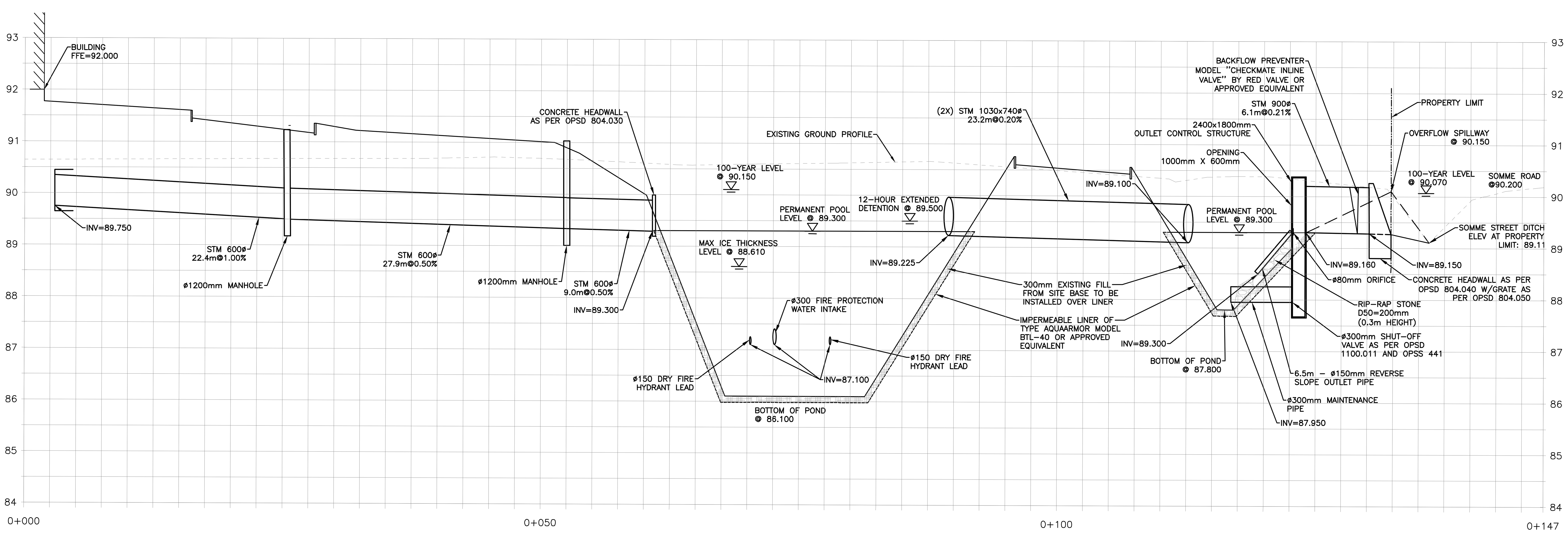


OULTET CONTROL STRUCTURE DETAILS
SCALE: NTS



SECTION B-B
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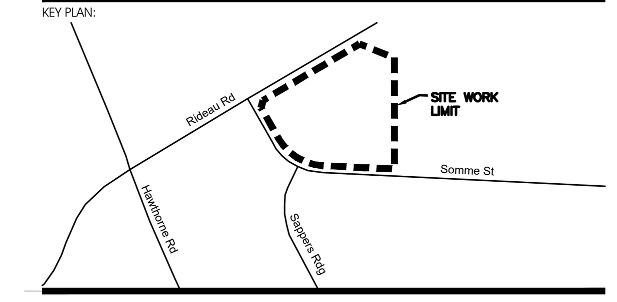

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ISSUE:

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER J.A. SALVE 100200100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LEBEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 | OTTAWA, ON CANADA K1S 1V9 | T: 613.742.7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: 1:500

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

SECTIONS

DRAWN BY:	D.CANN	DRAWING NUMBER:	C006B
DATE:			
REVIEWED BY:	J.SALVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
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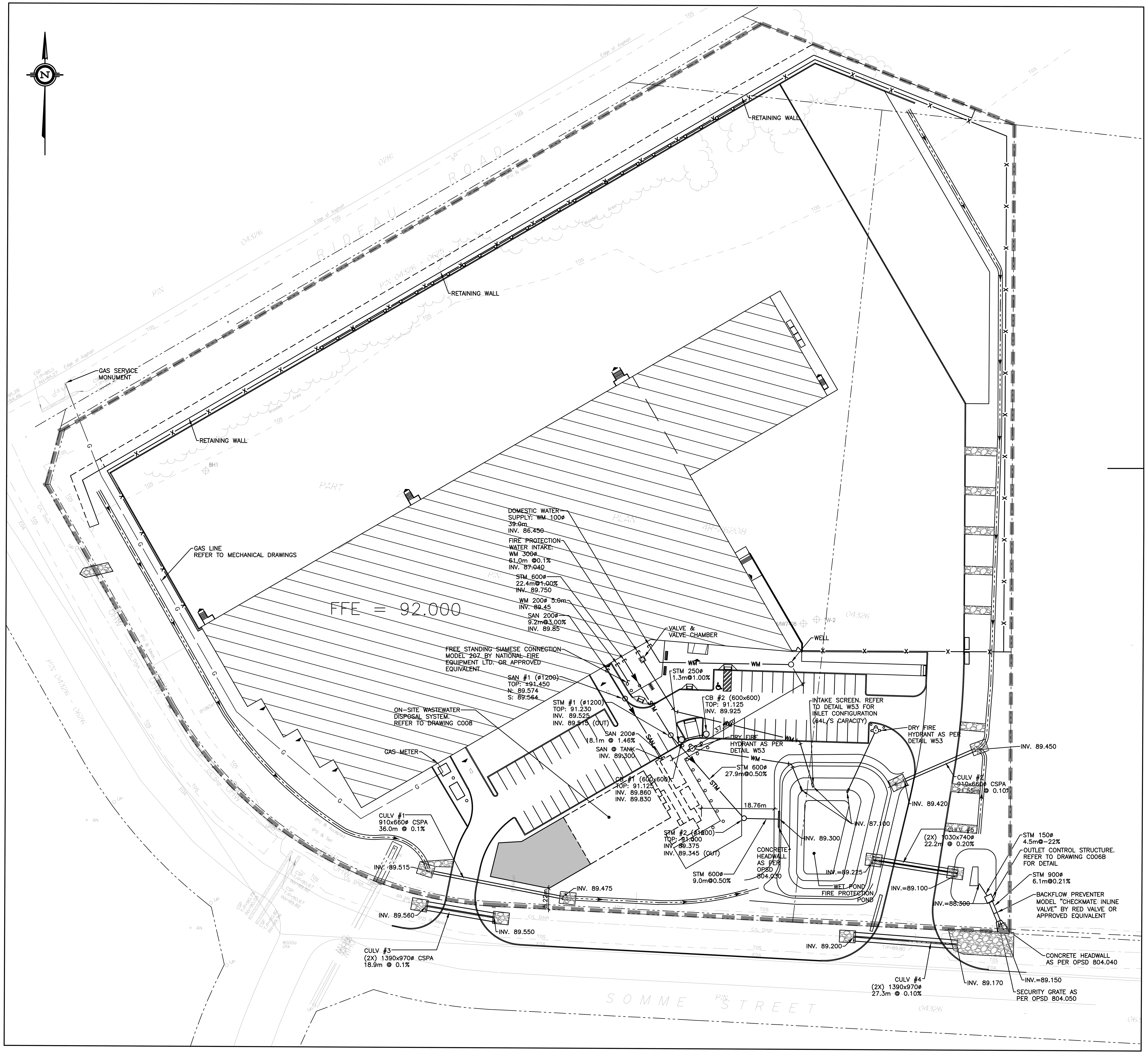
CLIENT LOGO:

FASTFRATE



LEGEND

EXISTING	LEGEND	PROPOSED
	SURVEY MONUMENT PLANTED	
	SURVEY MONUMENT FOUND	
SIB	STANDARD IRON BAR	
SSIB	SHORT STANDARD IRON BAR	
IB	IRON BAR	
CC	CUT CROSS	
CP	CONCRETE PIN	
IBø	ROUND IRON BAR	
SSIB*	SHORT STANDARD IRON BAR	
IB*	IRON BAR	
(WIT)	WITNESS	
Meas.	MEASURED	
(AOG)	ANNIS, O'SULLIVAN, VOLLEBEKK LTD.	
(P1)	REGISTERED PLAN 4M-1388	
(P2)	PLAN 4R-26208	
	SIGN	
LS	LIGHT STANDARD	
UP	UTILITY POLE	
AN	ANCHOR	
	NATURAL GAS LINE	
CSP	CORRUGATED STEEL PIPE	
+65.00	LOCATION OF ELEVATIONS	
C/L	CENTRELINE	
	PROPERTY LINE	
TOS	TOP OF SLOPE	
BOS	BOTTOM OF SLOPE	
T/P	TOP OF PIPE	
T/G	TOP OF GRATE	
EOA	EDGE OF ASPHALT	
JB	JERSEY BARRIER	
	OVERHEAD WIRES	
	WORK LIMIT	
BH-1	BOREHOLE	
A	WATERMAIN	WM
S	SANITARY SEWER	SAN
P	STORM SEWER	STM
D	DRAIN	D
G	GAS LINE (APPROX. LOC.)	
T	UNDERGROUND TELEPHONE (APPROX. LOC.)	
CA	UNDERGROUND CABLE (APPROX. LOC.)	
X	FENCE	
E	UNDERGROUND ELECTRICITY (APPROX. LOC.)	
	OVERHEAD WIRES	
	LOT LINE	
	RIGHT-OF-WAY LIMITS	
	EASEMENT	
	WORK LIMITS AREA	
	TOP OF SLOPE	
	DITCH CENTER	
	BOTTOM OF SLOPE	
	WOOD AREA	
	GRADE CROSSING	
	FLAGPOLE	
	CATCHBASIN	
	MANHOLE/CATCHBASIN	
	MANHOLE	
	FIRE HYDRANT	
	VALVE	
	REDUCER	
	TEE	
	VALVE CHAMBER	
	PRIVATE UTILITIES (WATERMAIN)	
	EXTERIOR WATER FAUCET	
	SLUICEWAY	
	NATURAL GAS VALVE	
	SIGN	
	STOP SIGN	
	TRAFFIC LIGHT	
E	ELECTRICITY POLE	
T	TELEPHONE POLE	
E,T	ELECT.-TEL.-STREET LIGHT POLE	
E,T	ELECT.-TEL.-TRANSFORMER POLE	
	PRIVATE STREET LIGHT	
E	ELECTICITY MANHOLE	
T	TELEPHONE MANHOLE	
PK	SURVEY STATION	
×136,000	ELEVATION	+ 99,000
	DRAINAGE DIRECTION	
	OVERLAND FLOW	

0 5 10 20 30 40 50

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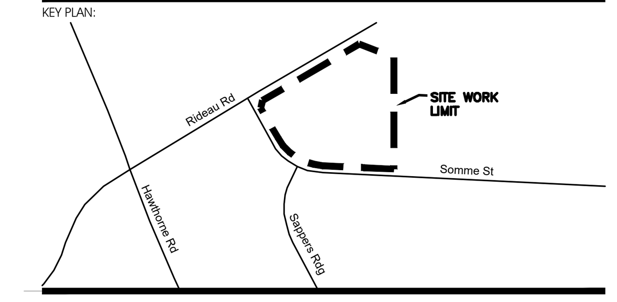
KEY PLAN:



TRUE NORTH:

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ISSUE:

PROFESSIONAL STAMP: PROFESSIONAL STAMP:

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

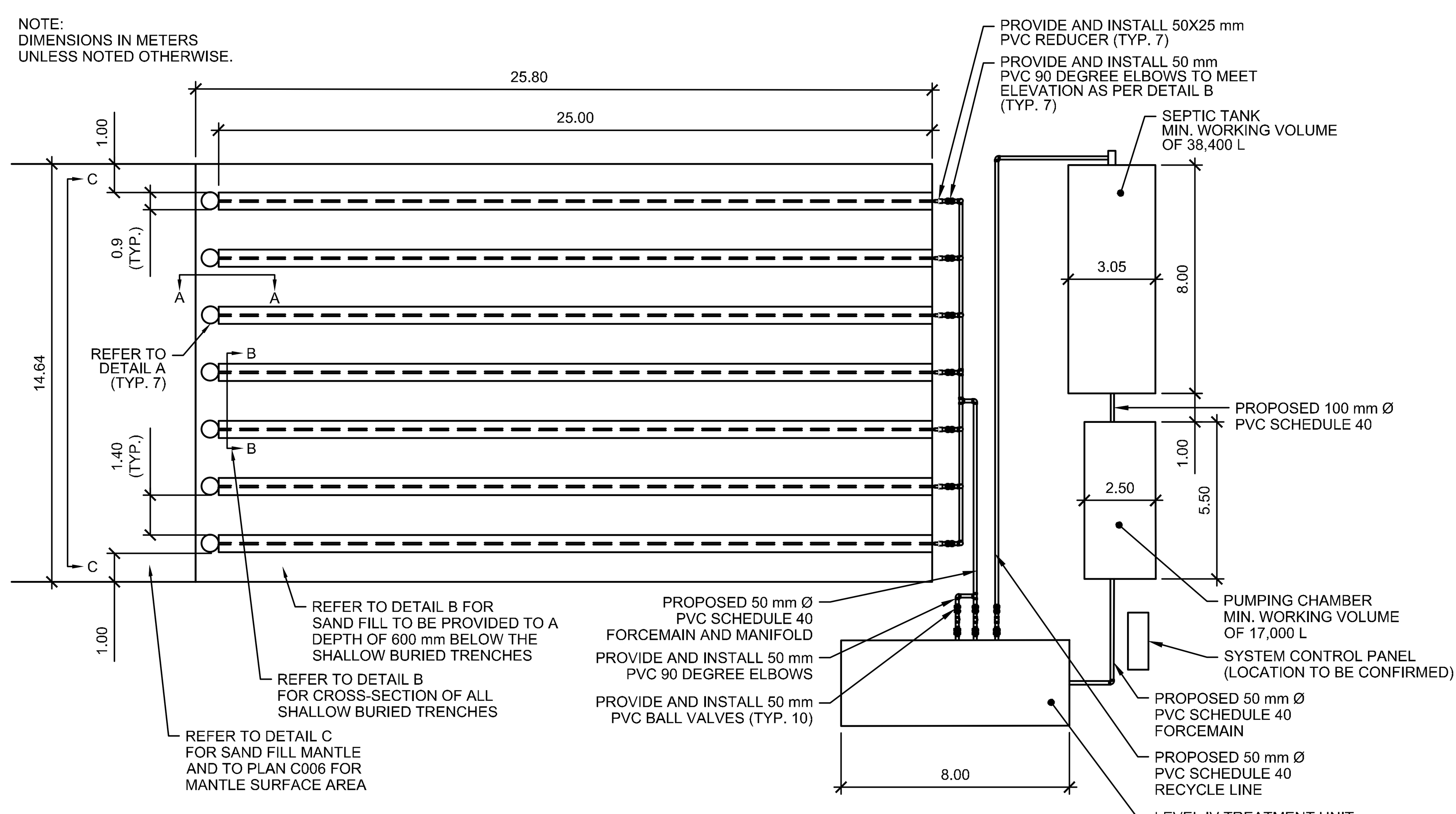
SCALE: 1:500

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

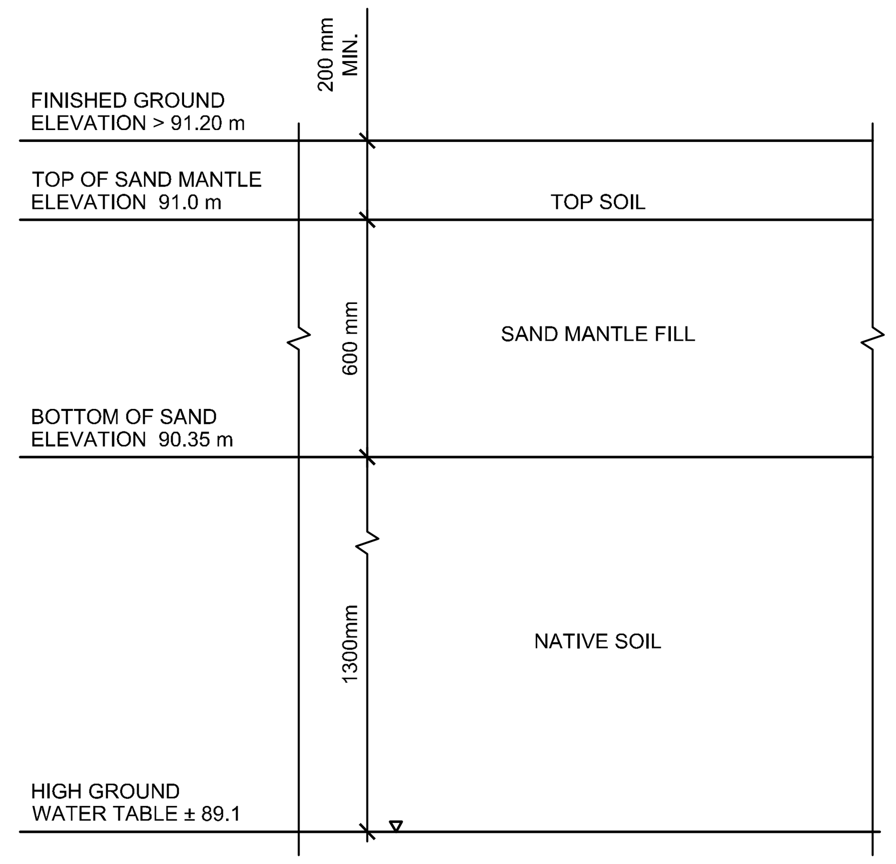
SITE SERVICING PLAN

DRAWN BY:	D.CANN	DRAWING NUMBER:	C007
DATE:			
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083



PLAN VIEW - SEPTIC SYSTEM

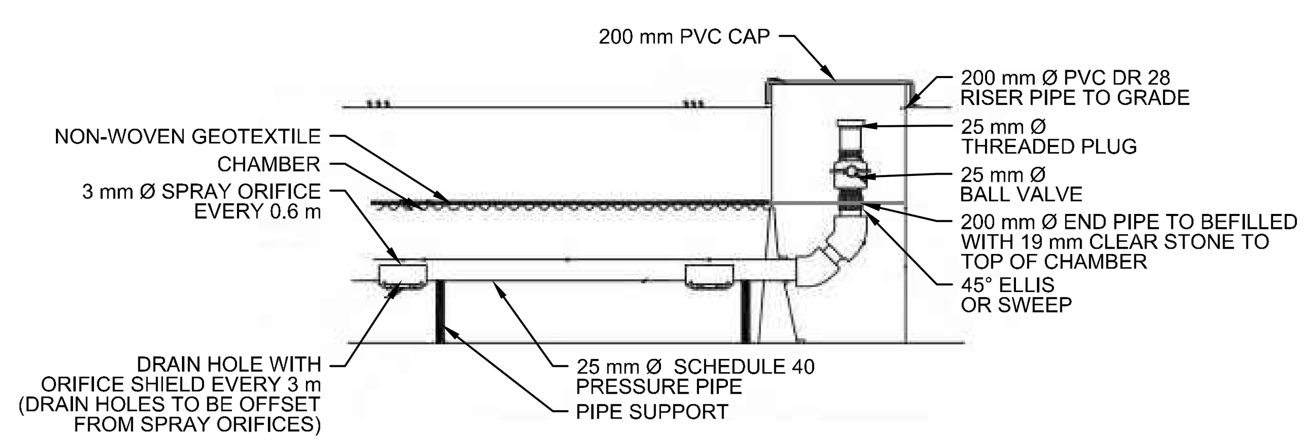
SCALE: N.T.S.



C

SAND MANTLE DETAIL

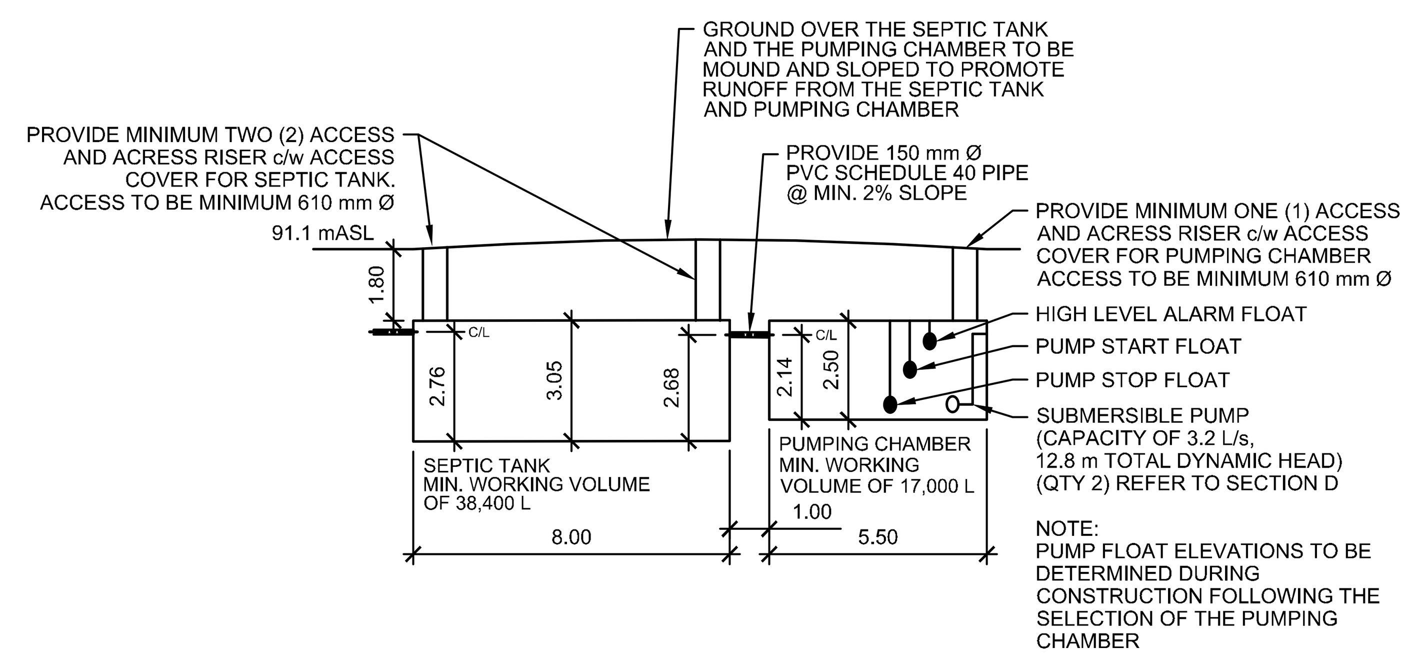
SCALE: N.T.S.



A

SHALLOW BURIED TRENCH ENDPORT

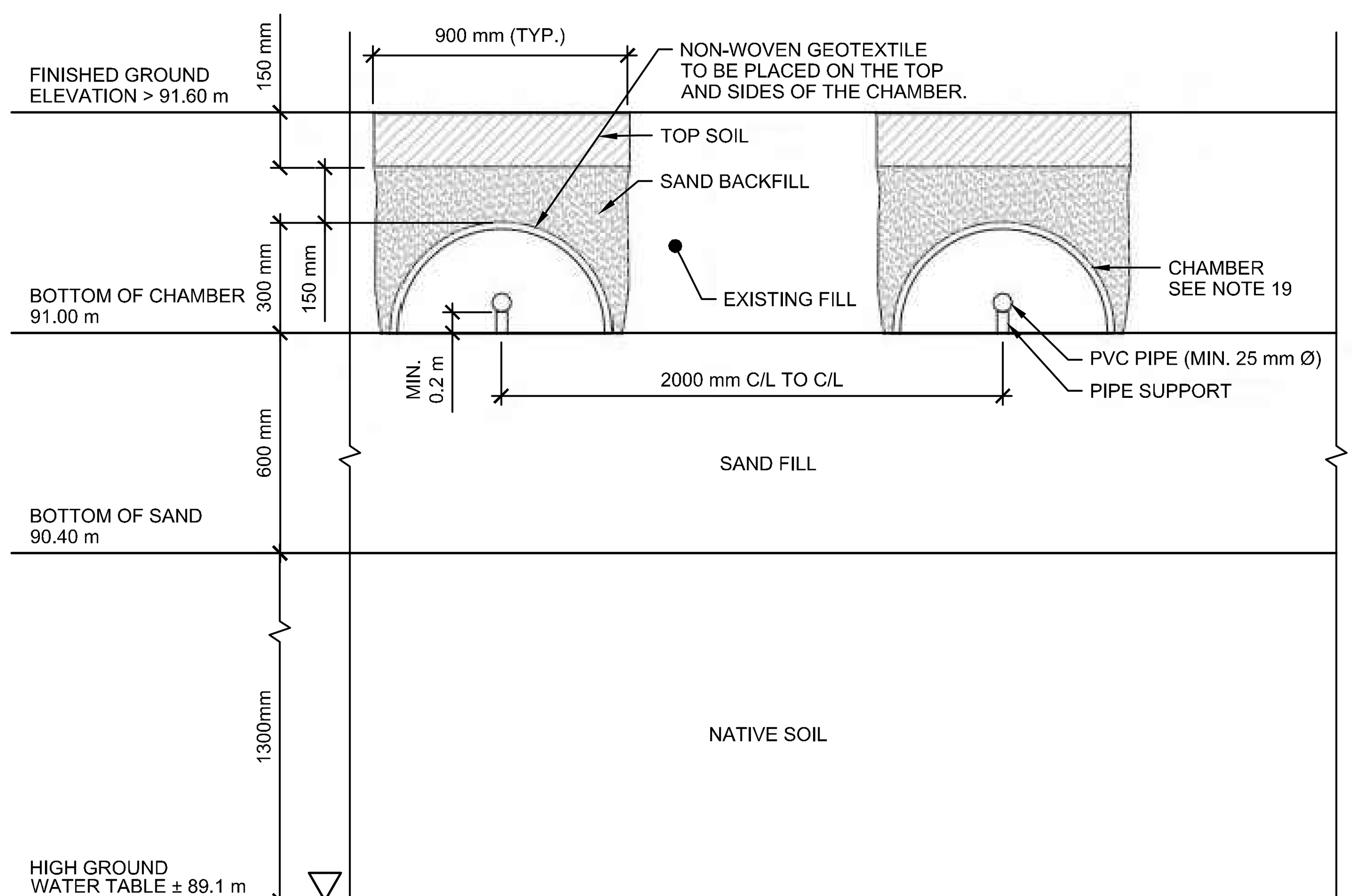
SCALE: N.T.S.



D

SECTION VIEW OF SEPTIC TANK, PUMPING CHAMBER PUMPS AND DISCHARGE PIPE

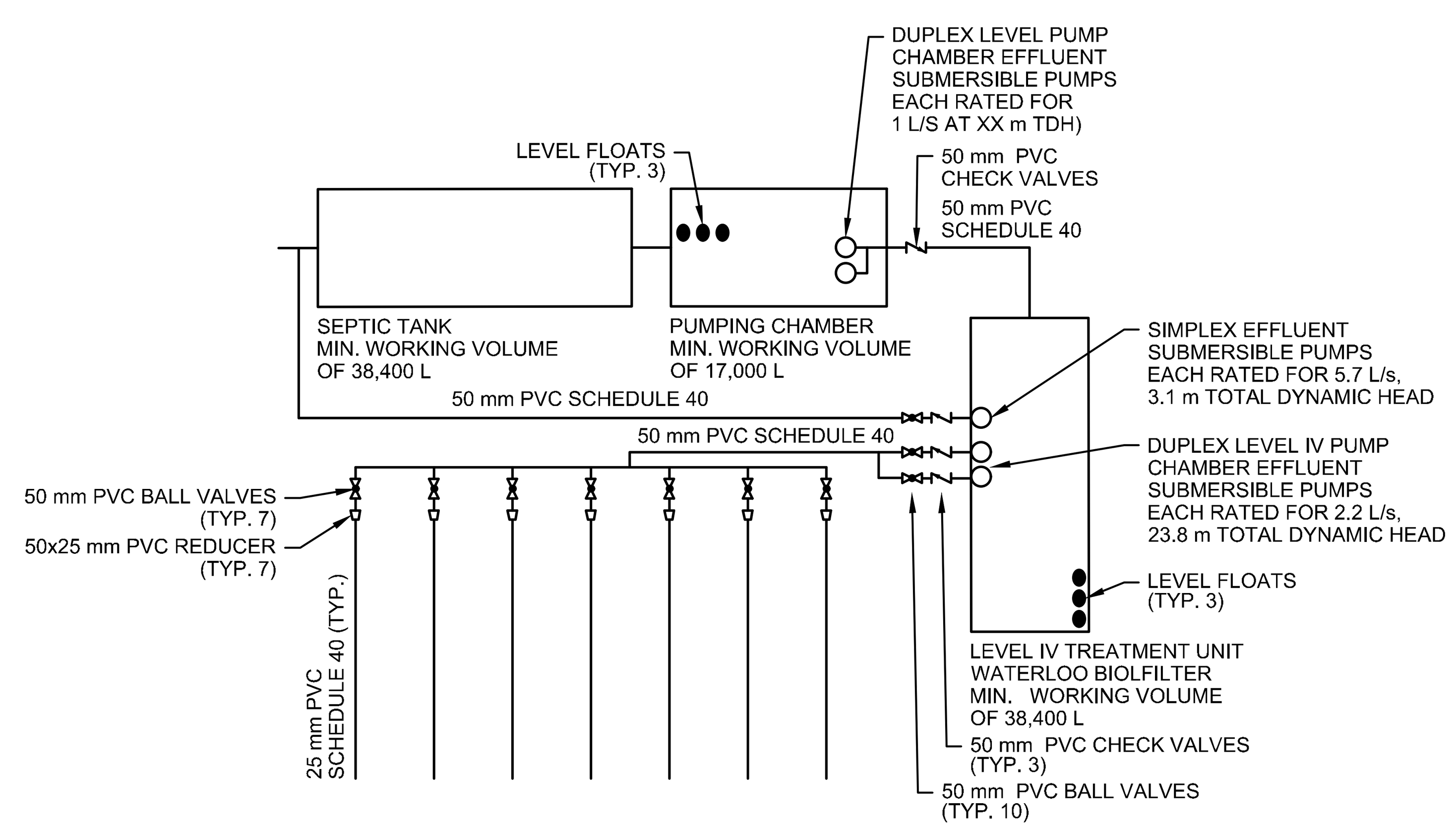
SCALE: N.T.S.



B

SHALLOW BURIED TRENCH DETAIL

SCALE: N.T.S.



PROCESS FLOW SCHEMATIC

SCALE: N.T.S.

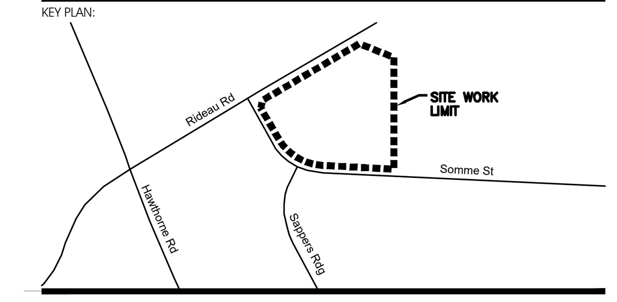
CLASS 4 SEPTIC SYSTEM NOTES

1. THE SEPTIC SYSTEM AND ALL APPURTENANCES SHALL ADHERE TO ONTARIO BUILDING CODE (OBC) PART 8.
2. THE DAILY DESIGN FLOW IS 12,800 L/DAY. THE SEPTIC TANK AND LEVEL IV TREATMENT UNIT TANK SHALL HAVE A MINIMUM WORKING VOLUME OF 38,400 L (THREE TIMES THE DAILY DESIGN FLOW).
3. THE SEPTIC SYSTEM TANK, PUMPING CHAMBER, AND LEVEL IV TREATMENT UNIT SHOWN ON THE DRAWINGS ARE APPROXIMATE SIZES. CONTRACTOR TO SUBMIT CUTSHEETS OF PROPOSED SEPTIC SYSTEM TANK, PUMPING CHAMBER, AND LEVEL IV TREATMENT TANK TO ENGINEER. ENGINEER TO APPROVE TANKS PRIOR TO THE CONTRACTOR ORDERING THE TANKS.
4. PROPOSED CHANGES TO SEPTIC SYSTEM DESIGN BY CONTRACTOR TO BE APPROVED BY THE ENGINEER.
5. SANITARY FLOWS FROM THE WAREHOUSE BY GRAVITY TO THE SEPTIC TANK. THE EFFLUENT FROM THE SEPTIC TANK TO THE PUMPING CHAMBER IS GRAVITY DRIVEN.
6. THE SEPTIC, PUMPING CHAMBER, AND LEVEL IV TREATMENT UNIT TO BE WRAPPED IN MEL-ROL (OR APPROVED EQUAL) ON THE TOP, BOTTOM AND SIDES.
7. THE LEVEL IV TREATMENT UNIT TO BE PROVIDED BY WATERLOO BIOFILTER.
8. THE LEVEL IV TREATMENT SYSTEM TO BE DESIGNED FOR THE FOLLOWING EFFLUENT OBJECTIVES: CBOD5 = 10 MG/L AND TSS = 10 MG/L.
9. THE SIMPLEX PUMP IN THE LEVEL IV TREATMENT UNIT RECIRCULATES A PORTION OF THE EFFLUENT TO THE INLET OF THE SEPTIC TANK.
10. THE PUMP TANK EFFLUENT TO BE DOSED TO THE WATERLOO BIOFILTER BASKET, HOUSING TWO BASKETS FILLED WITH BIOFILTER MEDIUM. THE PUMP TANK EFFLUENT TO BE EVENLY DISTRIBUTED OVER THE SURFACE OF THE MEDIUM. A PASSIVE CHARCOAL VENTING TO BE PROVIDED.
11. ALL PUMPS TO BE OPERATED BY WATERLOO SMART PANEL(S). THE WATERLOO SMART PANEL SHALL PROVIDE REMOTE MONITORING, CONTROL, AND DATALOGGING OVER A STABLE WIRELESS CELLULAR NETWORK.
12. PROVIDE ACCESS FROM GRADE TO SEPTIC TANK EFFLUENT FILTER AS PER THE OBC.
13. PROVIDE SEPTIC TANK EFFLUENT FILTER PER OBC REQUIREMENTS DESIGNED FOR A MINIMUM CAPACITY OF 25,000 L/DAY.
14. ALL TANKS TO BE DESIGNED FOR A MINIMUM OF 2m OF BURIAL OVERTOP OF THE TANK.
15. PRIOR TO PLACEMENT OF THE IMPORTED SAND FILL ANY SURFICIAL ORGANICS ARE TO BE REMOVED FROM THE SBT BED AND MANTLE AREA.
16. THE EXISTING FILL MATERIAL IS TO BE COMPACTED TO ENSURE UNEVEN SETTLEMENT DOES NOT OCCUR.
17. ALL SAND FILL (SEPTIC SAND) TO HAVE A MINIMUM AND MAXIMUM PERCOLATION RATES OF 6 MINUTES/CM AND 10 MINUTES/CM RESPECTIVELY. SAND TO HAVE A MAXIMUM 5% FINES PASSING THROUGH A NO. 200 SIEVE. CONTRACTOR TO SUBMIT GRADATION CURVES AND PERCOLATION TEST RESULTS FOR PROPOSED SAND FILL MATERIAL TO THE ENGINEER FOR APPROVAL PRIOR TO DELIVERING MATERIAL TO THE SITE.
18. CONTRACTOR TO SUBMIT WORKING DRAWINGS FOR: SEPTIC TANK, SEPTIC TANK APPURTENANCES, PUMPING CHAMBER, PUMPING CHAMBER APPURTENANCES, ALL PUMPS, WATERLOO BIOFILTER, LEVEL FLOATS, SBT CHAMBERS, PIPE SUPPORTS, CHECK VALVES, BALL VALVES, THREADED PLUG, PIPES, REDUCERS, PVC CAPS, GEOTEXTILE, ORIFICE SHEILDS TO BE REVIEWED AND ACCEPTED BY THE ENGINEER.
19. APPROVED CHAMBERS FOR SBT INCLUDE: CULTEC RECHARGER 150XLHD OR APPROVED EQUAL. CONTRACTOR TO SUBMIT WORKING DRAWINGS FOR REVIEW AND APPROVAL BY THE ENGINEER.
20. SEPTIC TANK, PUMPING CHAMBER, AND LEVEL IV TREATMENT UNIT TANKS TO BE PRE-CAST CONCRETE. CONCRETE AND RATED FOR H-20 LOADING. ALL TANKS TO CONFORM TO NATIONAL STANDARDS OF CANADA CAN/CSA B66-10 AND CSA A23.4-19. CONTRACTOR TO SUBMIT WORKING DRAWINGS FOR REVIEW AND APPROVAL BY THE ENGINEER.

CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

PRELIMINARY

NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NUMBER	REVISION	DATE: (MM/DD/YY)
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER 08/13/2021 K.G. SCHMIDT 100524348 PROVINCE OF ONTARIO

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LE BEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP

ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 OTTAWA, ON CANADA K1S 1V9 T: 613.742.7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

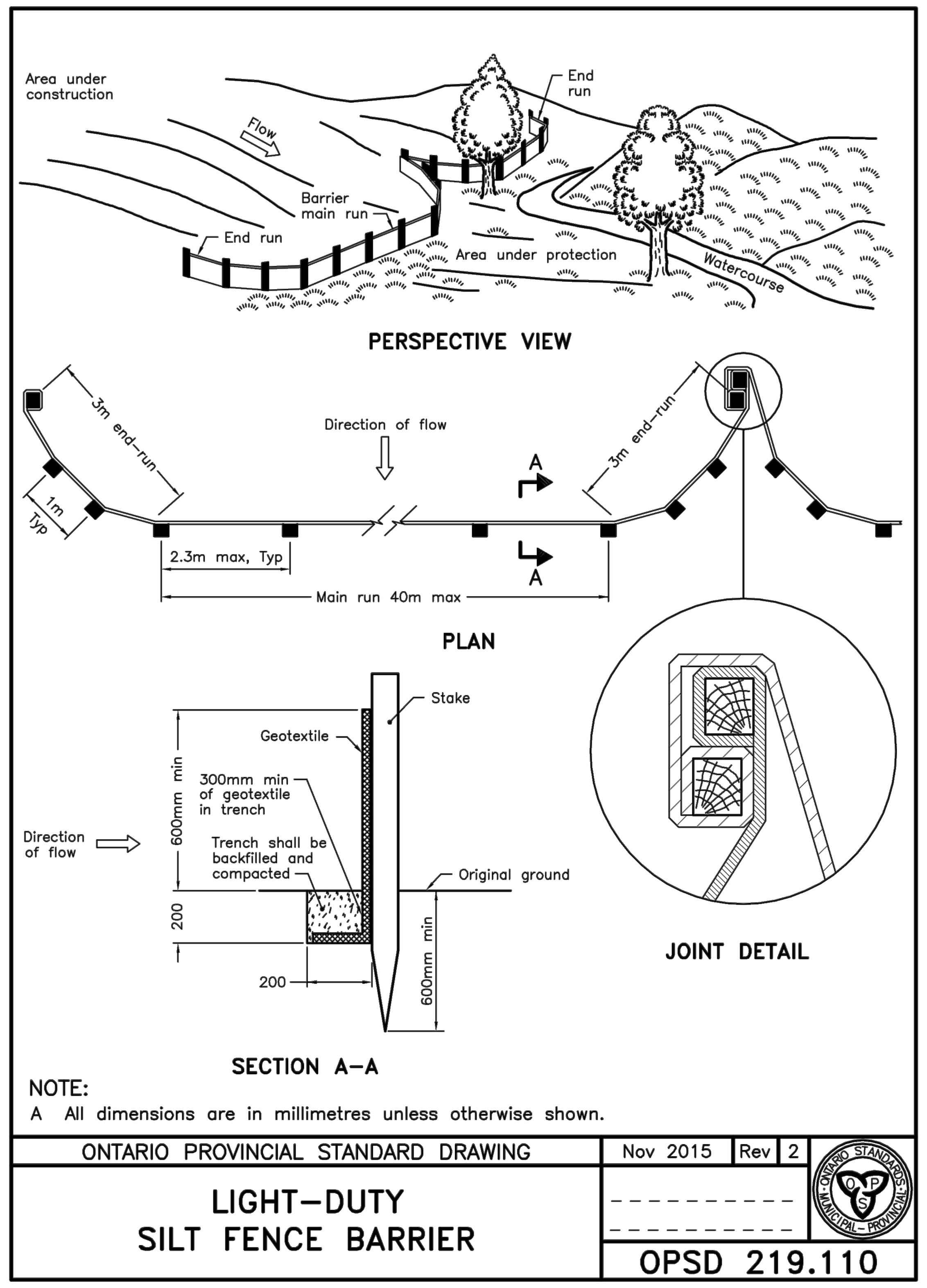
SCALE: NONE

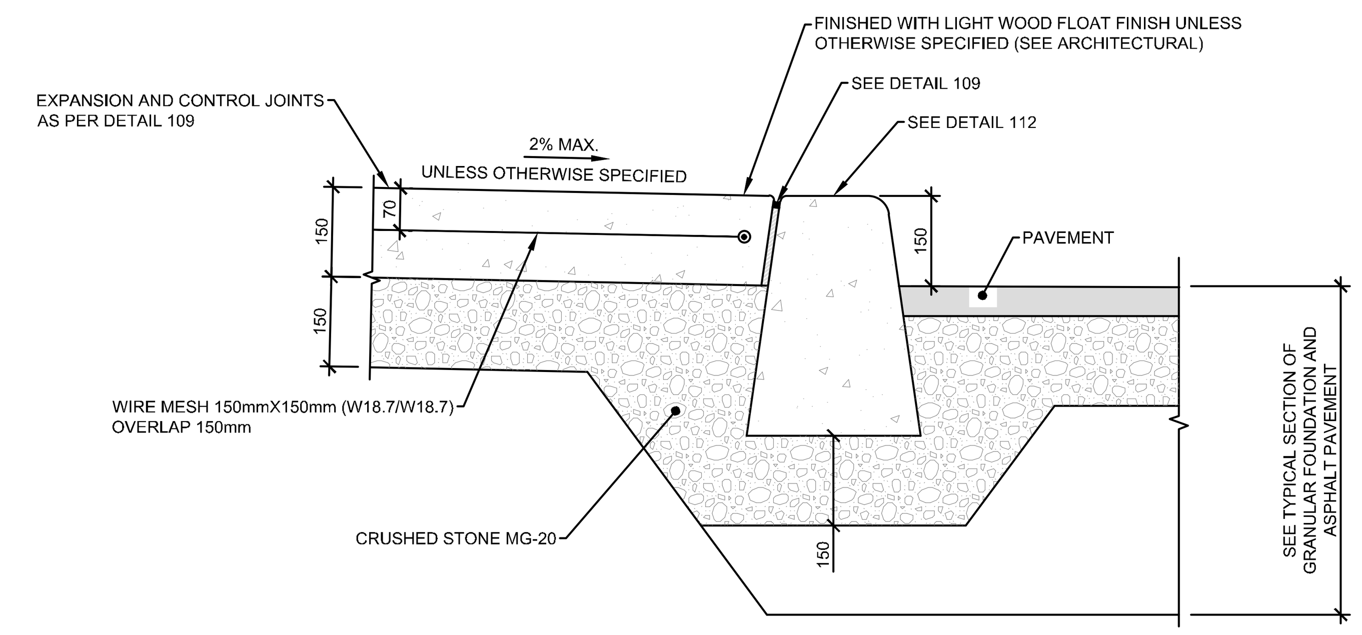
SOMME ST. OTTAWA, ON

DRAWING TITLE:

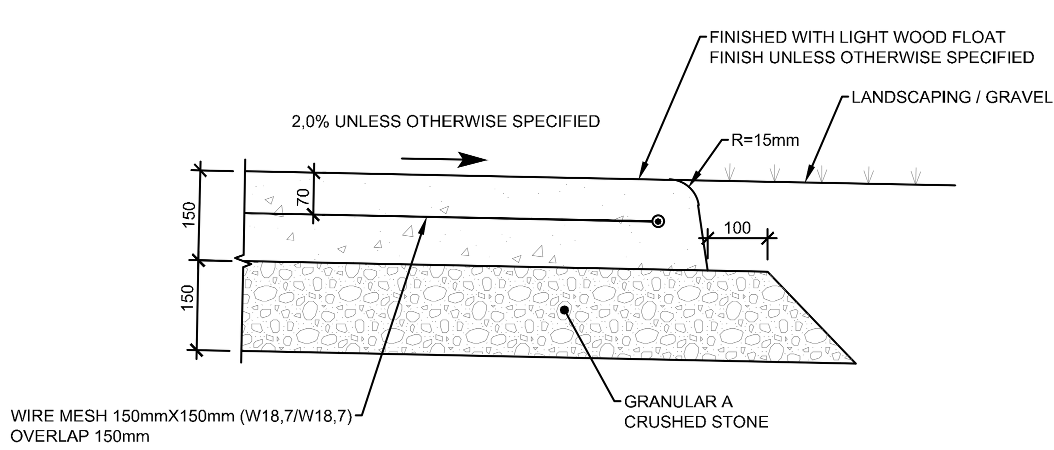
SEPTIC SYSTEM CONFIGURATION AND SECTIONS

DRAWN BY:	D.CANN	DRAWING NUMBER:	C008
REVIEWED BY:	K.SCHMIDT		
ISSUED DATE:	AUGUST 13, 2021	REVISION NUMBER:	
CLIENT PROJECT #:		PROJECT #:	A001083





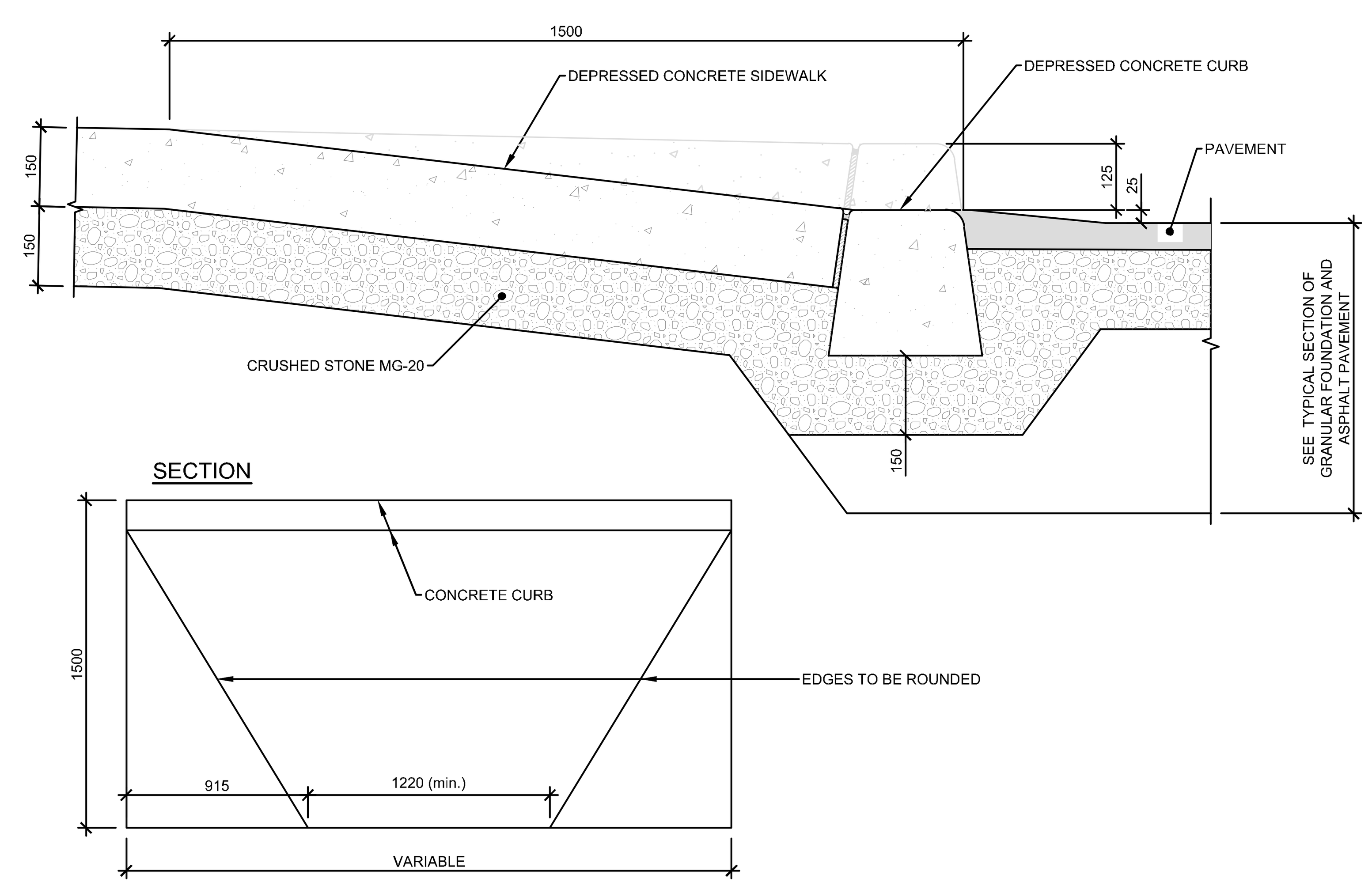
102 SIDEWALK - BUILDING TYPE - SLAB AND CURB
AUCUNE / NTS



NOTES:

- CONCRETE CLASS: C-2;
- WATER/BINDER MAX. RATIO: 0.45;
- MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS: 32 MPa;
- GRANULARS MAXIMAL NOMINAL Ø: 20mm;
- AIR CONTENT: 5% TO 8%;
- SLUMP: 80mm ± 30mm FOR FIXE FORMWORK
  30mm ± 30mm FOR SLIDING FORMWORK;
- CONTROL AND EXPANSION JOINTS AS PER DETAIL 109.

101 SLAB SIDEWALK
AUCUNE / NTS



103 DEPRESSED SIDEWALK TYPE SLAB AND CURB
AUCUNE / NTS

CLIENT LOGO:
FASTFRATE

KEY PLAN:

SITE WORK LIMIT

TRUE NORTH:

PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NUMBER	REVISION	DATE (MM/DD/YY)
6		
5		
4		
3		
2		
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER J.A. SAUVE 100200100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LEBEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:
CIMA+

PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOMME ST.
OTTAWA, ON

DRAWING TITLE:
DETAILS

DRAWN BY:	D.CANN	DRAWING NUMBER:	C009
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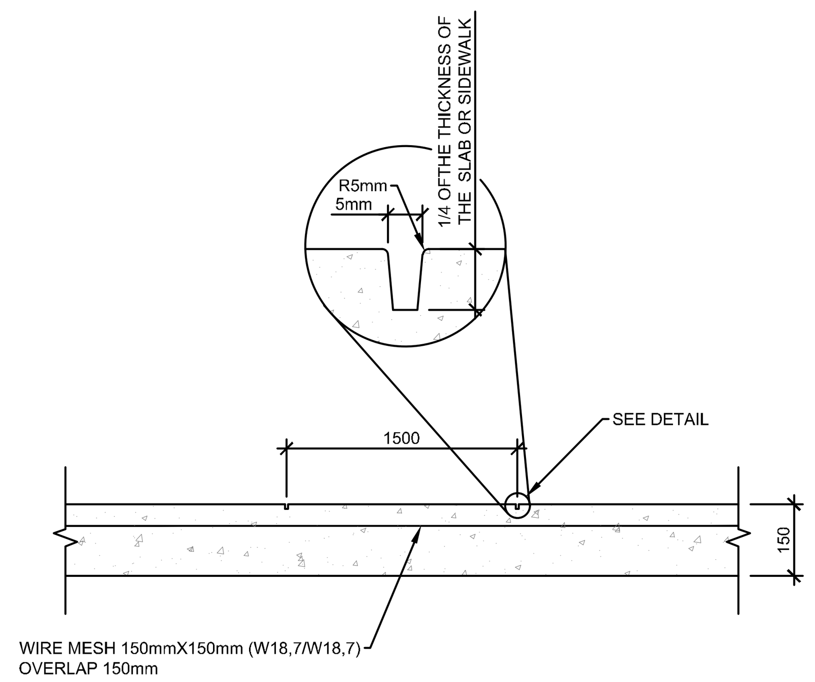
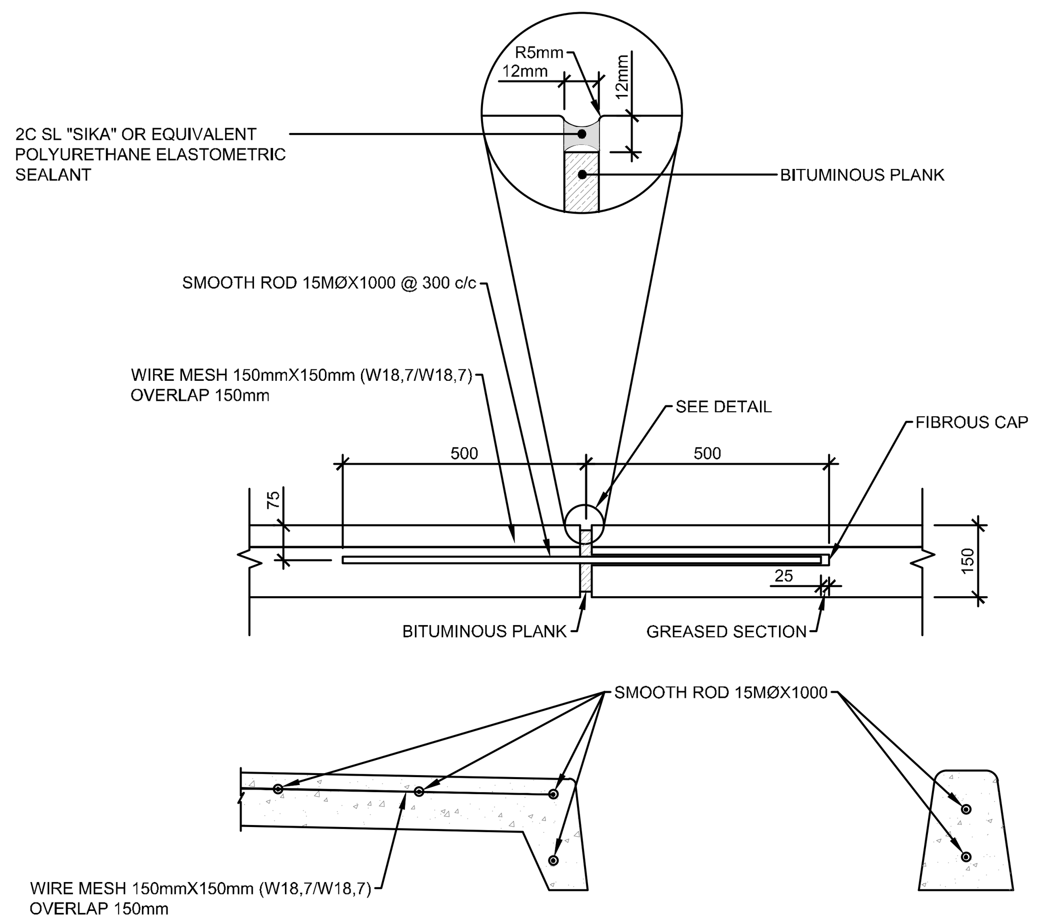
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083



CONTROL JOINT



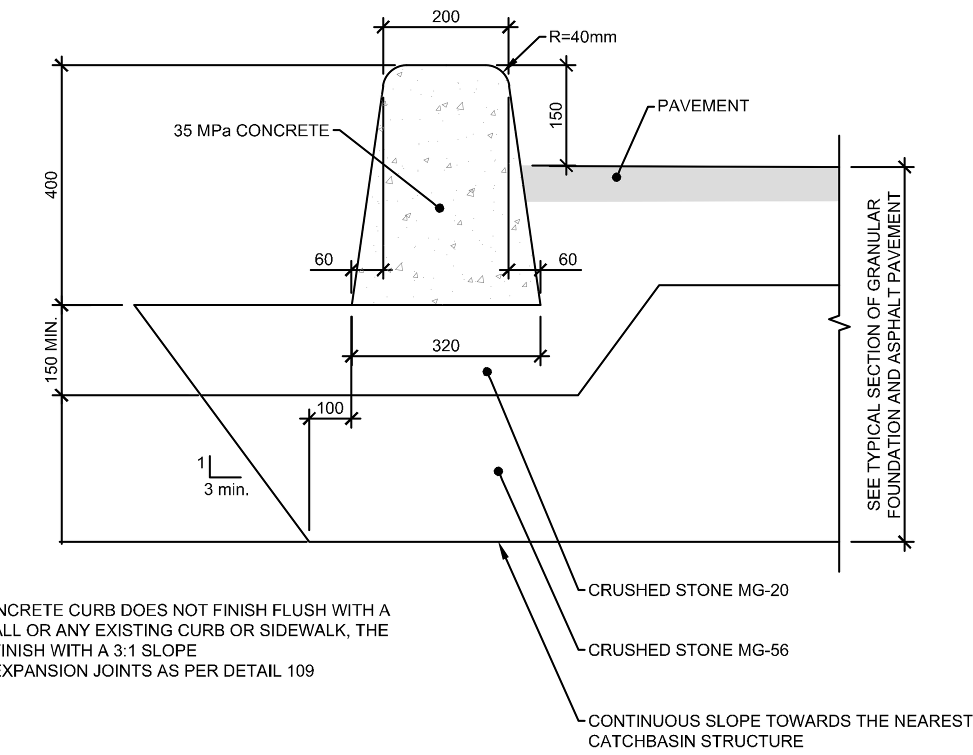
CONSTRUCTION AND EXPANSION JOINT

NOTES :

- EXPANSION JOINTS OF CONCRETE WORK AT 6,0m C/C MAX. DIRECTION CHANGE AND AT CONTACT WITH CONCRETE STRUCTURES
- EDGES AND CONTROL JOINTS SHALL BE GROOVED, TOOLED AND BURNISHED WITH BRONZE EDGERS AND GROOVERS.

109 EXPANSION, CONTROL AND CONSTRUCTION JOINTS FOR CONCRETE WORK

AUCUNE / NTS

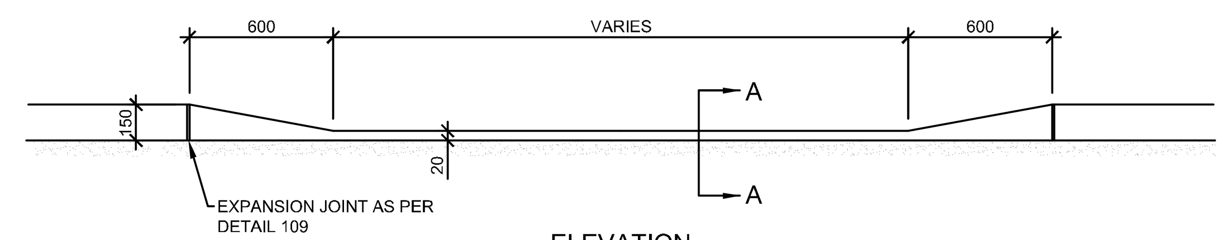


NOTES:

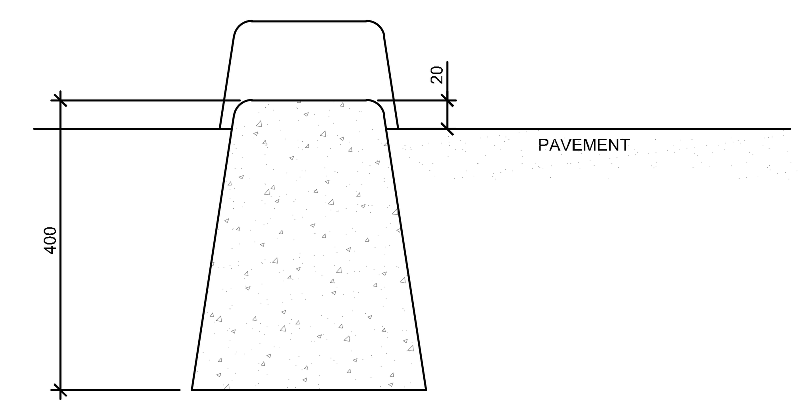
- WHERE THE CONCRETE CURB DOES NOT FINISH FLUSH WITH A SIDEWALK, A WALL OR ANY EXISTING CURB OR SIDEWALK, THE CURB SHOULD FINISH WITH A 3:1 SLOPE
- CONTROL AND EXPANSION JOINTS AS PER DETAIL 109

112A CONCRETE CURB DETAIL (TYPICAL)

AUCUNE / NTS



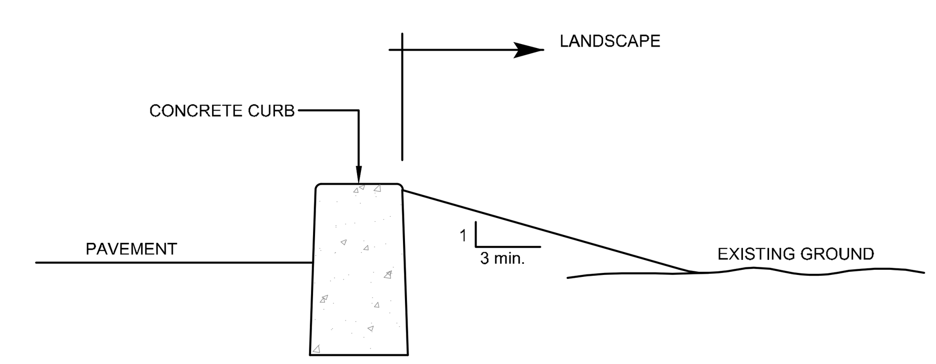
ELEVATION



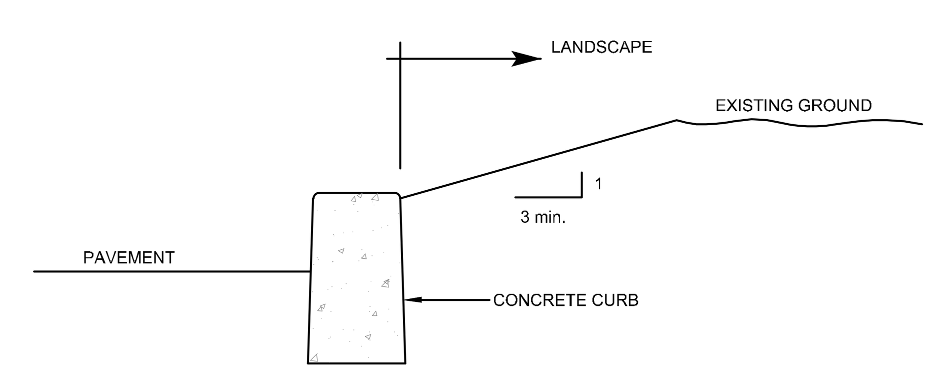
SECTION A-A

113 DEPRESSED CONCRETE CURB

AUCUNE / NTS



SIDE VIEW - LOWER EXISTING GROUND



SIDE VIEW - UPPER EXISTING GROUND

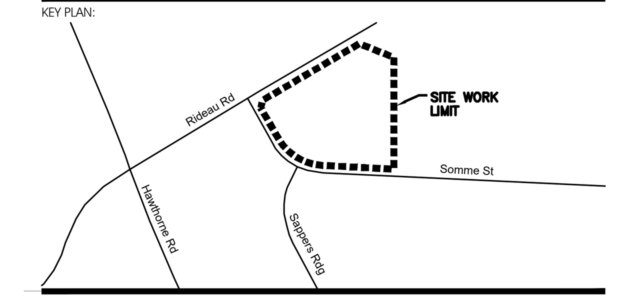
120 TYPICAL SECTION - LANDSCAPE CONCRETE CURB

AUCUNE / NTS

CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

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ISSUE:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER J. A. SAUVE 100200100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LEBEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 | OTTAWA, ON CANADA K1S 1V9 | T: 613.742.7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

SOMME ST.
OTTAWA, ON

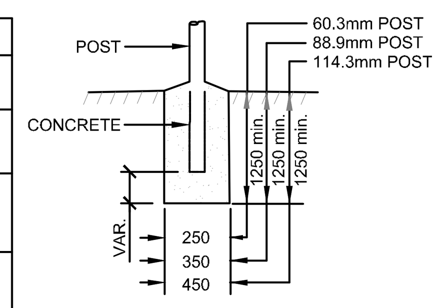
DRAWING TITLE:

DETAILS

DRAWN BY: D.CANN
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PRINT DATE:
ISSUED DATE: AUGUST 13, 2021
CLIENT PROJECT #:

DRAWING NUMBER: **C010**
REVISION NUMBER:
PROJECT #: **A001083**

POST DETAILS				
POST TYPE	OUTSIDE DIA. (mm)	POST LENGTH		SLEEVES
		STANDARD (m)	RETAINING WALLS (m)	OUT. DIA. (mm)
LINE POST	60.3	2.6	2.0	88.9
END, CORNER, OR STRAINING POST	88.9	2.9	2.3	114.3

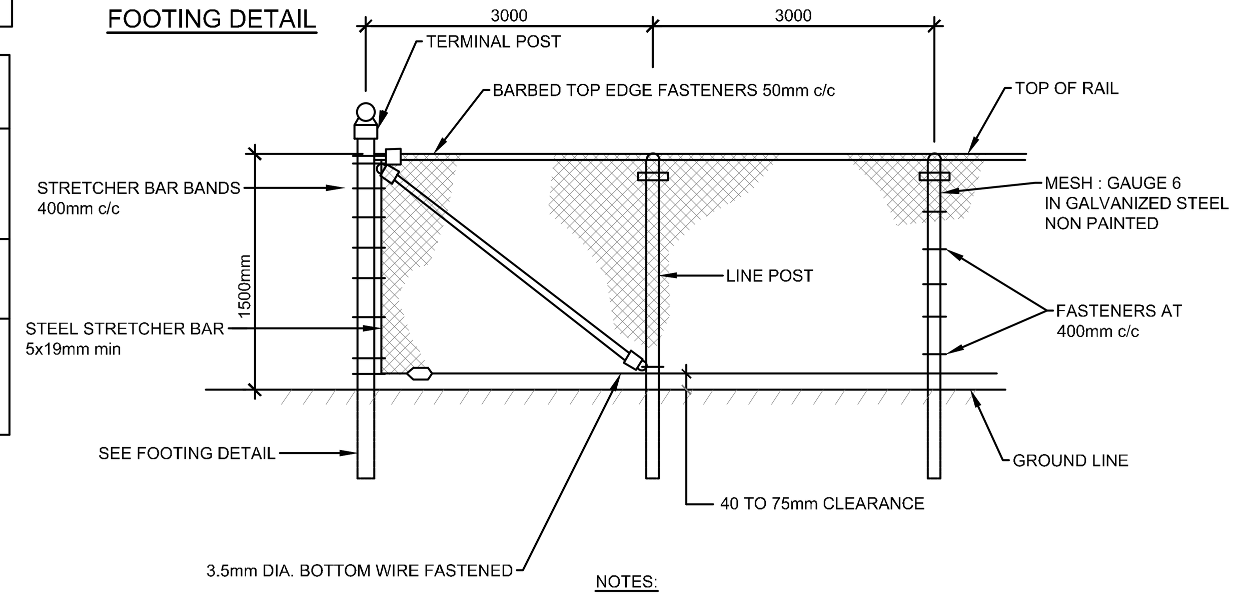


FOOTING DETAIL

GATE AND GATE POST DETAILS			
GATE TYPE AND MAX. OPENING (m)	FRAME MEMBER RENFORT MIN OUT. DIA.(mm)	POST DIA. MIN. OD(mm)	LENGTH STANDART (m)
SINGLE SWING 3.0 DOUBLE SWING 6.0	42.9	88.9	2.6
SINGLE SWING 4.5 SINGLE SWING 6.0 DOUBLE SWING 9.0	48.3	114.3	2.9

NOTE:

GATE LEAVES GREATER THAN 3.6m IN WIDTH ARE SUPPLIED WITH DIAGONAL BRACES.



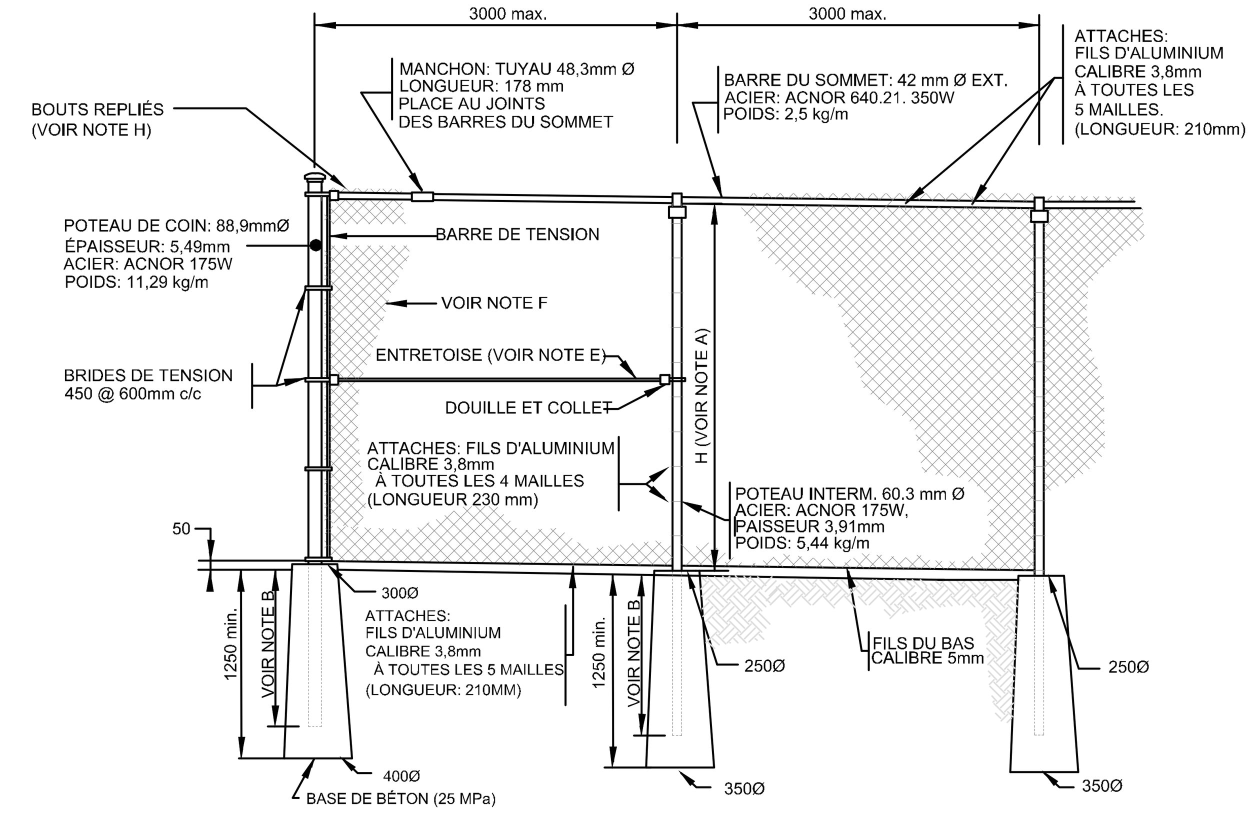
NOTES:

1. ALL FASTENERS MADE OF GALVANIZED STEEL (NO ALUMINUM)
2. TOP OF RAIL TYPE "KNUCKLE/KNUCKLE" (NO POINTY EDGE)

126

CHAIN LINK FENCE

AUCUNE / NTS



NOTES:

A. FENCE HEIGHT: 1.5 m.

B. LENGTH OF UNDERGROUND POLES: 1.1 m

C. CORNER POST: 88.9 mmØ WITH TWO SPACERS.

D. REINFORCING POST: 88.9 mmØ EVERY 60 m WITH TWO SPACERS.

E. SPACERS: 42.2 mmØ, 350W ACNOR STEEL.

F. GALVANIZED GRILLING-008; COVERED WITH VINYL (BLACK) FOR A TOTAL GAUGE #9E-008; CONFORMS TO CAN/CGSB-138.1 (TYPE 1. CATEGORY A, MEDIUM STYLE) SPACING OF 50mm X 50mm.

G. ALL METAL PARTS ARE GALVANIZED.

H. THE ENDS OF THE MESHES AT THE TOP AND BOTTOM MUST BE FOLDED INWARDS SO AS NOT TO HAVE PRICKLY TIPS.

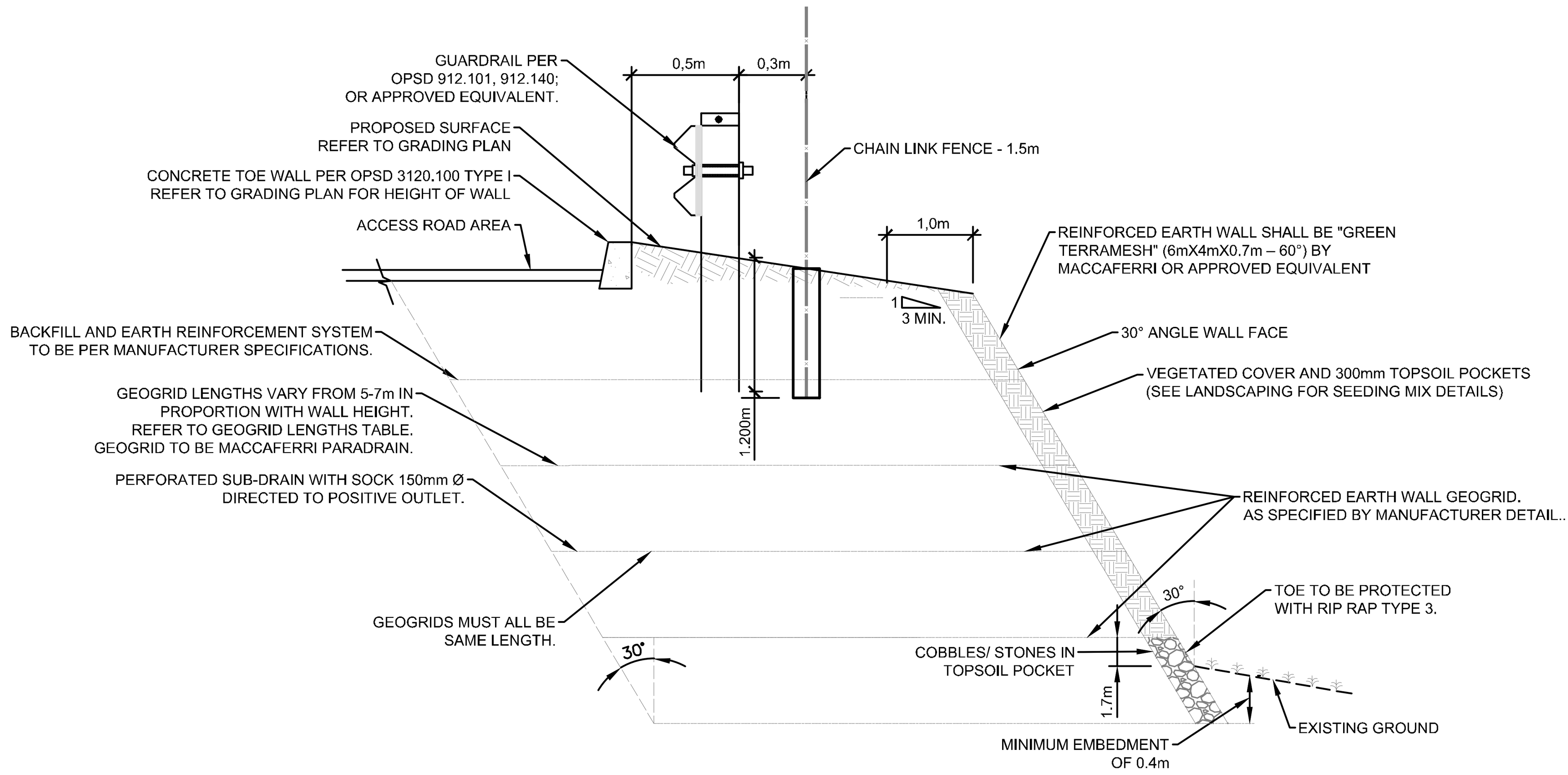
I. THE WIRE MESH AND METAL PARTS MUST BE BLACK WITH PVC STRAP "SUPER PRIVACY" (BLACK) IN THE PLACES INDICATED ON THE OVERALL PLAN

J. MEASUREMENTS ARE IN MILLIMETRES

141A

GALVANIZED METAL MESH FENCE 1.8m HIGH

AUCUNE / NTS



NOTES:

- INSTALLATION OF GUARDRAIL AND FENCE POSTS BY AUGERING STRICTLY PROHIBITED.
- STRUCTURE MUST BE FOUNDED ON APPROVED COMPETENT SOIL
- APPLIED LOAD = 175kPA
- SHOP DRWAINGS FOR EARTH WALL DESIGN, SIGNED AND SEALED BY AN ENGINEER LICENSED IN ONTARIO SHALL BE SUBMITTED.
- A TRANSITION IS REQUIRED WHERE SUBGRADE FILL MATERIAL HAS DIFFERENT FROST SUCEPTIBILITY. TRANSITION SHALL REACH A MAXIMUM DEPTH OF 1.8m BELOW PROJECTED PAVEMENT ELEVATION.

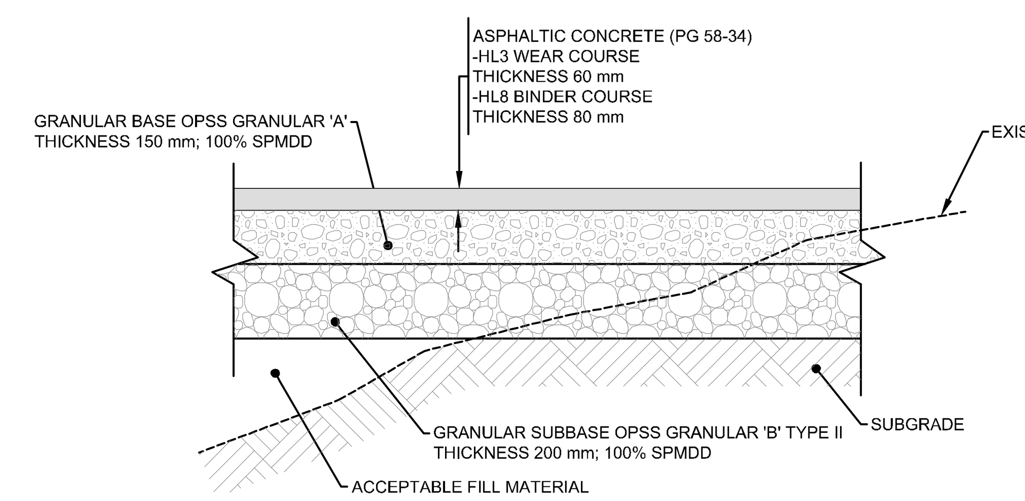
GEOGRID LENGTH TABLE	
H	REINFORCED PARADRAIN LENGTH Lg (m)
UP TO 4.9 m	5 m
4.91 m TO 6.3 m	6 m
6.31 m TO 7 m	7 m

LOAD TABLE			
PARAMETERS	REINFORCED SOIL	RETAINED SOIL	FOUNDATION SOIL
UNIT WEIGHT, Kn/m³	21.2	19	20
ANGLE OF INTERNAL FRICTIONS, ϕ	32	30	30
COHESION, KPA	0	0	0
SURCHARGE LOAD AWAY FROM BACKSLOPE, kPA	17.00		

138

TYPICAL SECTION - RETAINING WALL, GUARDRAIL AND FENCE

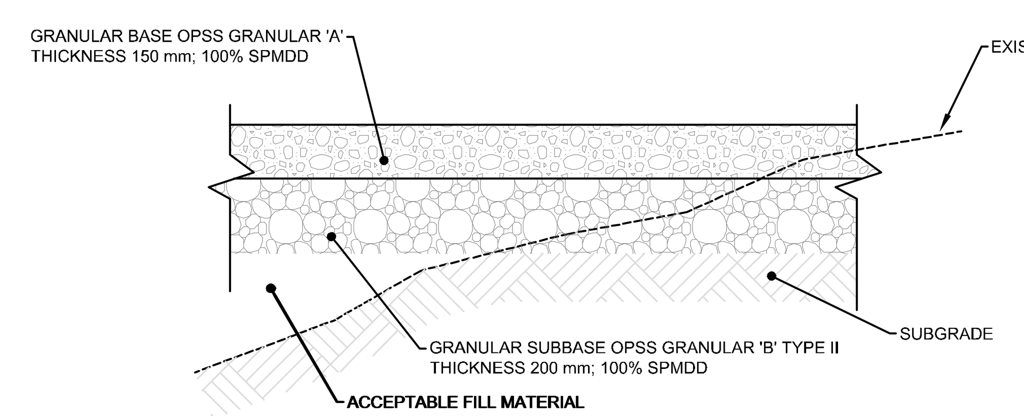
AUCUNE / NTS



202

TYPICAL SECTION - GRANULAR FOUNDATION AND ASPHALT PAVEMENT (HEAVY DUTY)

AUCUNE / NTS



202A

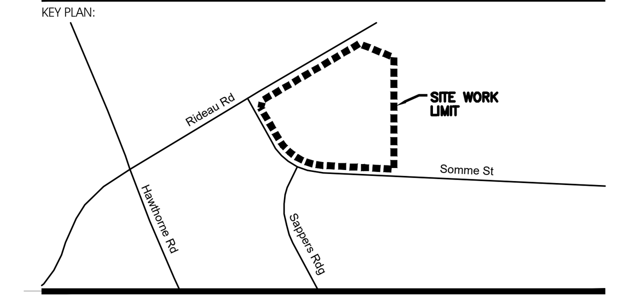
TYPICAL SECTION - GRANULAR PAD

AUCUNE / NTS

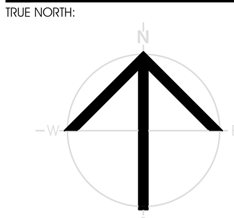
CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:



PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

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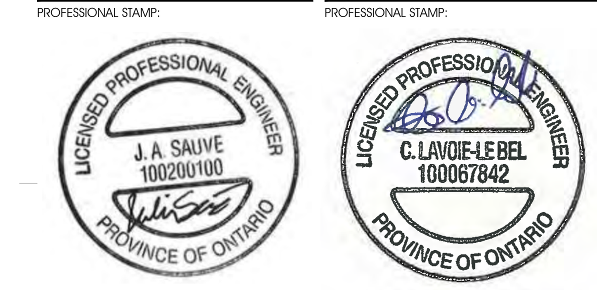
ISSUE:

PROFESSIONAL STAMP:

PROFESSIONAL STAMP:



CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE
AND DISTRIBUTION FACILITY

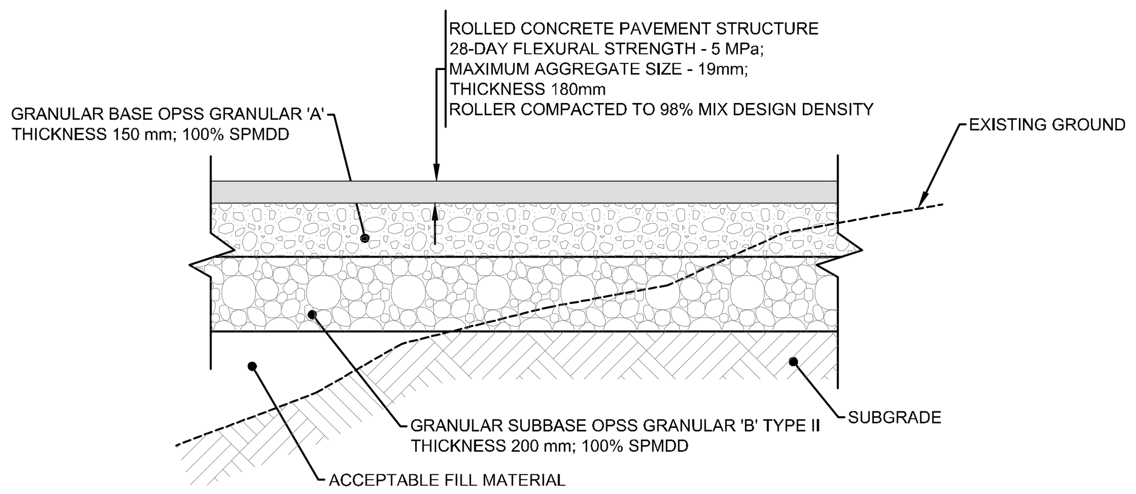
SCALE: NONE

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

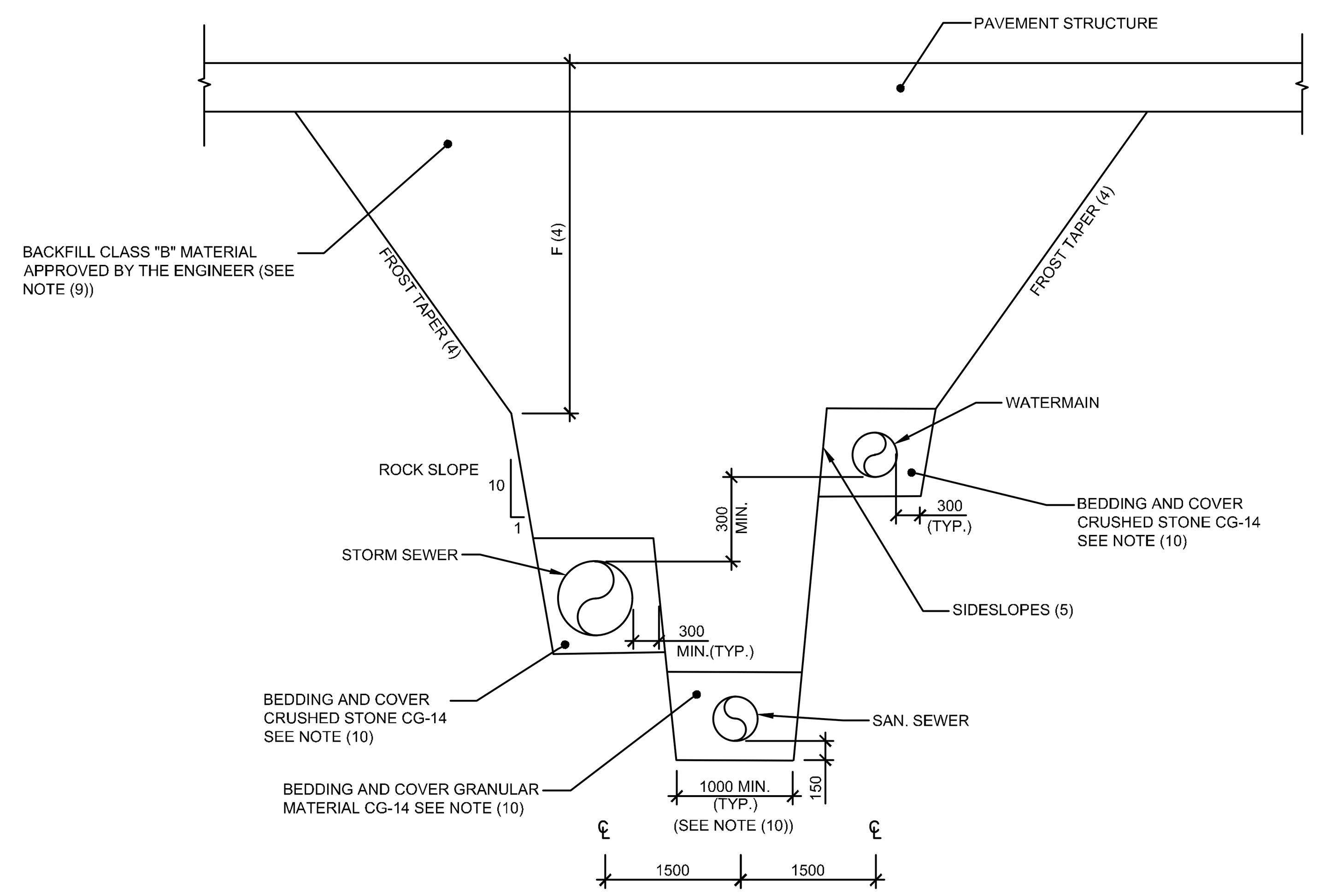
DETAILS

DRAWN BY:	D.CANN	DRAWING NUMBER:	C011
DATE:			
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083



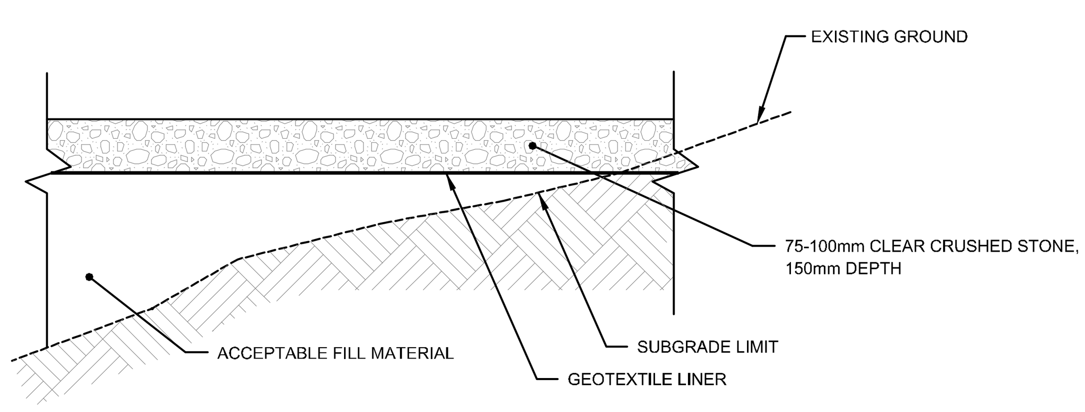
203 TYPICAL SECTION - GRANULAR FOUNDATION AND CONCRETE PAVEMENT (HEAVY DUTY)

AUCUNE / NTS



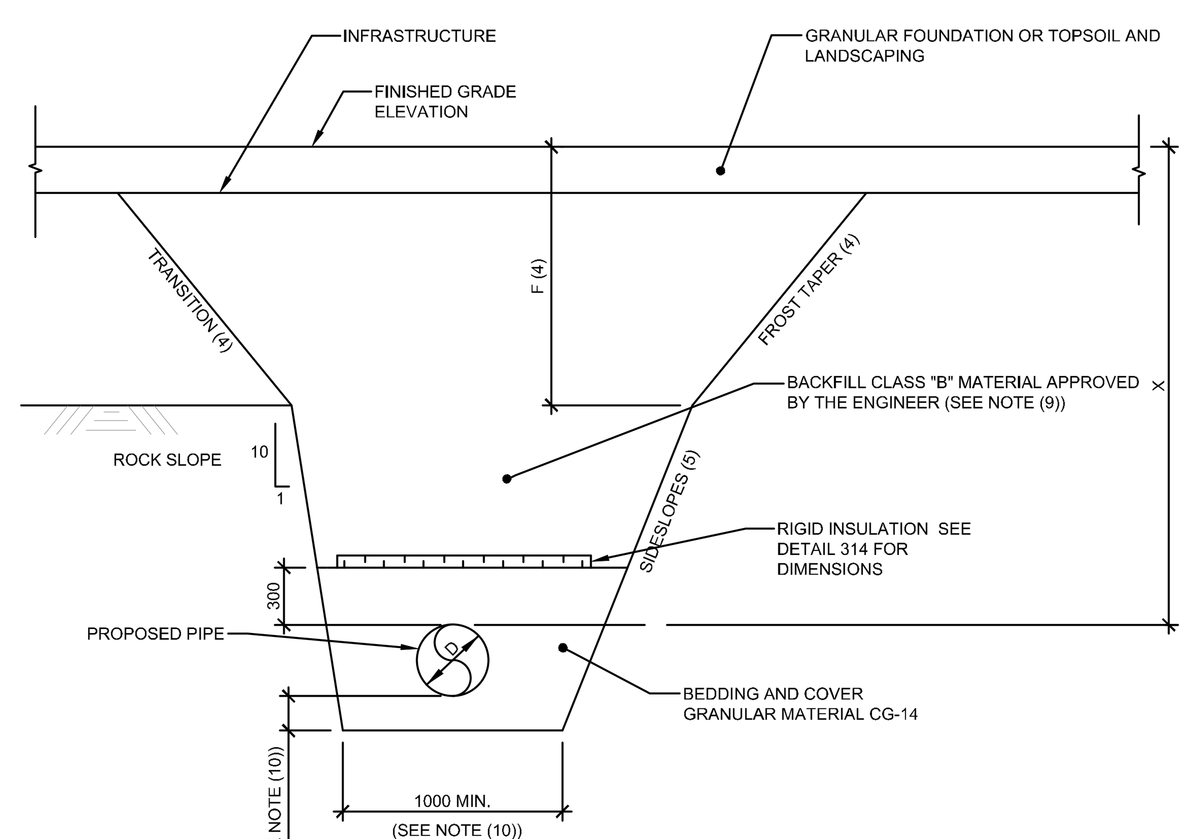
308 TYPICAL SECTION SINGLE TRENCH - MULTIPLE PIPES

AUCUNE / NTS



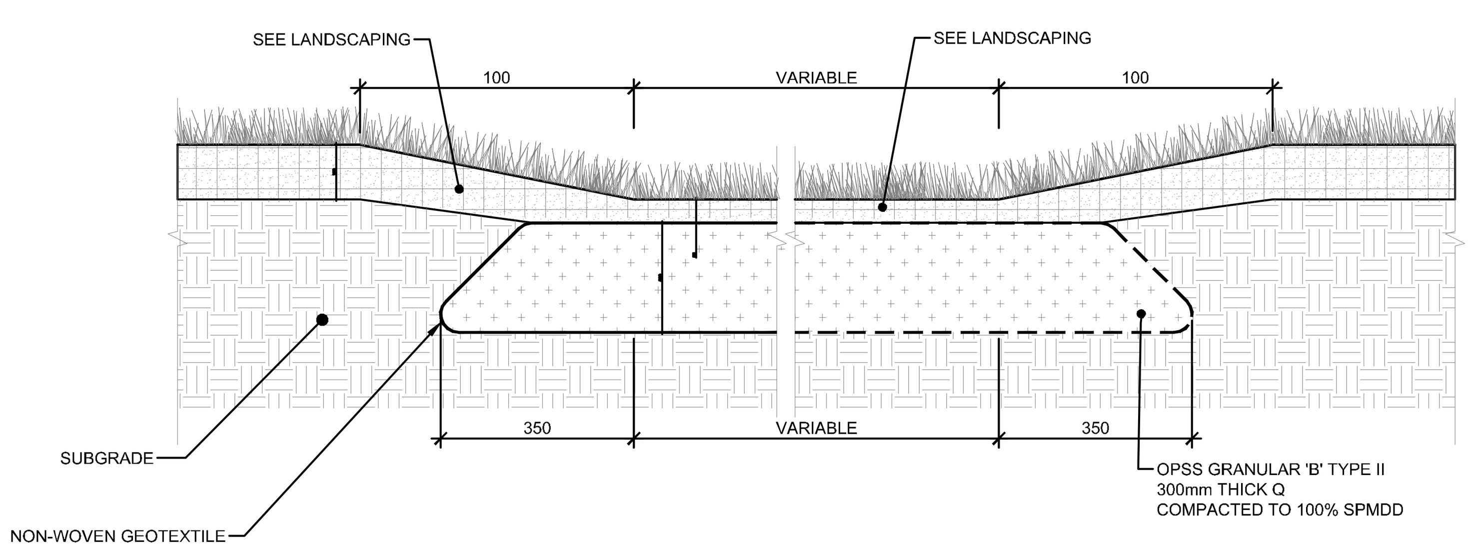
212 TYPICAL SECTION - TEMPORARY CONSTRUCTION ENTRANCE

AUCUNE / NTS



NOTES:

A - WHEN X < 1,8m, INSULATION IS REQUIRED FOR WATERMAIN
B - WHEN X < 1,5m, INSULATION ID REQUIRED FOR SEWER



215 SEPTIC SYSTEM MAINTENANCE TRUCK ACCESS AREA

AUCUNE / NTS

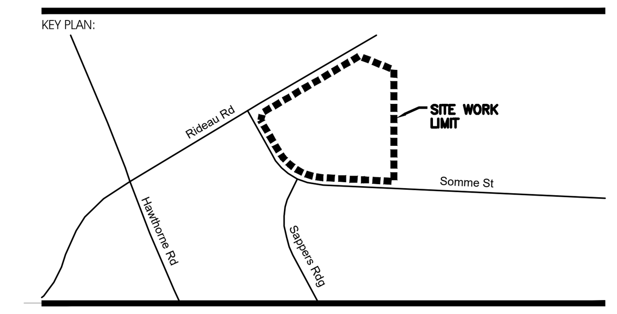
309 TYPICAL SECTION FROST PROTECTION FOR SEWERS, CATCHBASIN LEAD AND WATERMAIN

AUCUNE / NTS

CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

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ISSUE:

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER
J.A. SAUVE
100200100
PROVINCE OF ONTARIO

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER
C. LAVOIE-LE BEL
100067842
PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

DETAILS

DRAWN BY:	D.CANN	DRAWING NUMBER:	C012
DATE:			
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083

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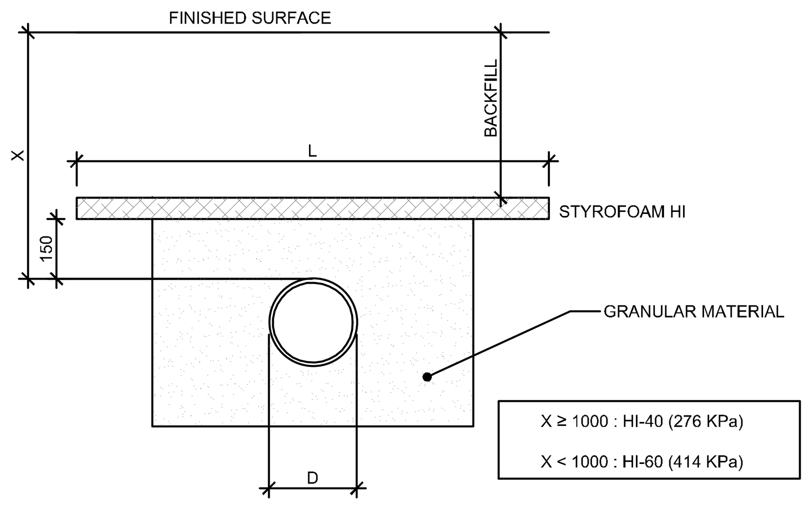


MINIMUM WIDTH OF ISULATION TABLE (L)

X \ D	≤150	200	250	300	375	450	525	600
750	1650	1700	1750	1800	1875	1950	2025	2100
1000	1150	1200	1250	1300	1375	1450	1525	1600
1250	650	700	750	800	875	950	1025	1100
1500	600	600	600	600	600	600	600	600
1750	600	600	600	600	600	600	600	600

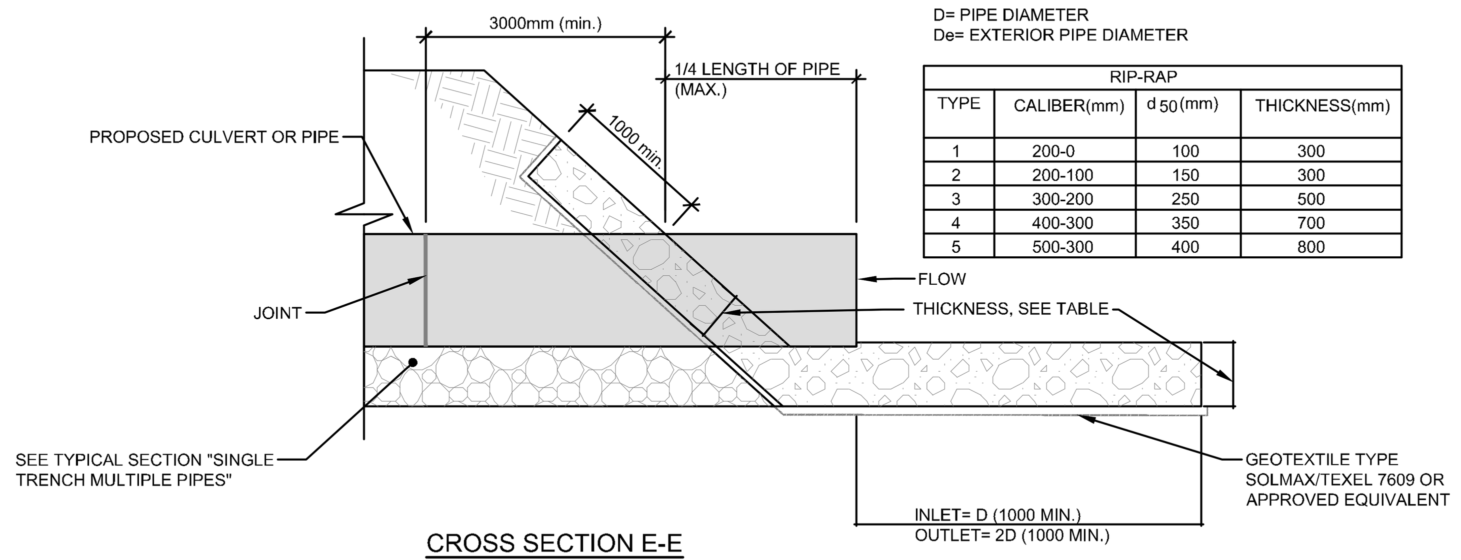
INSULATION THICKNESS
100
100
75
75
50

L= INSULATION WIDTH (mm)
D= PIPE DIAMETER (mm)

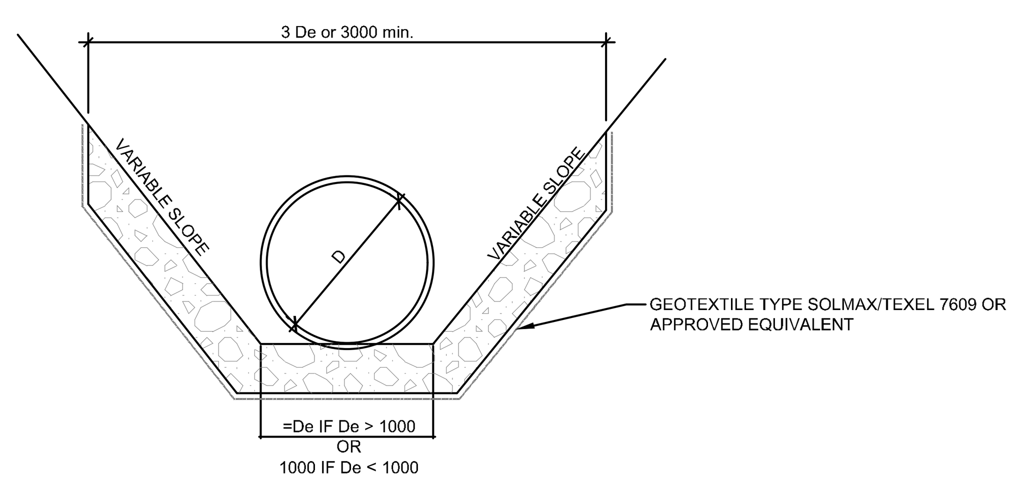
314A PIPE INSULATION (1.8m COVER)
AUCUNE / NTS

D= PIPE DIAMETER
De= EXTERIOR PIPE DIAMETER

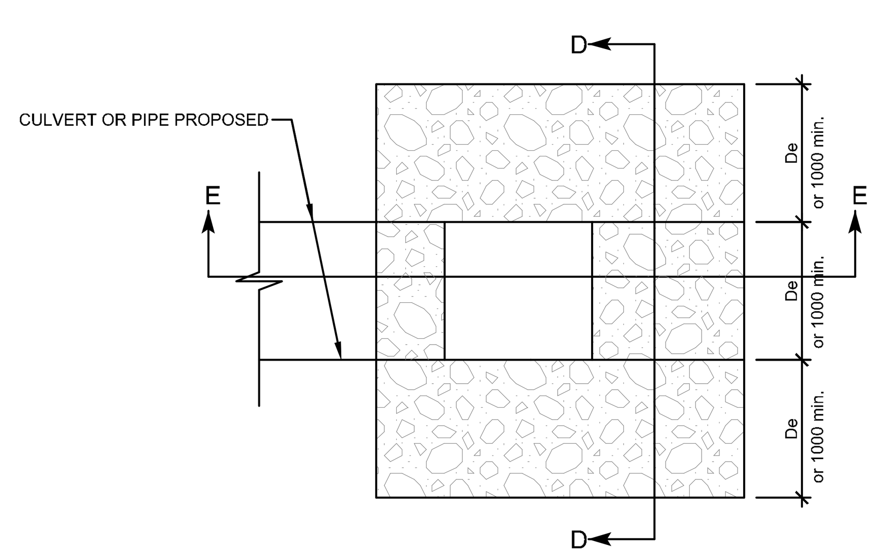
RIP-RAP			
TYPE	CALIBER(mm)	d_{50}(mm)	THICKNESS(mm)
1	200-0	100	300
2	200-100	150	300
3	300-200	250	500
4	400-300	350	700
5	500-300	400	800



CROSS SECTION E-E

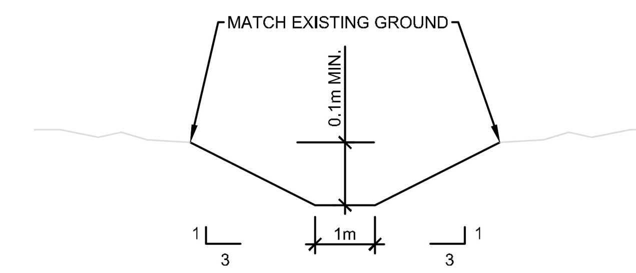


CROSS SECTION D-D

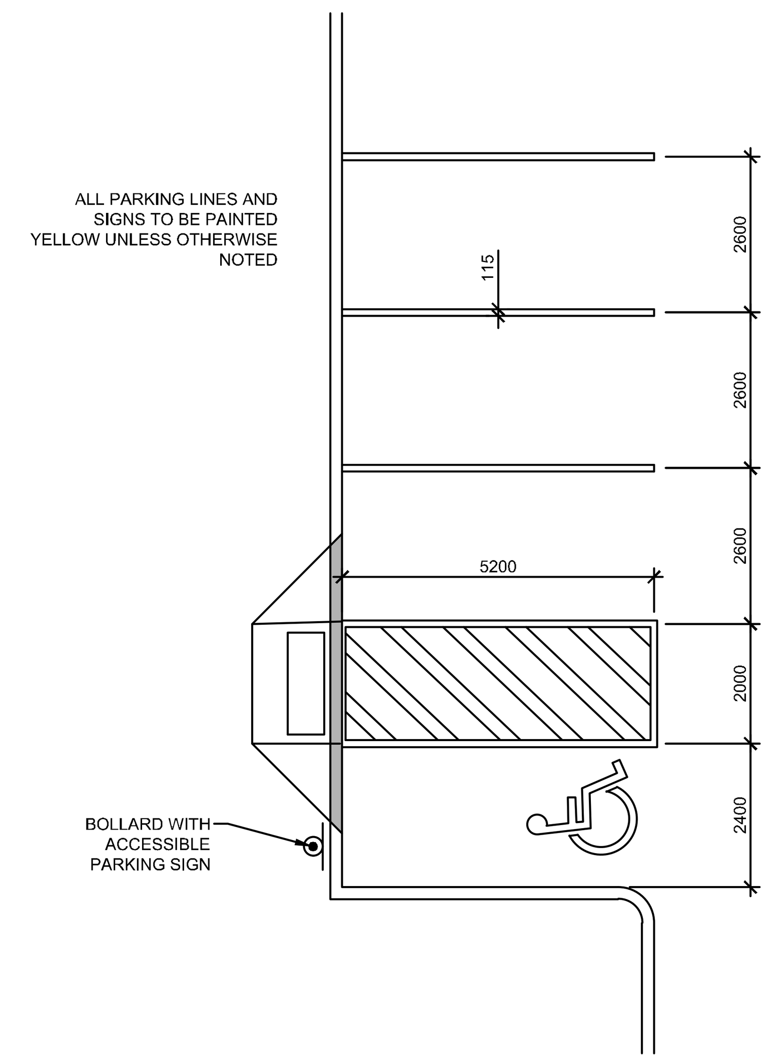


PLAN VIEW

319 INLET/OUTLET FOR CULVERT OR PIPE DETAIL (TYPICAL)
AUCUNE / NTS

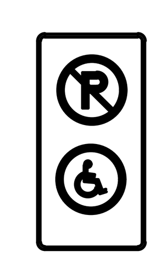


333 SWALE (TYPICAL)
AUCUNE / NTS

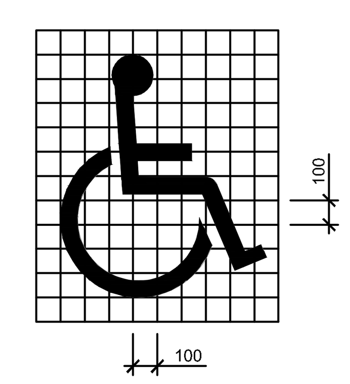


408 TYPICAL PARKING STALLS
AUCUNE / NTS

ACCESSIBLE PARKING SIGN



P-150-5

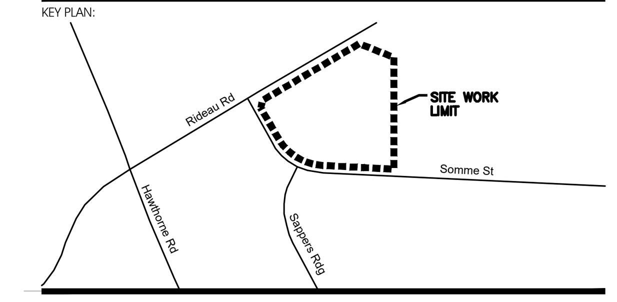


409B ACCESSIBLE PARKING SIGN AND MARKING

CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NUMBER:	REVISION:	DATE: (MM/DD/YY)
6		
5		
4		
3		
2		
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP: PROFESSIONAL STAMP:

CIVITAS GROUP

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 OTTAWA, ON CANADA K1S 1V9 T: 613.742.7482 WWW.CIVITAS-INC.CA

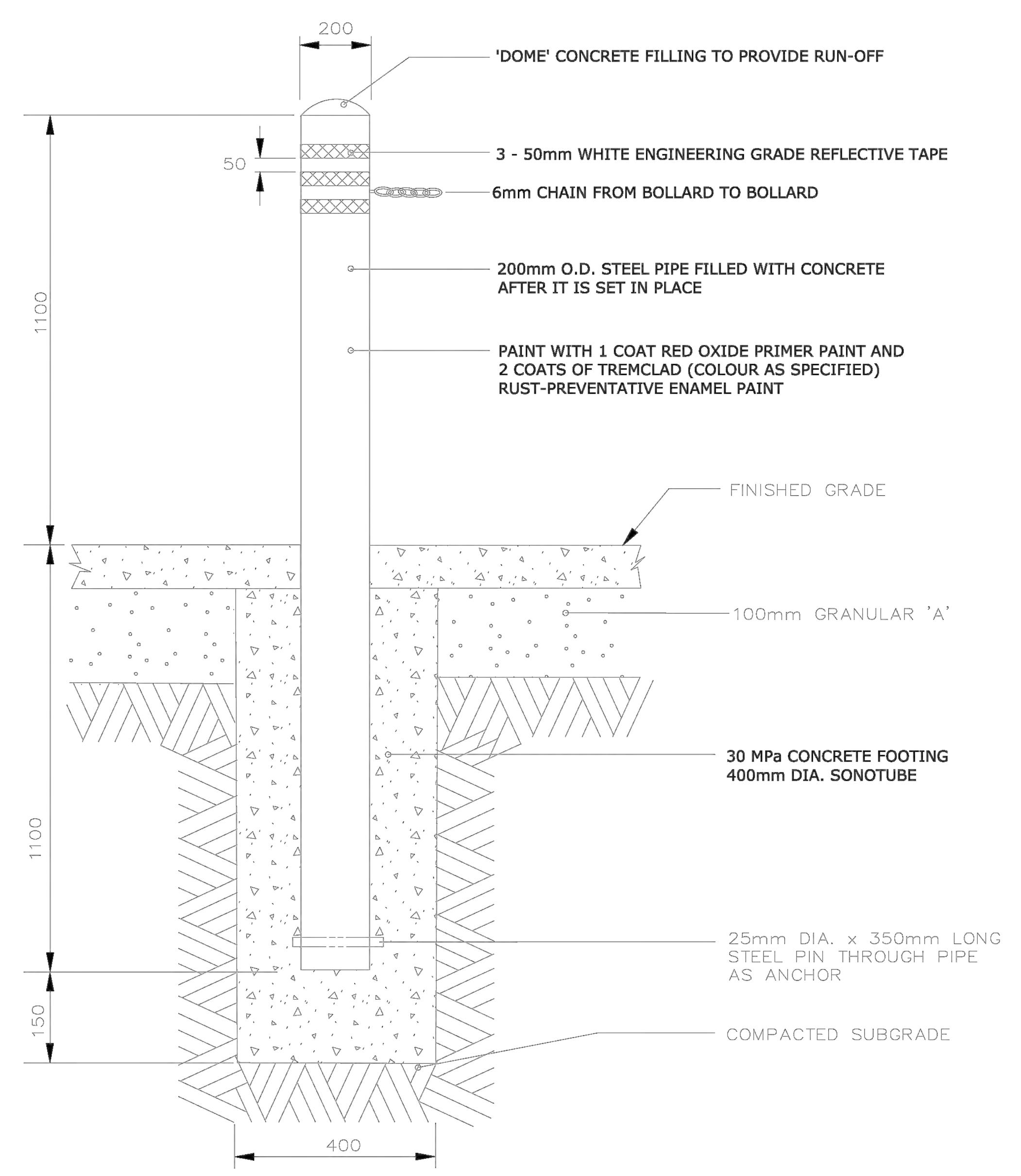
CONSULTANT LOGO:

CIMA+

PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOMME ST.
OTTAWA, ON

DRAWING TITLE:
DETAILS

DRAWN BY: D.CANN
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PRINT DATE:
ISSUED DATE: AUGUST 13, 2021
DRAWING NUMBER: C013
REVISION NUMBER:
CLIENT PROJECT #:
PROJECT #: A001083

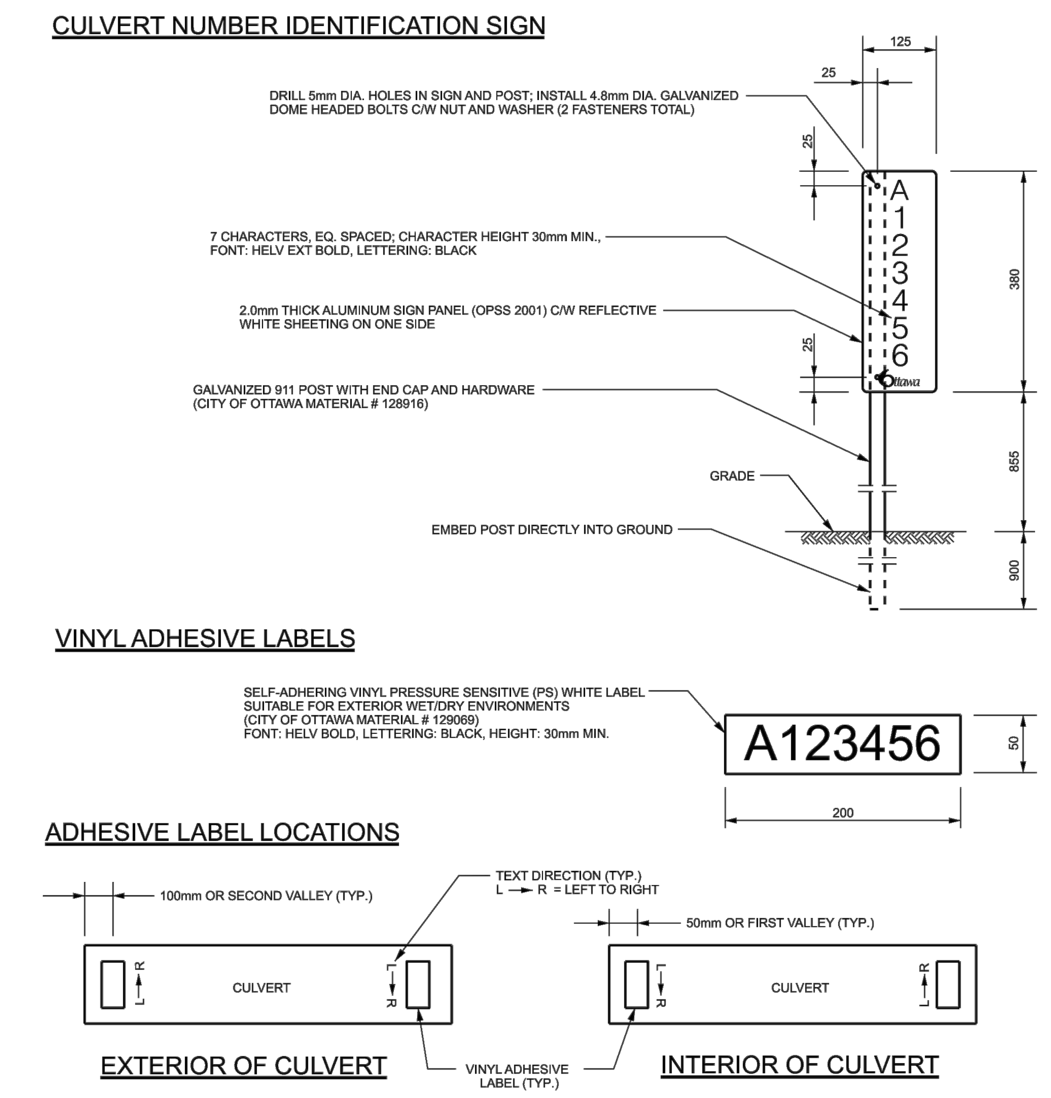


NOTES:

1. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

TITLE: 200mm DIAMETER STEEL BOLLARD INSTALLATION FOR ROAD CLOSURE

DATE: MAY 2001 | REV: JAN 2015 | DWG No: F4



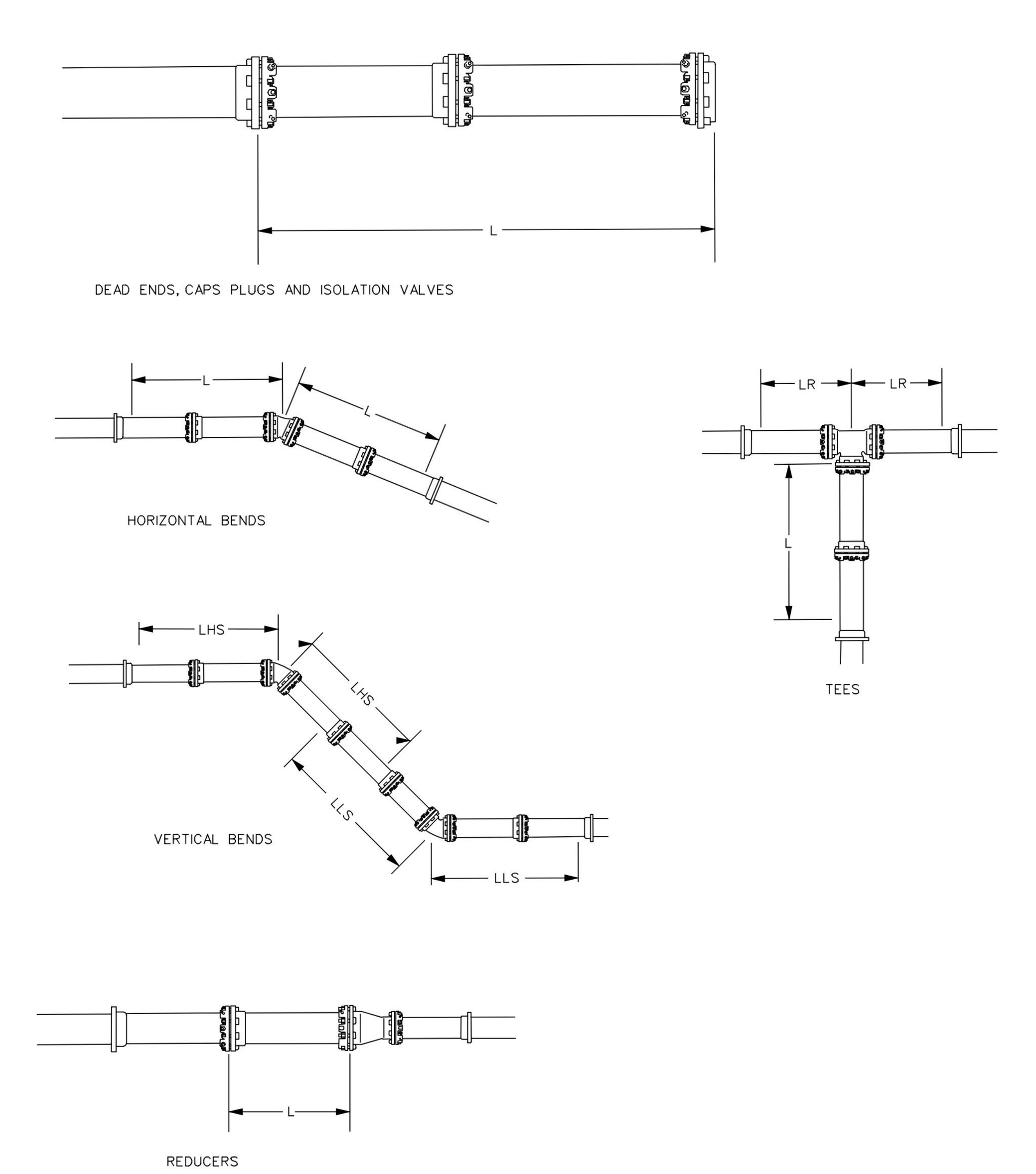
NOTES:

1. REFLECTIVE WHITE SHEETING SHALL BE 3M ENGINEERED PRESSURE SENSITIVE (PS) OR EQUIVALENT.
2. TOTAL OF 2 CULVERT NUMBER IDENTIFICATION SIGNS AND 4 VINYL ADHESIVE LABELS REQUIRED FOR EACH CULVERT.
3. PREPARE SURFACE OF GALVANIZED STEEL AS PER LABEL MANUFACTURER'S RECOMMENDATION TO ACHIEVE PROPER BOND.
4. CITY OF OTTAWA LOGO STAMP SHALL BE AFFIXED TO THE FRONT OF EACH CULVERT NUMBER IDENTIFICATION SIGN.
5. TO BE PLACED NEXT TO CEDAR POST WITH REFLECTIVE STRIP.

N.T.S.

CULVERT IDENTIFICATION SIGN FOR CULVERTS OWNED BY CITY OF OTTAWA

DATE: SEPTEMBER 2006 | REV. DATE: MARCH 2021 | DWG. No.: S34

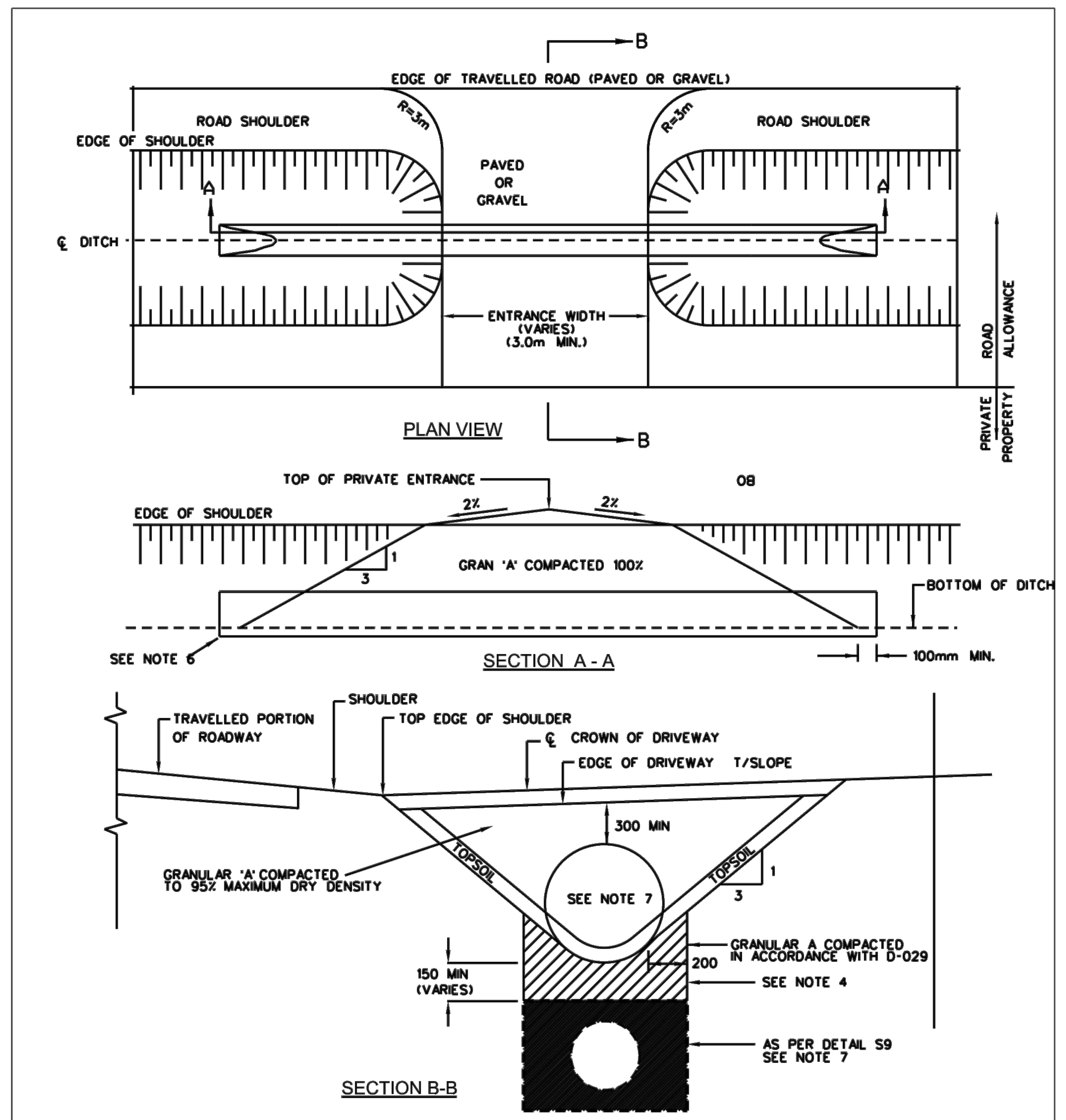


NOTES:

1. ANY JOINT THAT FALLS WITHIN THE RECOMMENDED LENGTH (L) SHALL BE RESTRAINED. SEE DRAWING W25.6
2. TO REDUCE THE NUMBER OF RESTRAINERS REQUIRED THE USE OF FULL PIPE LENGTHS IS RECOMMENDED IN THESE AREAS.

RESTRAINING AND RETAINING RINGS FOR PVC AND DI PIPE 400mm AND UNDER

DATE: MAY 2001 | REV. DATE: NONE | DWG. No.: W25.5

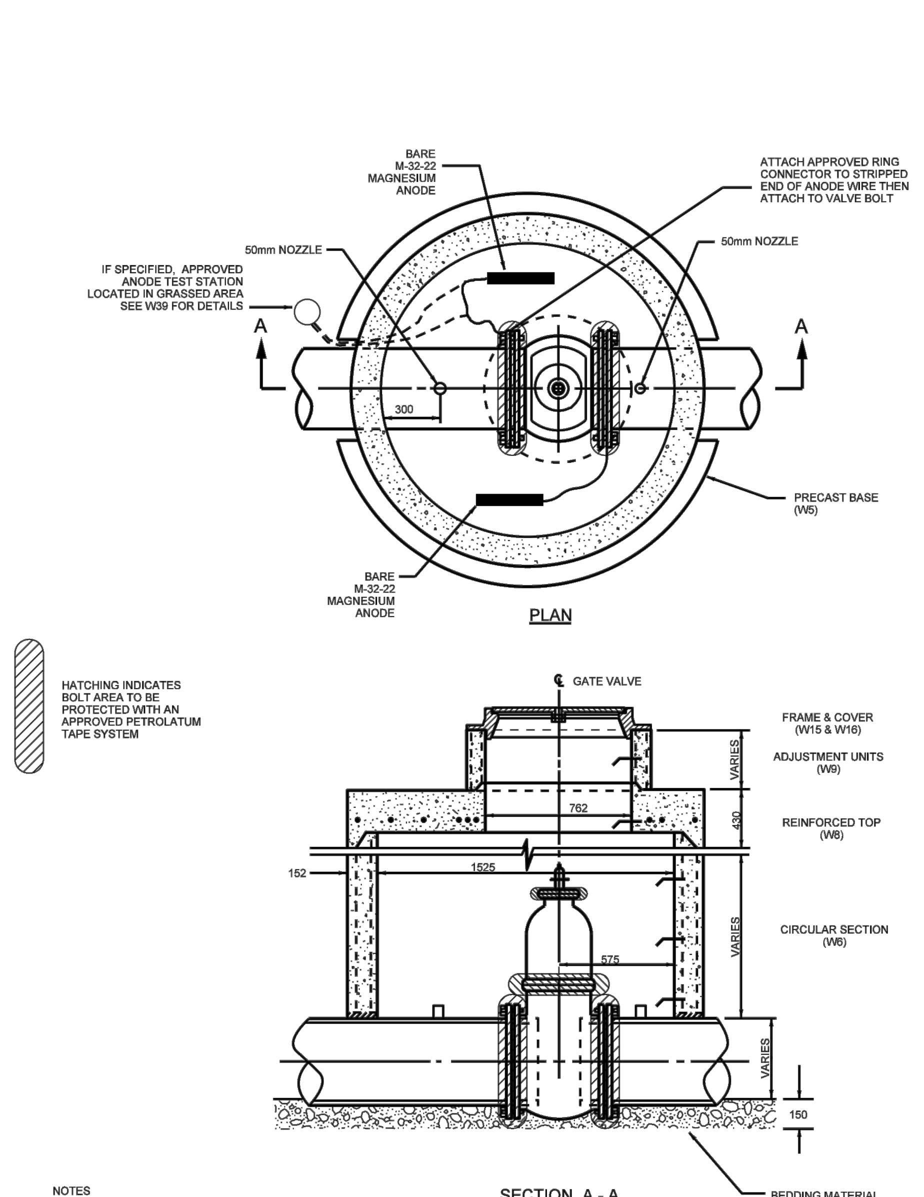


NOTES:

1. APPROVED NEW CULVERT MATERIAL ONLY, MIN. 500mm UNLESS SPECIFIED OTHERWISE, DITCH AND CULVERT TO BE SIZED ACCORDING TO SEWER DESIGN GUIDELINE MANUAL.
2. LENGTH OF CULVERTS IS DEPENDENT UPON THE DEPTH OF DITCH AND WIDTH OF ENTRANCE.
3. ENTRANCE CULVERTS GREATER THAN 900mm DIA. OR MULTIPLE CULVERTS MUST BE APPROVED PRIOR TO INSTALLATION. CULVERTS OVER 12m LONG AND HEADWALLS REQUIRE APPROVAL AND PERMIT BY THE CITY.
4. IN FROST SUSCEPTIBLE SOILS SPECIAL BEDDING CONDITIONS WILL BE REQUIRED.
5. REMOVE ALL ORGANICS FROM SIDE SLOPES AND DITCH BOTTOM PRIOR TO PLACING CULVERT AND GRANULARS.
6. CULVERT TO BE COUNTERSUNK 10% OF ITS DIAMETER BELOW FINISHED DITCH INVERT.
7. WHERE SPECIFIED, APPROVED DITCHED PIPE TO BE AT A MINIMUM GRADE OF 0.5% AND BE NON-PERFORATED TYPE UNDER CULVERTS.
8. SEE MS 22.15 FOR APPROVED PRODUCTS. UNLESS OTHERWISE STATED IN THE CONTRACT, CONSTRUCTION AS PER OPSS 421.
9. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

PRIVATE ENTRANCE DETAIL - RURAL

DATE: MAY 2001 | REV. DATE: MARCH 2016 | DWG. No.: S26



NOTES

FOR VALVES ON 300mm (NOMINAL) WATERMAINS.

1. CLEARANCE AROUND PIPE AT CHAMBER WALL TO BE 50mm MINIMUM.
2. VALVE CHAMBERS IN LIEU OF BOXES ON WATERMAINS SMALLER THAN 300mm ONLY TO BE USED, IF APPROVED BY THE CONTRACT ADMINISTRATOR.
3. REFER TO MW-13.1 FOR ADDITIONAL REQUIREMENTS.
4. REFER TO MW-19.15 FOR APPROVED MANUFACTURERS.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
6. CATHODIC PROTECTION MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH W39, W40 AND W42.
7. TRACER WIRE REQUIRED FOR PVC, PEX AND HDPE WATERMAIN PIPE ONLY AS PER W36. TRACER WIRE TO BE CONNECTED TO VALVE BOLT AS PER W55 AND SECURED TO TOP OF CHAMBER.

CIRCULAR CHAMBER GATE VALVES

DATE: MAY 2001 | REV. DATE: MARCH 2021 | DWG. No.: W3

TABLE OF RESTRAINED LENGTHS FOR DI AND PVC WATERMAIN PIPE IN STANDARD GRANULAR 'A' EMBEDMENT IN SOILS OF BEARING CAPACITY OF 100 KPa AND OVER

REDUCERS — LARGER DIAMETER SIDE (TO BE RESTRAINED)

SMALLER DIAMETER (UNRESTRAINED)	100mm	150mm	200mm	250mm	300mm	400mm
100mm	N/A	3	6	8	10	14
150mm	N/A	N/A	4	6	9	13
200mm	N/A	N/A	N/A	3	6	11
250mm	N/A	N/A	N/A	N/A	4	9
300mm	N/A	N/A	N/A	N/A	N/A	7
400mm	N/A	N/A	N/A	N/A	N/A	N/A

PIPE DIAMETER

	100mm	150mm	200mm	250mm	300mm	400mm
DEAD ENDS, CAPS, PLUGS, VALVES						
BEFORE CAPS AND EITHER SIDE OF VALVES - L	5	6	9	10	12	16
VERTICAL BENDS						
LENGTH HIGH SIDE - LHS	3	4	5	6	7	9
LENGTH LOW SIDE - LLS	1.5	2	2.5	3	3.5	4.5
TEES						
LENGTH ALONG THE BRANCH - L	1	1	1	1	1	1
LENGTH ALONG THE RUN - Lr	3	3	3	3	3	3
HORIZONTAL BENDS						
11.25, 22.5, AND 45 DEGREE BENDS	1	1.5	1.5	2	2	2.5

NOTES:

1. THE ABOVE RESTRAINED LENGTHS MEET OR EXCEED THE WATERMAIN DESIGN CRITERIA FOR FUTURE ALTERATIONS AUTHORIZED UNDER A DRINKING WATER WORKS PERMIT.
2. THE ASSUMPTIONS MADE FOR THE ABOVE CALCULATIONS ARE AS FOLLOWS:
   a) MAXIMUM OPERATING PRESSURE OF 100 psi.
   b) MAXIMUM SURGE PRESSURE WITH A FLOW VELOCITY CHANGE OF 0.6 m/s OF 115 psi (115 psi FOR CLASS 52 DI AND FOR PVC MAX. SURGE IS 35 psi)
3. FOR SOFTWARE CALCULATIONS A TEST PRESSURE OF 150 psi AND A SAFETY FACTOR OF 1.5 WAS USED WHICH RESULTS IN 225 psi MAXIMUM PRESSURE.
4. TYPE 5 TRENCH BEDDING.
5. DEPTH TO BURY 2.4 METRES EXCEPT FOR VERTICAL BENDS WHERE THE HIGH SIDE IS AT 1.8 METRES.
6. EMBEDMENT MATERIAL GRANULAR 'A' WITH CHARACTERISTICS OF ASTM D2487 GP.
7. GP SOILS ARE DESCRIBED AS POORLY GRADED GRAVEL AND SAND-GRAVEL MIXES WITH LITTLE OR NO FINES.
8. (Lr) MUST BE OF SOLID PIPE WITHOUT JOINTS, FITTINGS, ETC.
9. THE TABLES APPLY TO BOTH DUCTILE IRON AND PVC. WHERE ONE LENGTH EXCEEDED THE OTHER THE LONGER LENGTH WAS USED.
10. RESTRAINED LENGTHS ARE IN METRES.

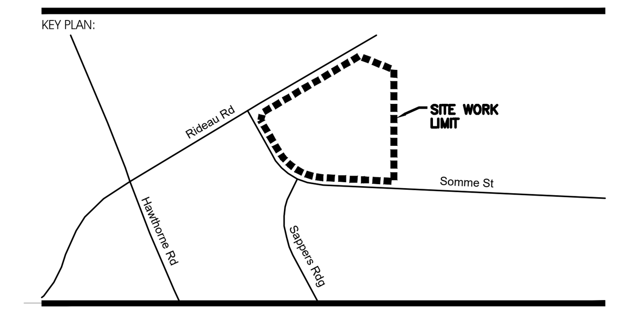
TABLES OF RESTRAINED LENGTHS FOR PVC AND DI PIPE 400mm AND UNDER

DATE: MAY 2001 | REV. DATE: MARCH 2011 | DWG. No.: W25.6

CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NUMBER	REVISION	DATE (MM/DD/YY)
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER J. A. SAUVE 100200100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LEBEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 | OTTAWA, ON CANADA K1S 1V9 | T: 613.742.7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

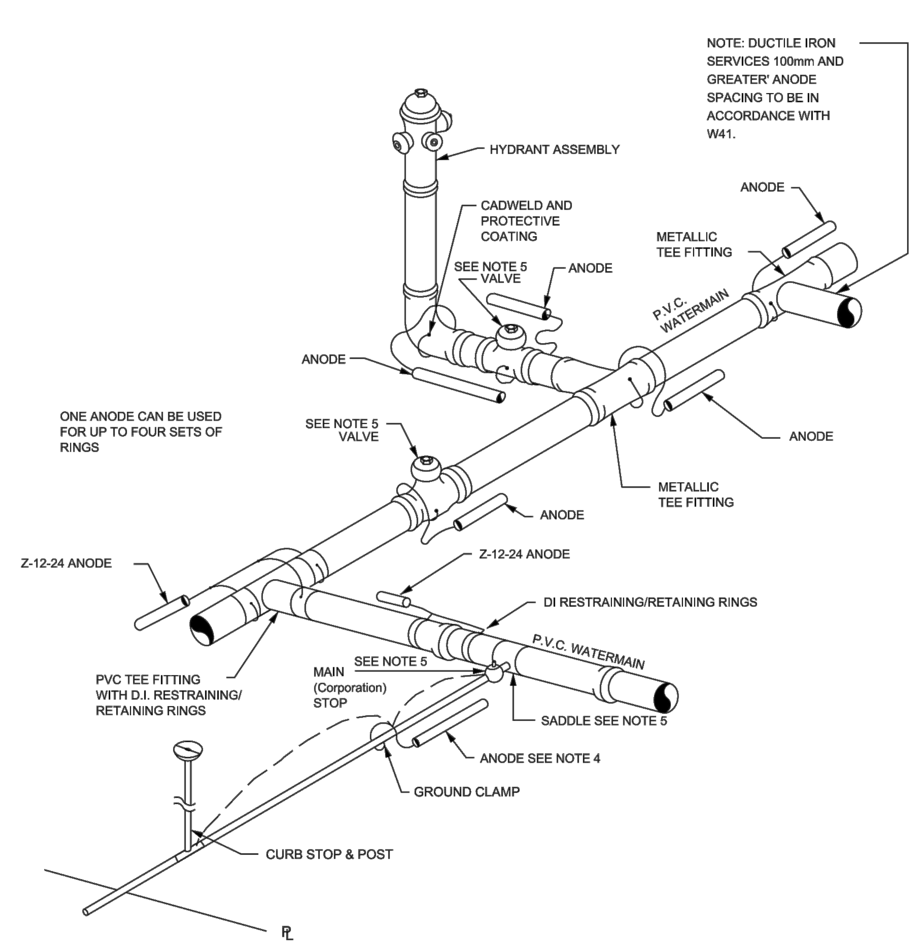
SOMME ST.
OTTAWA, ON

DRAWING TITLE:

DETAILS

DRAWN BY: D.CANN
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PRINT DATE:
ISSUED DATE: AUGUST 13, 2021
CLIENT PROJECT #:

DRAWING NUMBER: C014
REVISION NUMBER:
PROJECT #: A001083



NOTES:

1. ANODE CONNECTING WIRE TO BE LOOPED AROUND PIPES / FITTINGS AND KNOTTED.
2. PROTECTIVE COATING TO BE APPLIED TO ALL CADWELDS.
3. ANODE TYPE & SPACING AS PER W42.
4. CONNECT ANODE TO COPPER SERVICES USING A GROUND CLAMP AND FOR PEX SERVICES CONNECT ANODE TO TRACER WIRE TERMINALS ON BOTH MAIN AND CURB STOPS.
5. PROTECT AUXILIARY VALVES, ISOLATION VALVES, SADDLES AND MAIN STOPS WITH A PETROLATUM WAX TAPE COATING SYSTEM. FOR PEX SERVICES ALSO WAX TAPE CURB STOP UP TO THE BASE OF THE TEE HEAD.
6. ALL DIMENSIONS ARE IN MILLIMETERS.

N.T.S.

Ottawa

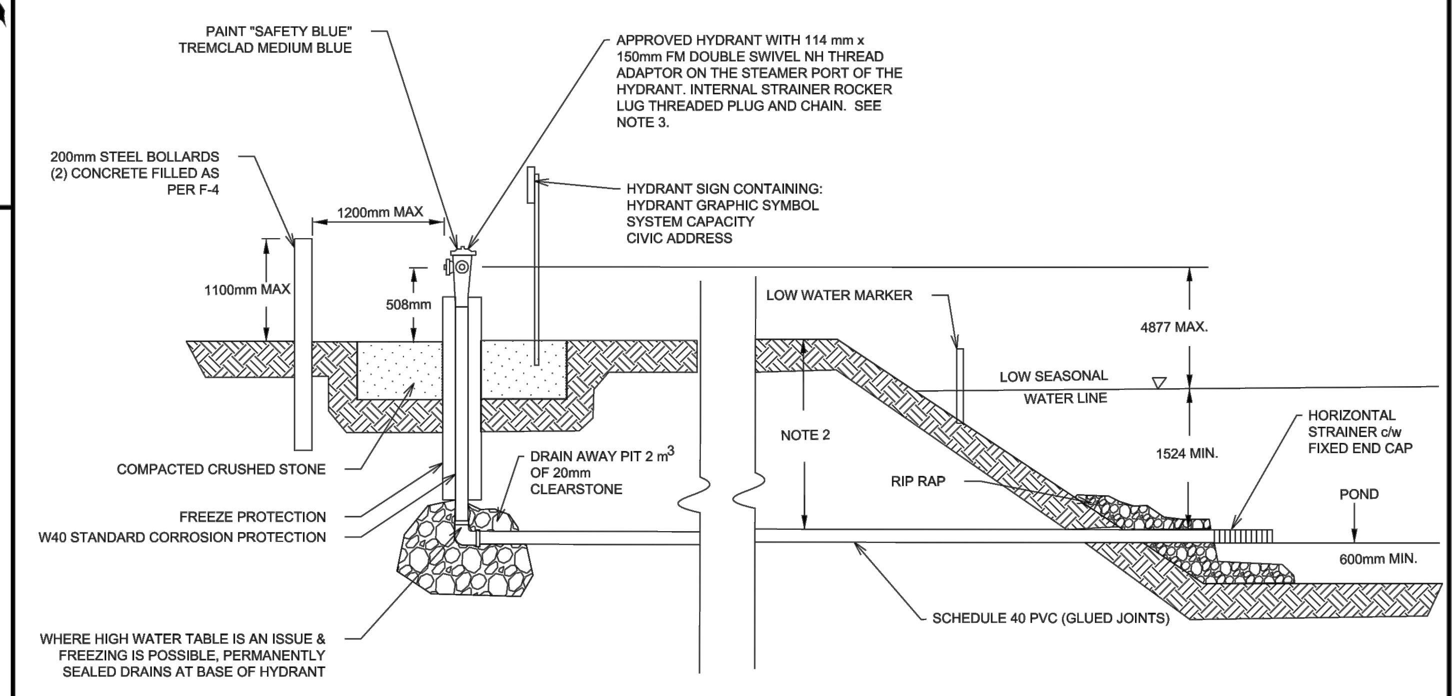
CATHODIC PROTECTION FOR PVC WATERMAIN SYSTEMS

DATE: MAY 2001
REV. DATE: MARCH 2013
DWG. No.: W40

Ottawa

DRY HYDRANT INSTALLATION - SURFACE WATER SOURCE

DATE: MARCH 2016
REV. DATE:
DWG. No.: W53

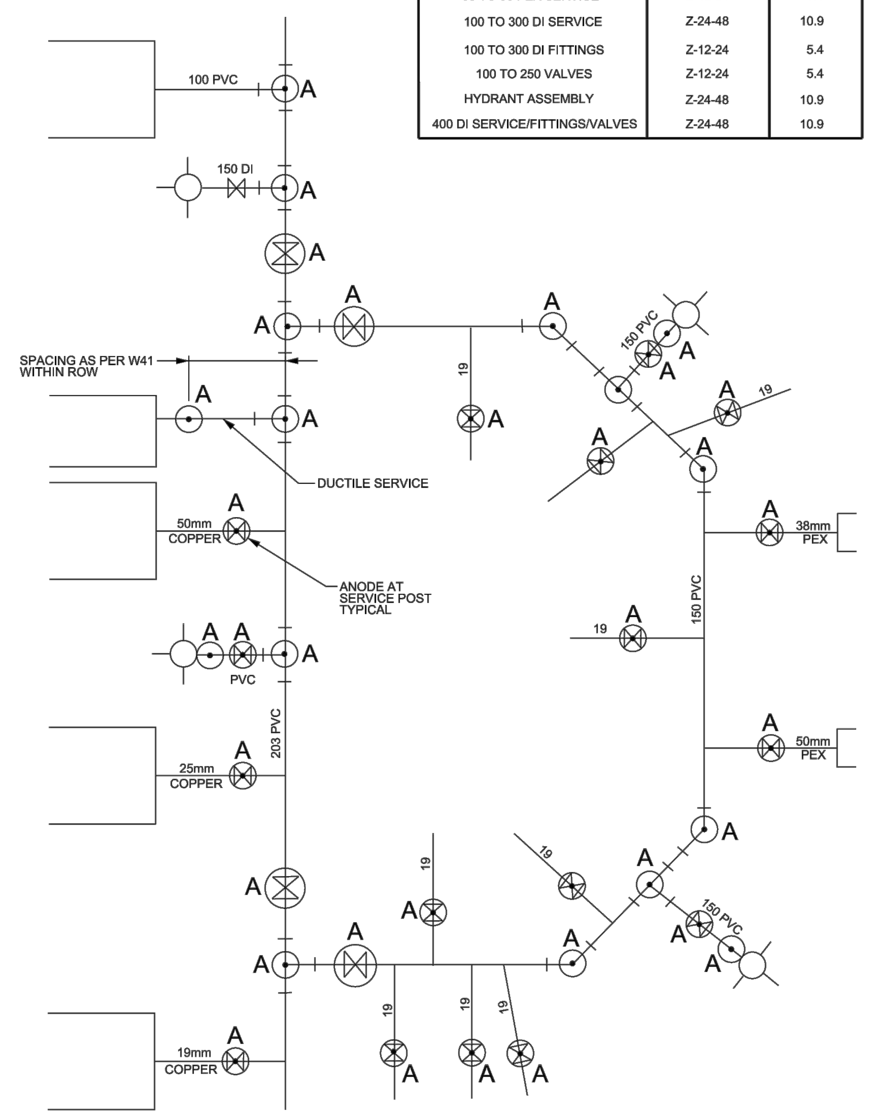


NOTES:

1. THESE ARE TYPICAL SPECIFICATIONS. LOCAL CONDITIONS MAY REQUIRE DEVIATION. ANY DEVIATION MUST BE APPROVED BY CONTRACT ADMINISTRATOR.
2. PIPING TO BE INSTALLED AT POSITIVE GRADE WITH NO HIGH OR LOW POINTS BETWEEN HYDRANT BASE AND INTAKE.
3. ALTERNATE SCHEDULE 40 STEEL PIPE WITH 90° ELBOW AND COULING AT TOP OF RISER PREFERRED WHERE RISK OF FREEZING IS NOT A THREAT.
4. PROVIDE CORROSION AND THRUST RESTRAINT AS PER THE STANDARD.

N.T.S.

SIZE (mm)	ANODE TYPE	WEIGHT (Kg)
19 TO 50 COPPER SERVICE	Z-12-24	5.4
38 TO 50 PEX SERVICE	Z-12-24	5.4
100 TO 300 DI SERVICE	Z-24-48	10.9
100 TO 300 DI FITTINGS	Z-12-24	5.4
100 TO 250 VALVES	Z-12-24	5.4
HYDRANT ASSEMBLY	Z-24-48	10.9
400 DI SERVICE/FITTINGS/VALVES	Z-24-48	10.9



A - DENOTES ANODE LOCATION

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

N.T.S.

Ottawa

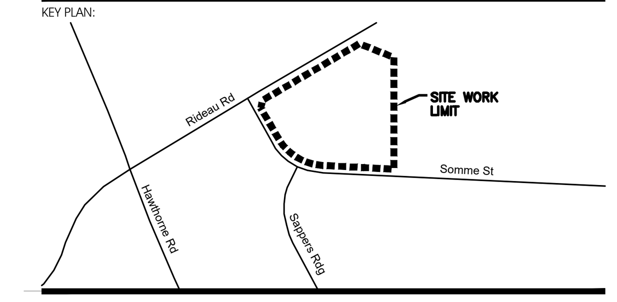
TYPICAL ANODE INSTALLATION PVC WATERMAIN

DATE: MAY 2001
REV. DATE: MARCH 2014
DWG. No.: W42

CLIENT LOGO:

FASTFRATE

KEY PLAN:



TRUE NORTH:

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NUMBER:	REVISION:	DATE: (MM/DD/YY)
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1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER J.A. SAUVE 100200100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LE BEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

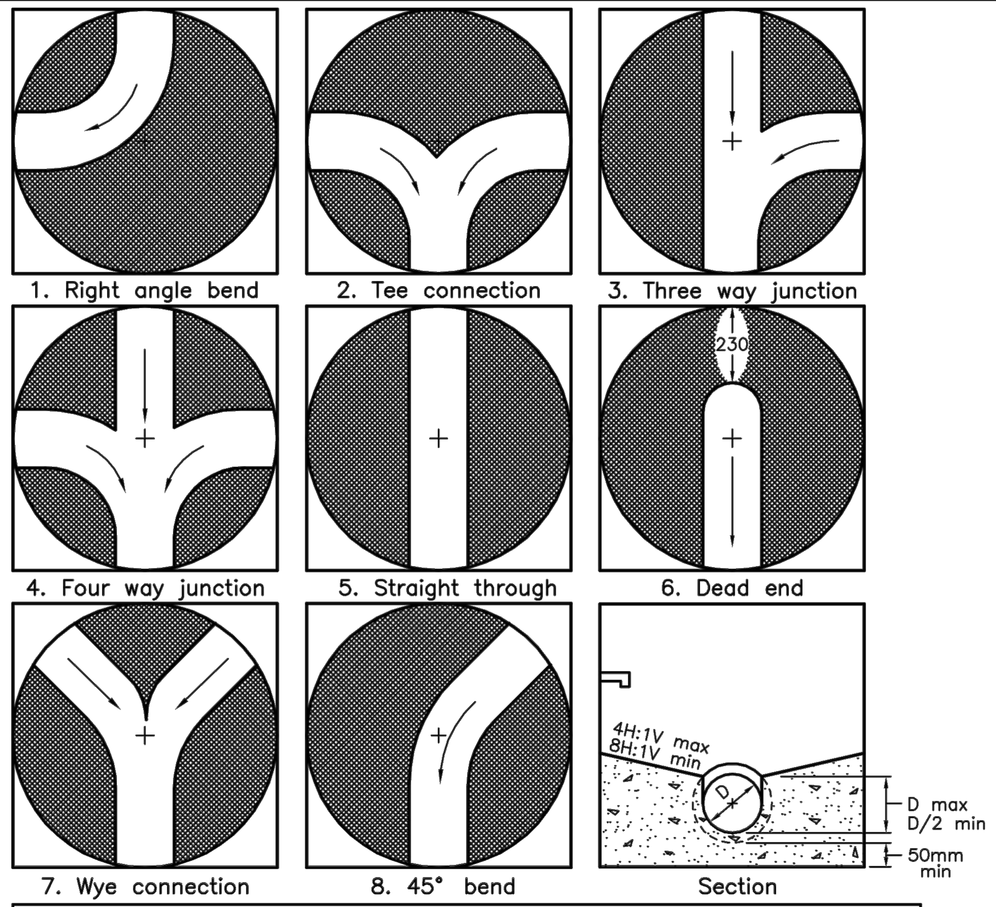
DETAILS

DRAWN BY: D.CANN
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PRINT DATE:
ISSUED DATE: AUGUST 13, 2021
CLIENT PROJECT #:

DRAWING NUMBER: C015
REVISION NUMBER:
PROJECT #: A001083

CLIENT LOGO:

FASTFRATE



MAXIMUM SIZE HOLE IN THE WALL IN PRECAST RISER SECTIONS					
Maintenance Hole Diameter	No. 1–4	No. 5 and 6	No. 8	No.7	
				Inlet Hole	Outlet Hole
1200	700	860	780	700	860
1500	860	1220	960	860	1170
1800	1220	1485	1220	1220	1485
2400	1485	2020	1760	1485	2020
3000	1930	2450	2300	1930	2450
3600	2470	3085	2730	2470	3085

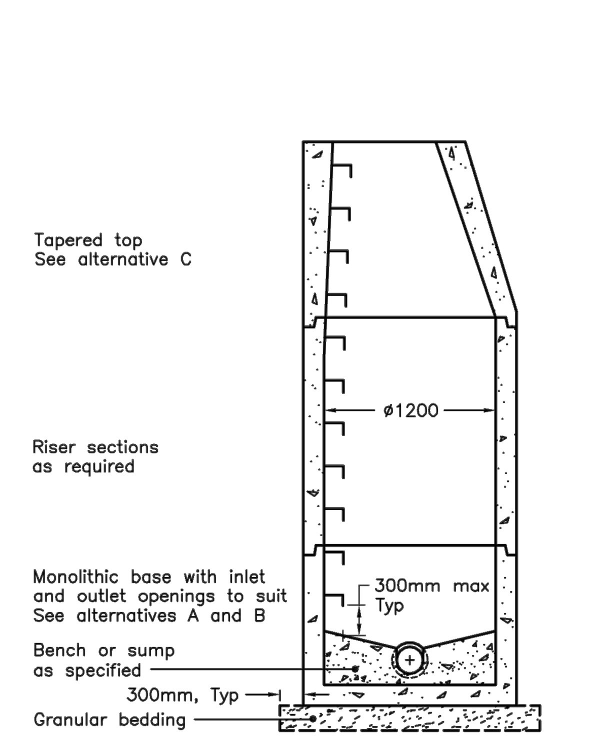
NOTES:

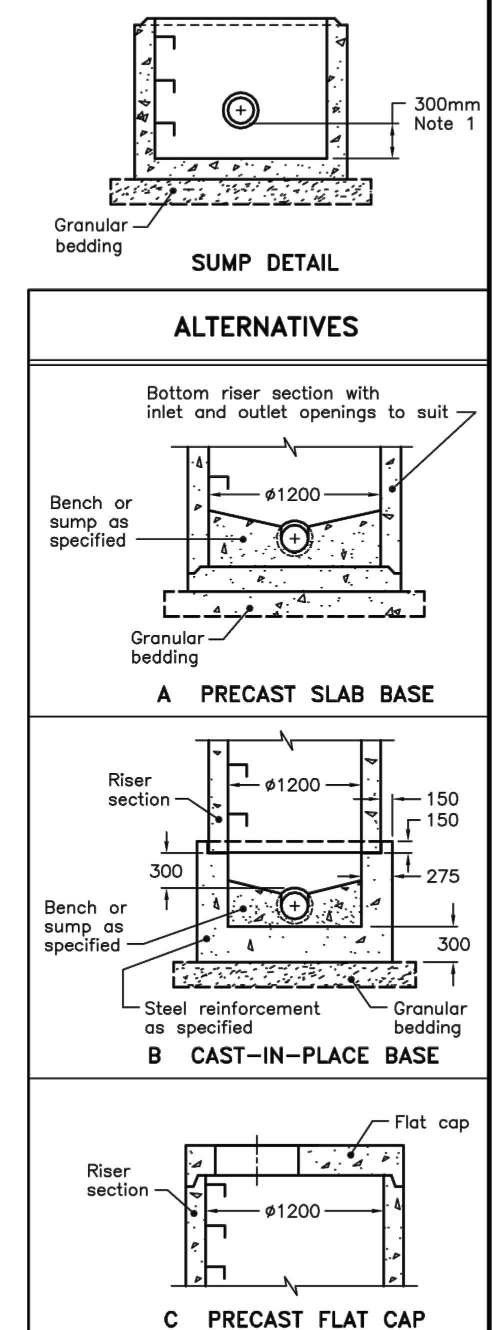
1 Slopes shall be maintained from the outlet hole opening for top of benching.
A Concrete for benching shall be 30MPa.
B When benching is hand–finshed, it shall be given wood float finish, channel shall be given steel trowel finish.
C Benching slope and height shall be as specified.
D When specified, maintenance holes that are 1200mm in diameter with a uniform channel for 200 or 250mm pipe may be prebenched at the manufacturer with standardized benching slope and channel orientation.
E All dimensions are nominal.
F All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2014 — Rev 4

MAINTENANCE HOLE BENCHING AND PIPE OPENING ALTERNATIVES

OPSD 701.021





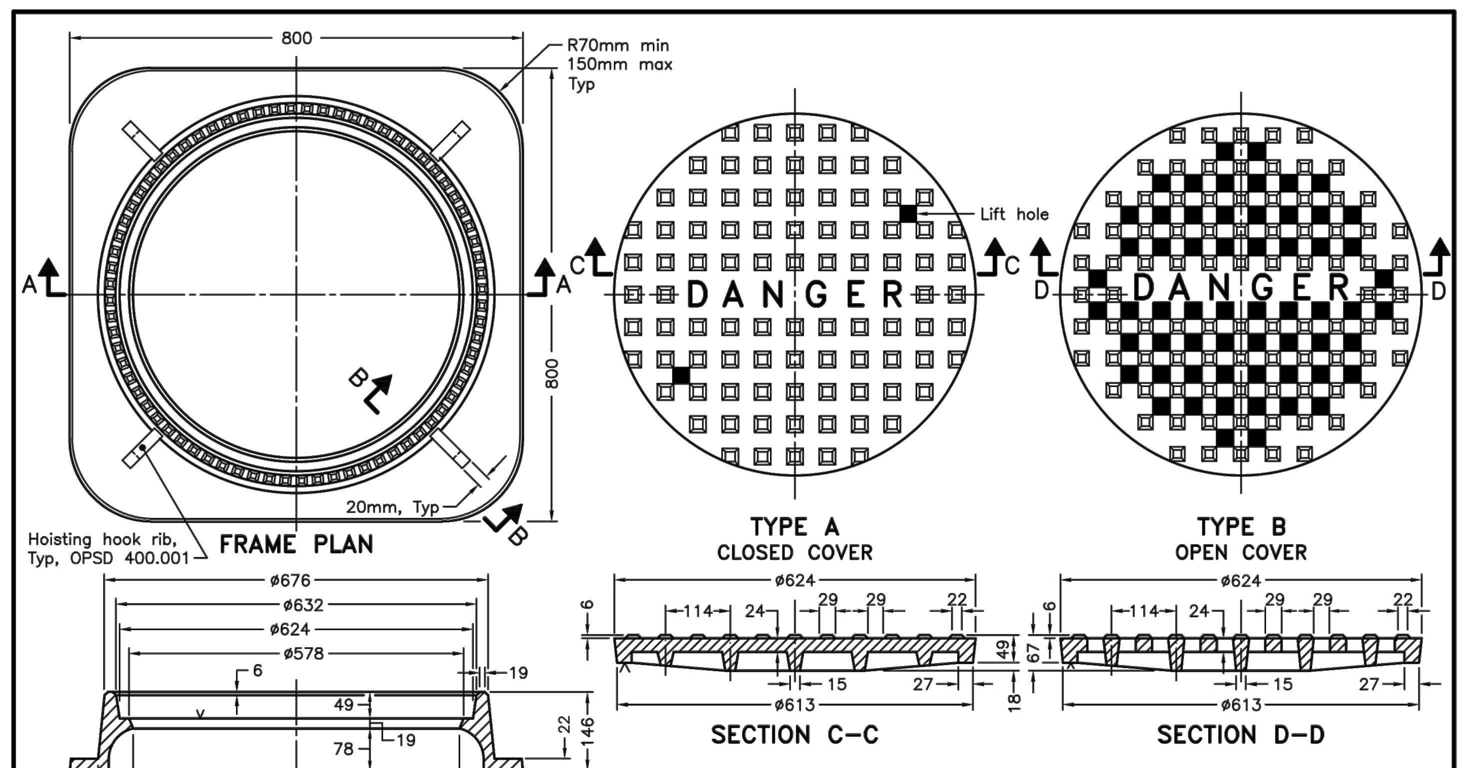
NOTES:

1 The sump is measured from the lowest invert.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
C Structure exceeding 5.0m in depth shall include safety platform according to OPSD 404.020.
D Pipe support according to OPSD 708.020.
E For benching and pipe opening details, see OPSD 701.021.
F For adjustment unit and frame installation, see OPSD 704.010.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2014 — Rev 5

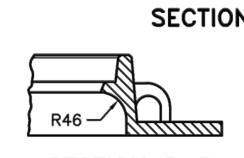
PRECAST CONCRETE MAINTENANCE HOLE
1200mm DIAMETER

OPSD 701.010



NOTES:

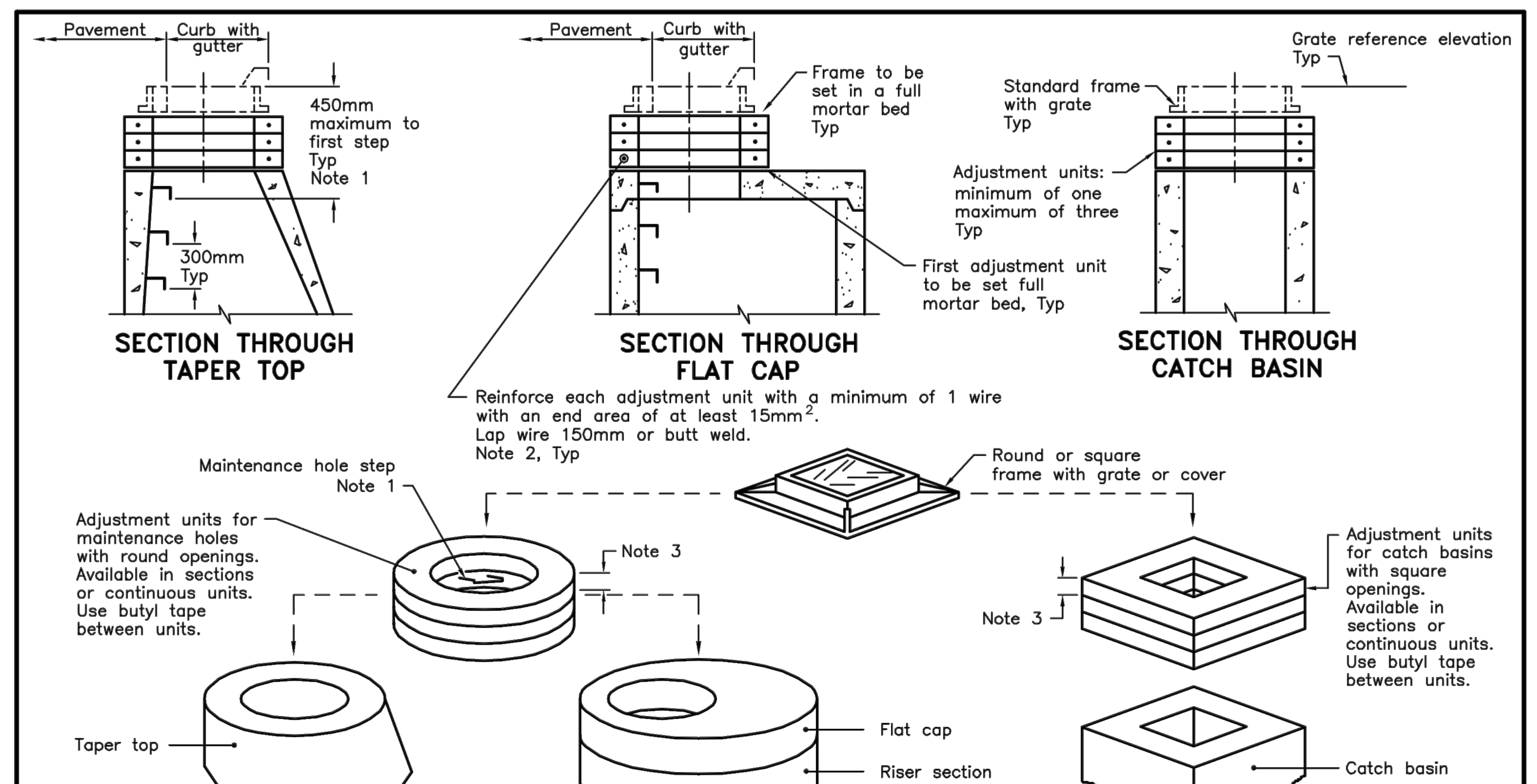
A Covers shall be Type A or Type B, as specified.
B All dimensions are in millimetres unless otherwise shown.



ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2018 — Rev 4

CAST IRON, SQUARE FRAME WITH CIRCULAR CLOSED OR OPEN COVER FOR MAINTENANCE HOLES

OPSD 401.010



NOTES:

1 If first step is in an adjustment unit, the adjustment unit shall be of the type manufactured with a step in place.
2 Centre reinforcing in adjustment unit ±10mm.
3 Round and square adjustment units are available in sizes of 50, 75, 100, 150, and 300mm.

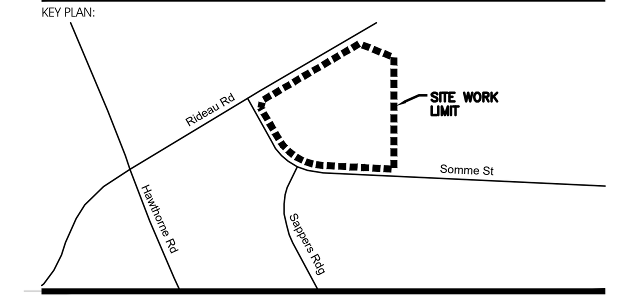
A Adjustment units shall not extend beyond the outside edge of the structure.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2014 — Rev 3

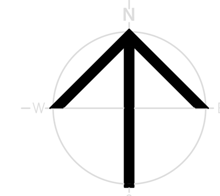
PRECAST CONCRETE ADJUSTMENT UNITS FOR MAINTENANCE HOLES, CATCH BASINS, AND VALVE CHAMBERS

OPSD 704.010

KEY PLAN:



TRUE NORTH:



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RECORD OF REVISIONS:

6		
5		
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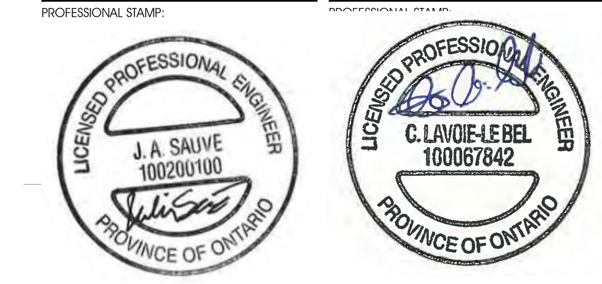
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021
NUMBER:	REVISION:	DATE: (MM/DD/YY)

ISSUE:

PROFESSIONAL STAMP:



CIVITAS GROUP

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 — OTTAWA, ON CANADA K1S 1V9 — T: 613.742.7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:

FASTFRATE OTTAWA WAREHOUSE
AND DISTRIBUTION FACILITY

SCALE: NONE

SOMME ST.
OTTAWA, ON

DRAWING TITLE:

DETAILS

DRAWN BY:	D.CANN	DRAWING NUMBER:	C016
DATE:			
REVIEWED BY:	J.SAUVE		
APPROVED BY:			
PRINT DATE:		REVISION NUMBER:	
ISSUED DATE:	AUGUST 13, 2021		
CLIENT PROJECT #:		PROJECT #:	A001083

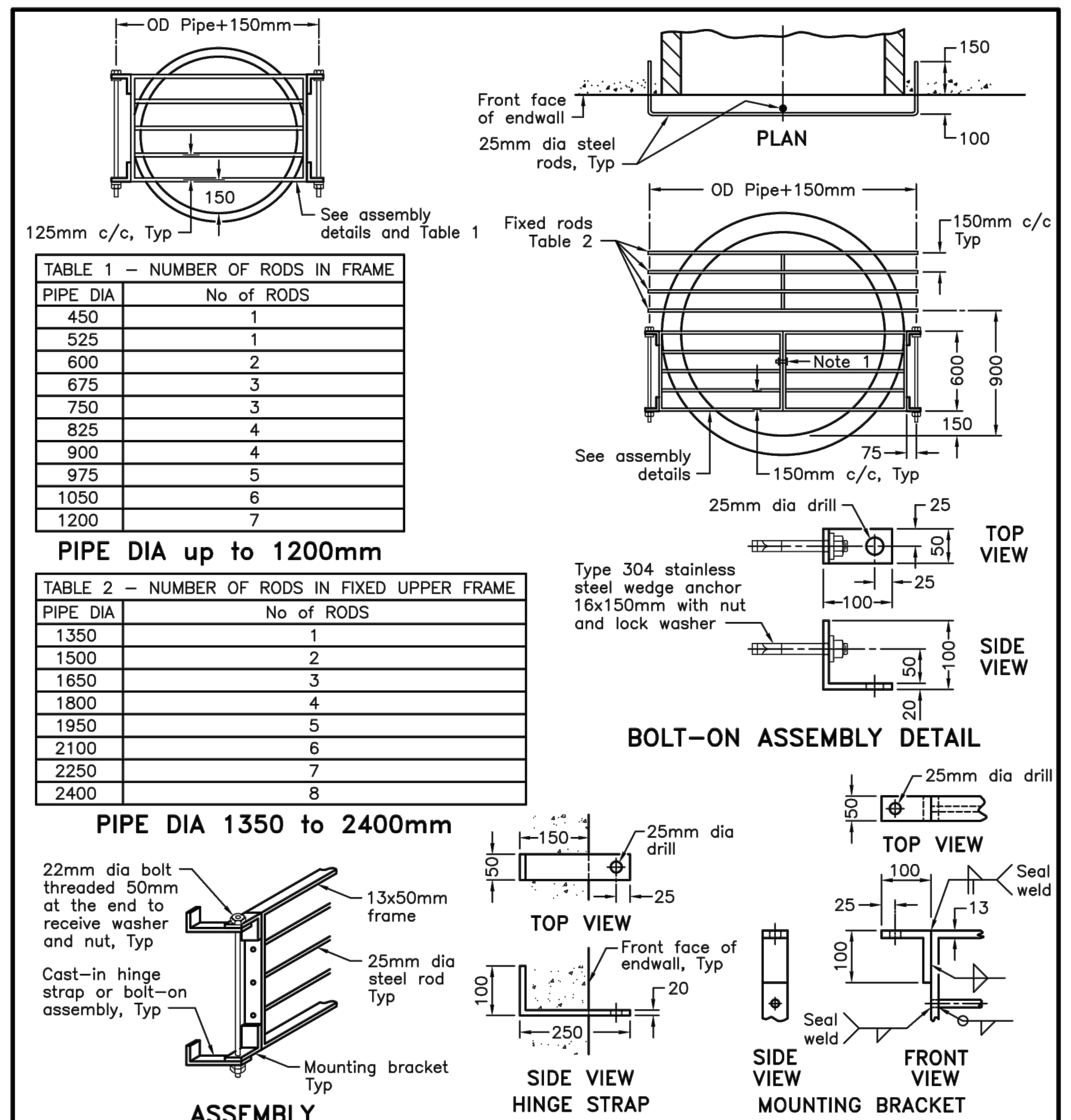


TABLE 1 – NUMBER OF RODS IN FRAME	
PIPE DIA	No of RODS
450	1
525	1
600	2
675	3
750	3
825	4
900	4
975	5
1050	6
1200	7

PIPE DIA up to 1200mm

TABLE 2 – NUMBER OF RODS IN FIXED UPPER FRAME	
PIPE DIA	No of RODS
1350	1
1500	2
1650	3
1800	4
1950	5
2100	6
2250	7
2400	8

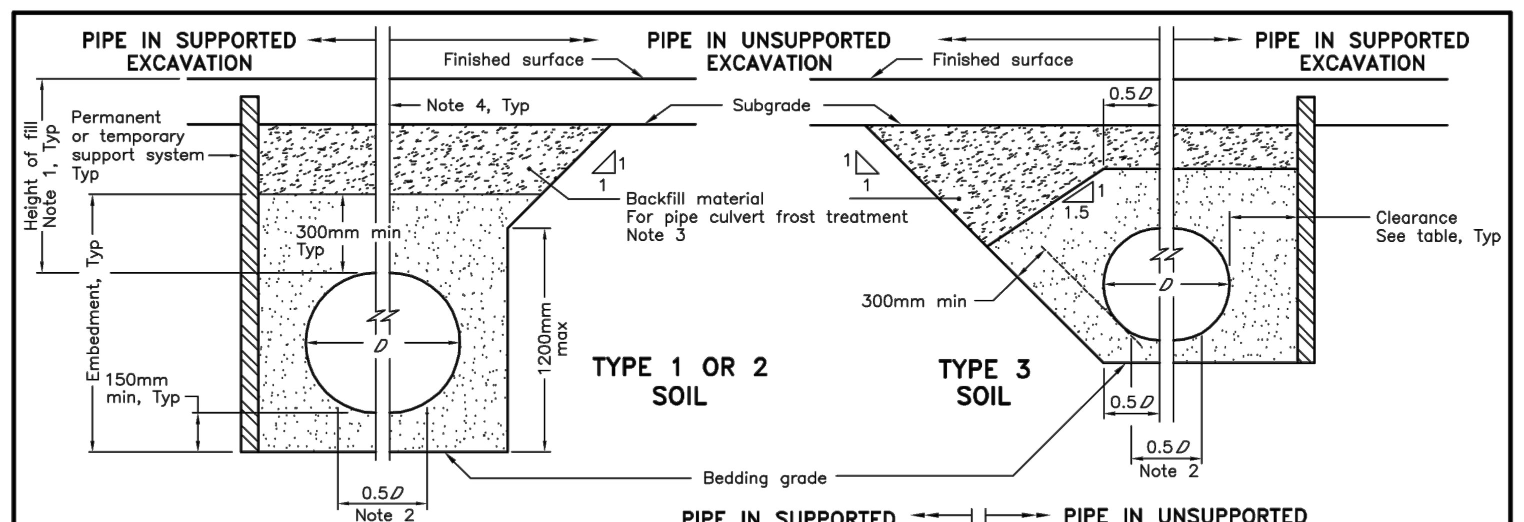
PIPE DIA 1350 to 2400mm

NOTES:
1 Grates shall be secured by either a bolt and nut or a locking device as specified.
A Metal surfaces shall be either painted with 2 coats of self priming abrasion resistant immersion grade epoxy or hot dip galvanized, as specified.
B Frame, hinge strap, mounting bracket, and steel rods shall be medium grade steel.
C All welding shall be according to CSA W59 and W47.1.
D All dimensions are in millimetres unless otherwise shown.

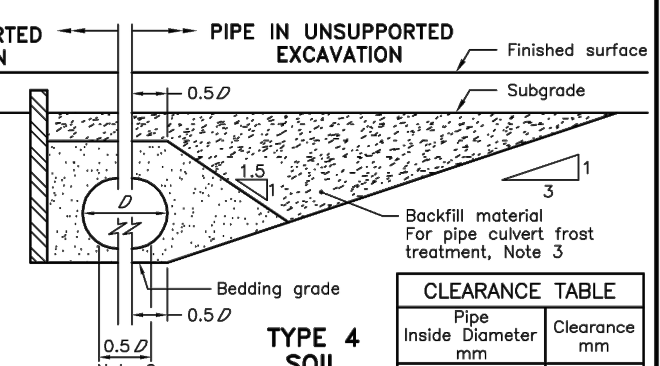
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 2

GRATING
FOR CONCRETE ENDWALL

OPSD 804.050



LEGEND:
D – Inside diameter



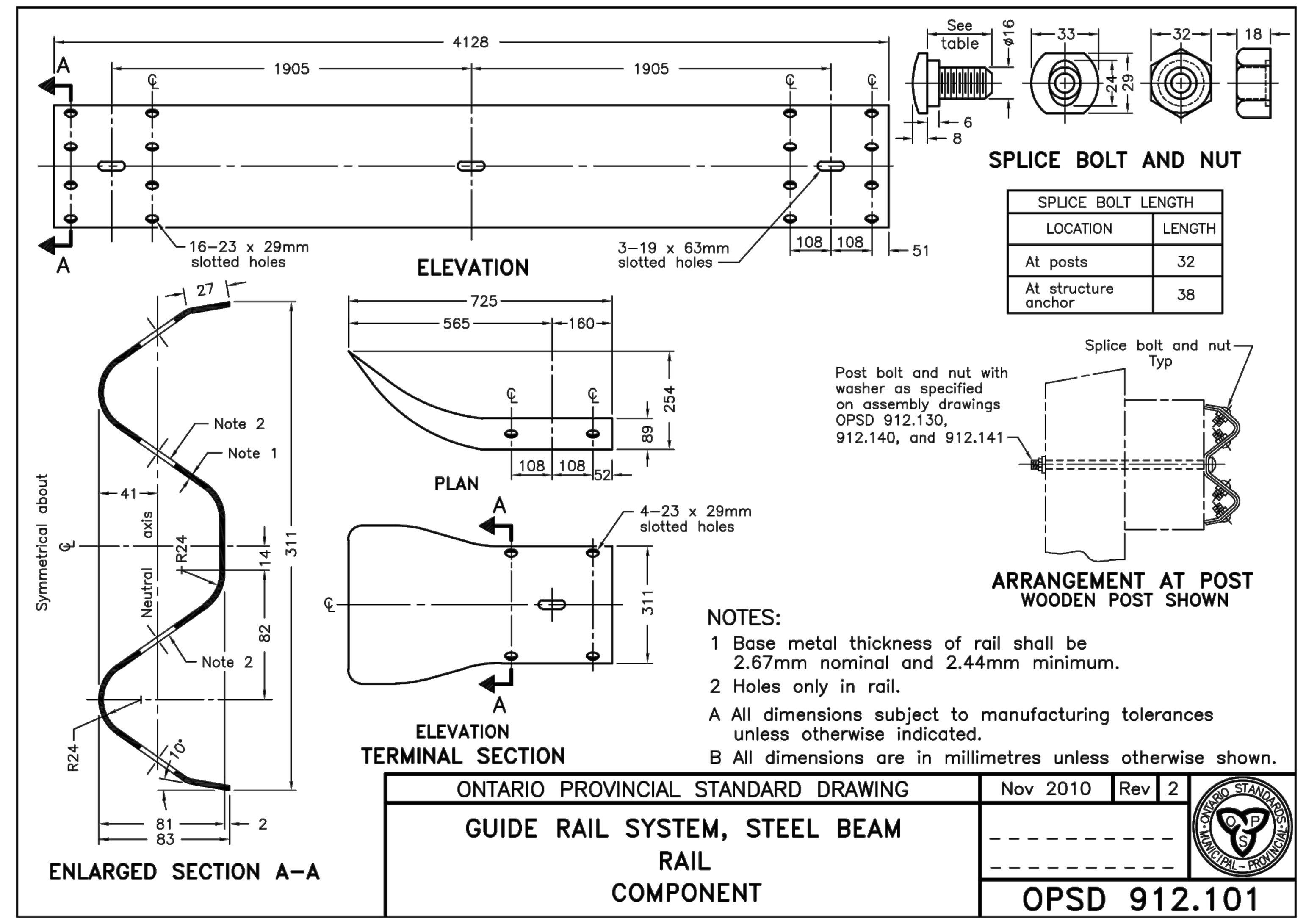
CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

NOTES:
1 Height of fill is measured from the finished surface to top of pipe.
2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
4 Condition of excavation is symmetrical about centreline of pipe.
A Granular material placed in the haunch area shall be compacted prior to placing and compacting the remainder of the embedment material.
B Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
C All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2014 | Rev 3

FLEXIBLE PIPE
EMBEDMENT AND BACKFILL
EARTH EXCAVATION

OPSD 802.010



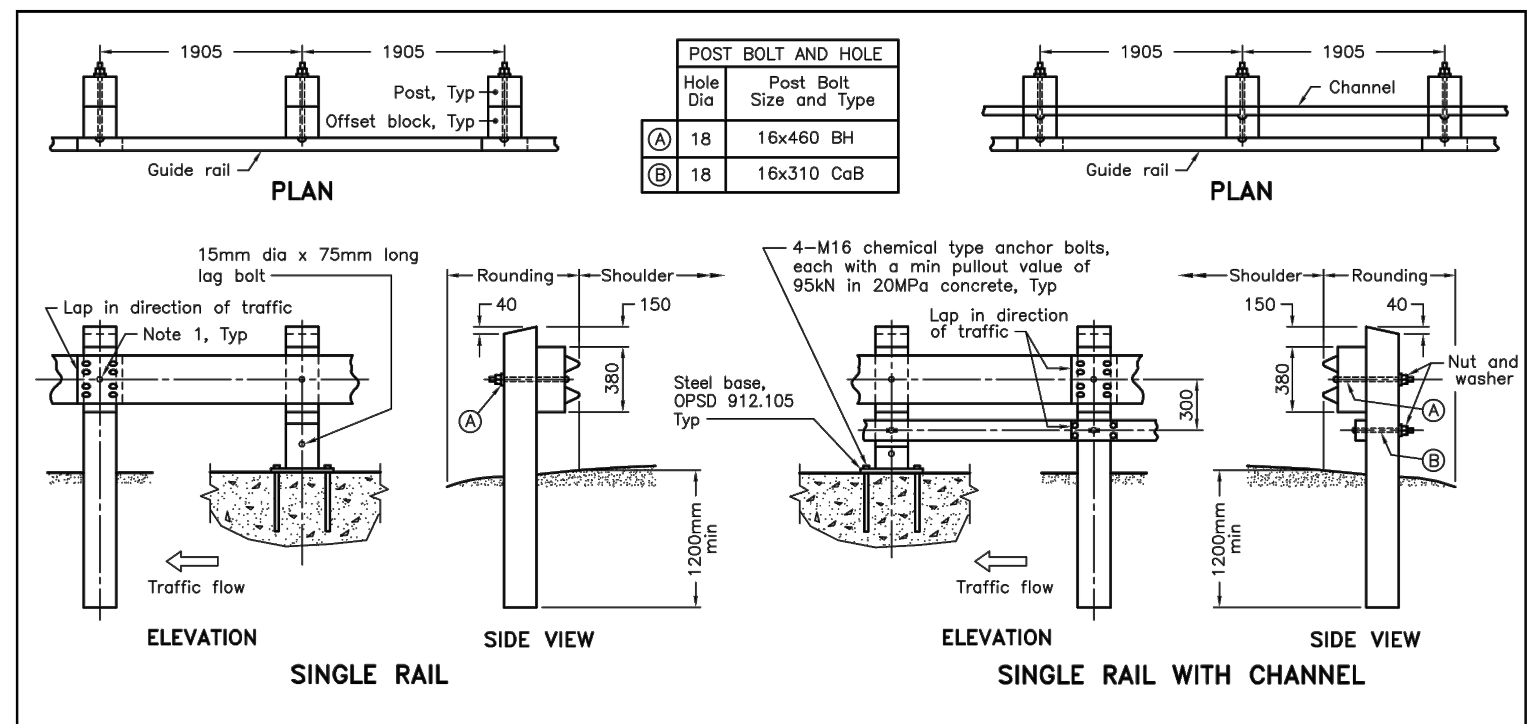
SPLICE BOLT LENGTH	
LOCATION	LENGTH
At posts	32
At structure anchor	38

NOTES:
1 Base metal thickness of rail shall be 2.67mm nominal and 2.44mm minimum.
2 Holes only in rail.
A All dimensions subject to manufacturing tolerances unless otherwise indicated.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2010 | Rev 2

GUIDE RAIL SYSTEM, STEEL BEAM
RAIL
COMPONENT

OPSD 912.101



POST BOLT AND HOLE		
	Hole Dia	Post Bolt Size and Type
A	18	16x460 BH
B	18	16x310 CoB

NOTES:
1 Washer shall not be installed at front face of rail. One bolt located at centre of steel beam guide rail.
A Wooden posts and offset blocks shall be 190x190mm. Tops to have 25mm chamfer.
B Steel beam guide rail mounting heights shall be as specified.
C This OPSD to be read in conjunction with OPSD 912.101 and 912.102.
D All dimensions are in millimetres unless otherwise shown.

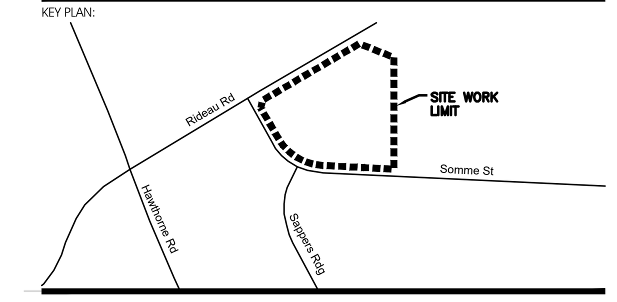
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2010 | Rev 2

GUIDE RAIL SYSTEM, STEEL BEAM
WOODEN POST ASSEMBLY
INSTALLATION – SINGLE RAIL

OPSD 912.140

CLIENT LOGO:
FASTFRATE

KEY PLAN:



TRUE NORTH:

PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NUMBER	REVISION	DATE (MM/DD/YY)
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER J. A. SAUVE 100200100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER C. LAVOIE-LEBEL 100067842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

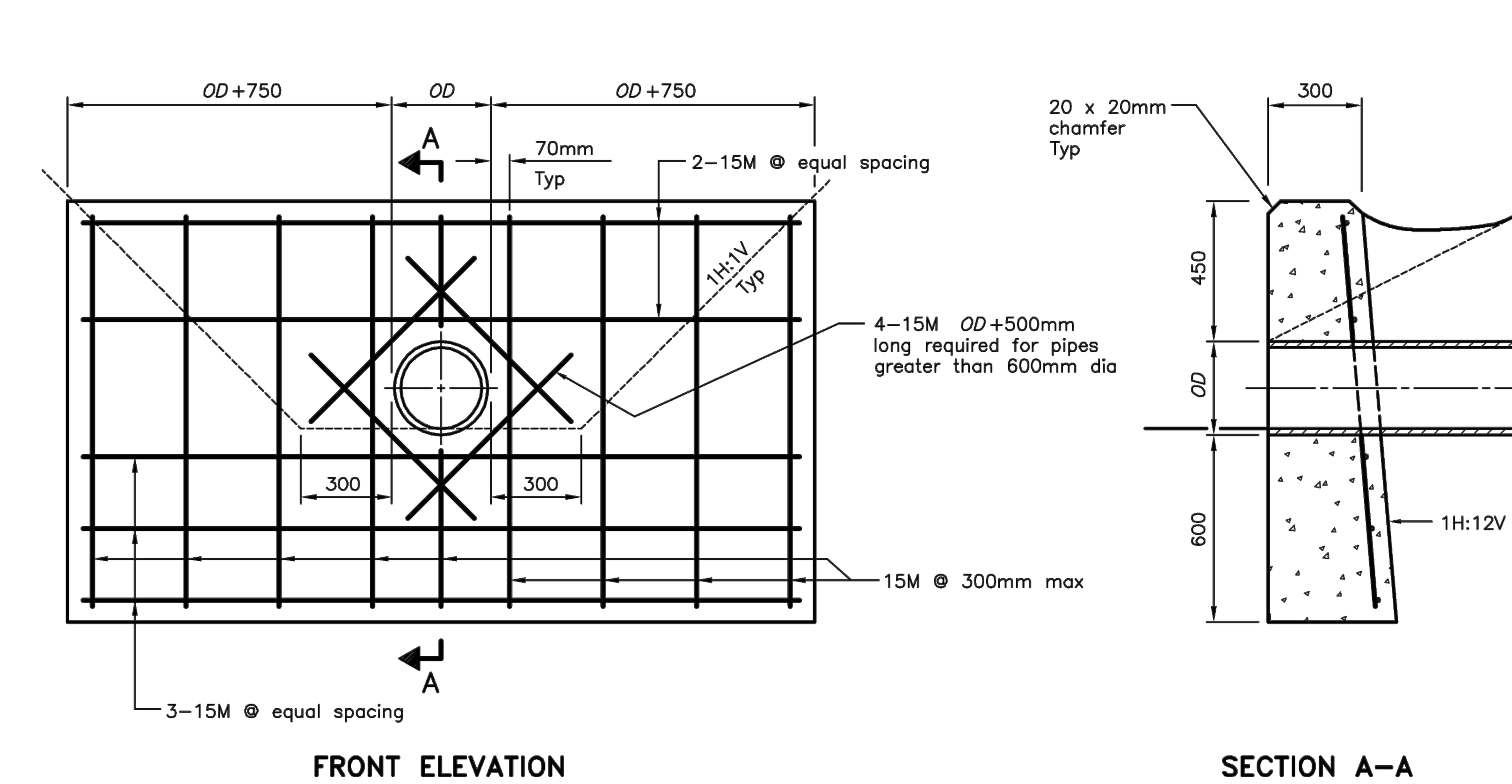
CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:
CIMA+

PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOMME ST.
OTTAWA, ON

DRAWING TITLE:
DETAILS

DRAWN BY: D.CANN
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PRINT DATE:
ISSUED DATE: AUGUST 13, 2021
DRAWING NUMBER: C017
REVISION NUMBER:
CLIENT PROJECT #:
PROJECT #: A001083



FRONT ELEVATION

SECTION A–A

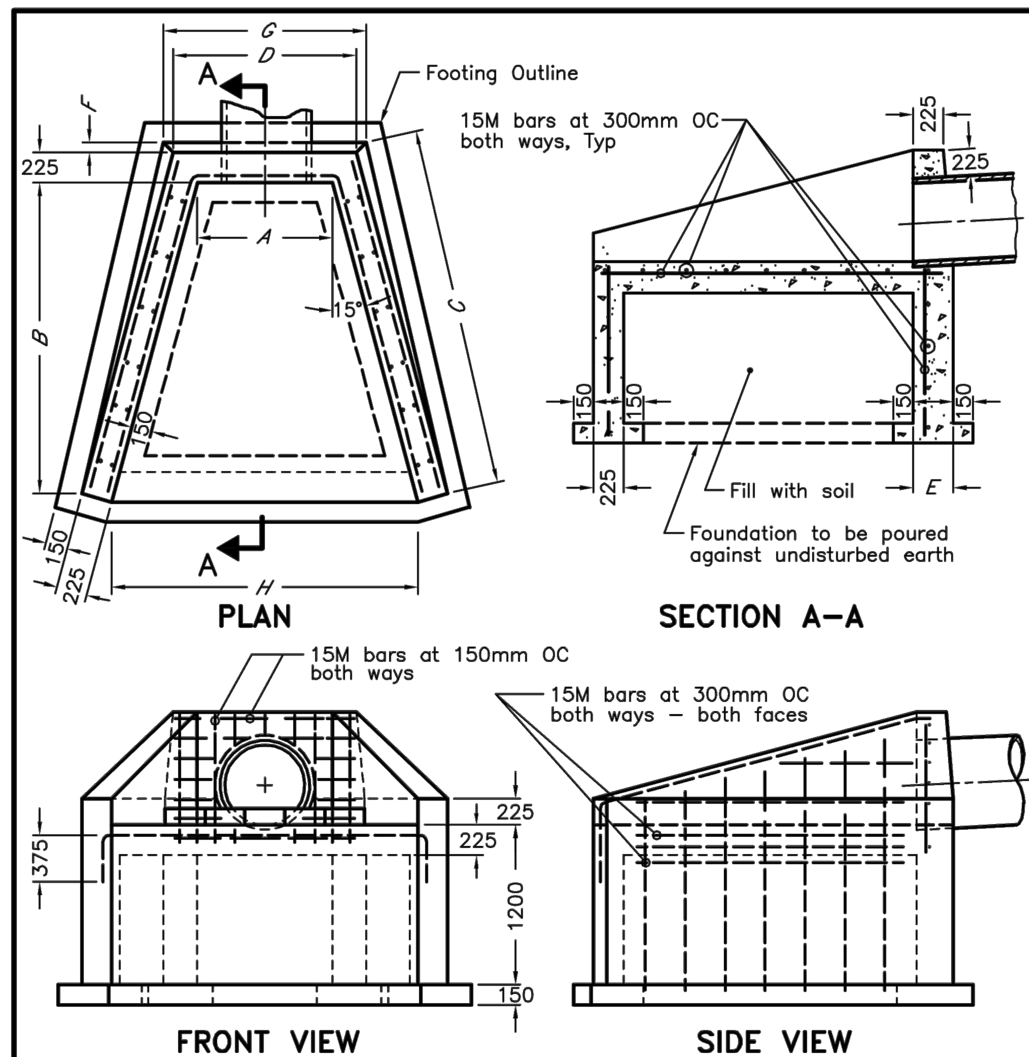
LEGEND:
OD – Outside diameter of pipe

NOTES:
A This OPSD to be read in conjunction with OPSD 3940.150.
B If a steel grate is required, refer to OPSD 804.05.
C Class of concrete: 30MPa.
D Cover to reinforcing bars 70mm ± 20mm.
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2017 | Rev 2

CONCRETE HEADWALL
FOR PIPE LESS THAN 900mm DIAMETER

OPSD 804.030



PLAN

SECTION A–A

FRONT VIEW

SIDE VIEW

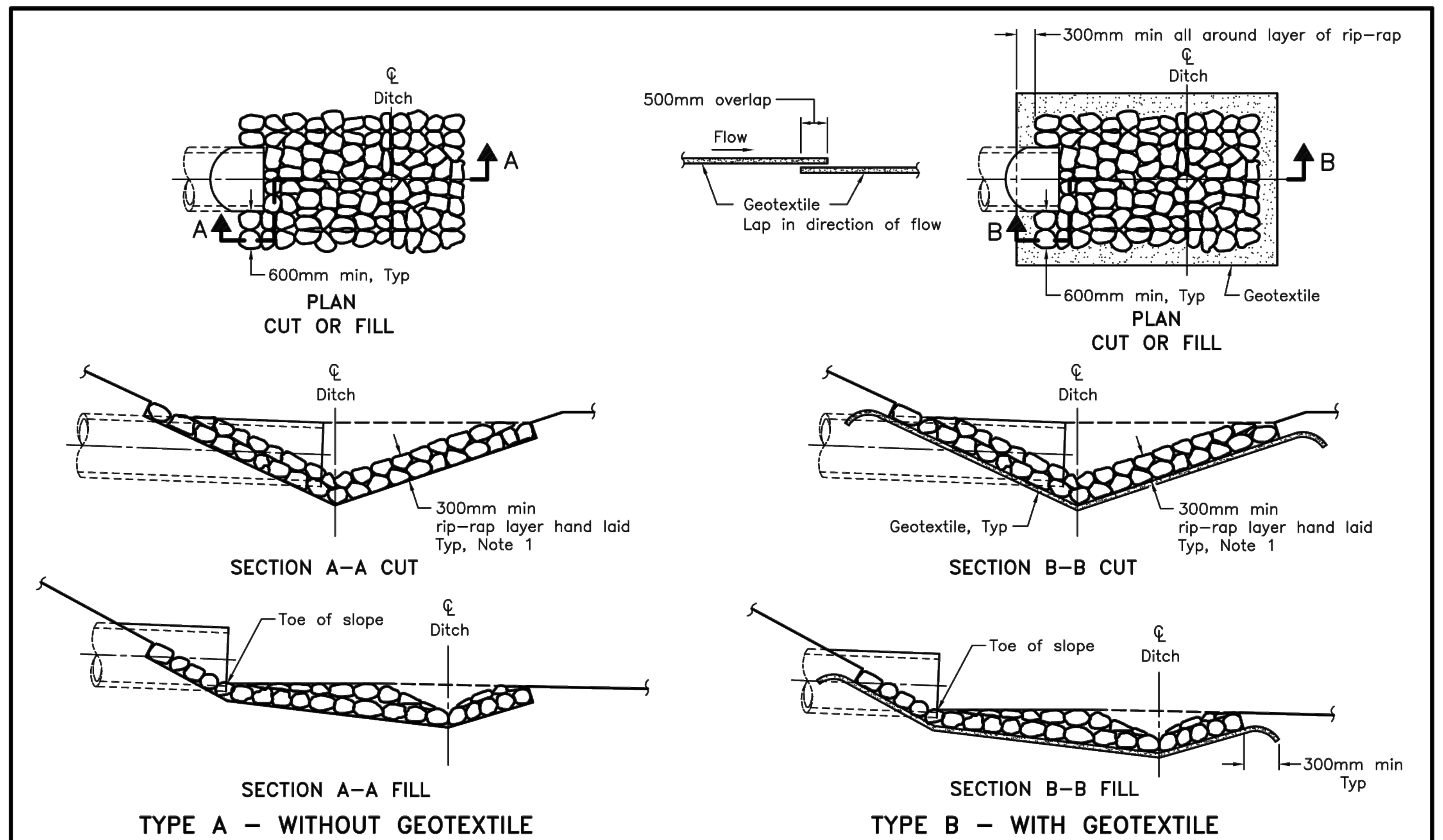
PIPE DIA	ENDWALL DIMENSIONS							
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
600	1050	2400	2725	1400	300	75	1525	2350
675	1125	2400	2725	1475	300	75	1600	2425
750	1200	2400	2725	1550	300	75	1675	2500
825	1275	2400	2725	1625	300	75	1755	2575
900	1350	2400	2725	1700	300	75	1825	2650
975	1425	2400	2725	1775	375	150	1975	2725
1050	1500	3000	3400	1850	375	150	2050	3100
1200	1650	3000	3400	2000	375	150	2200	3250
1350	1800	3000	3400	2150	375	150	2350	3400
1500	1950	3000	3400	2300	375	150	2500	3550
1650	2100	3000	3400	2450	375	150	2650	3700
1800	2250	3000	3400	2600	375	150	2800	3850
2400	3000	3000	3400	3350	375	150	3550	4600

NOTES:
A This OPSD to be read in conjunction with OPSD 3940.150.
B Class of concrete: 30MPa.
C Cover to reinforcing bars: 75mm ±20mm.
D Granular backfill to be placed to 300mm min thickness on all sides.
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2017 | Rev 1

CONCRETE HEADWALL
FOR SEWER OR CULVERT PIPE OUTLET

OPSD 804.040



TYPE A – WITHOUT GEOTEXTILE

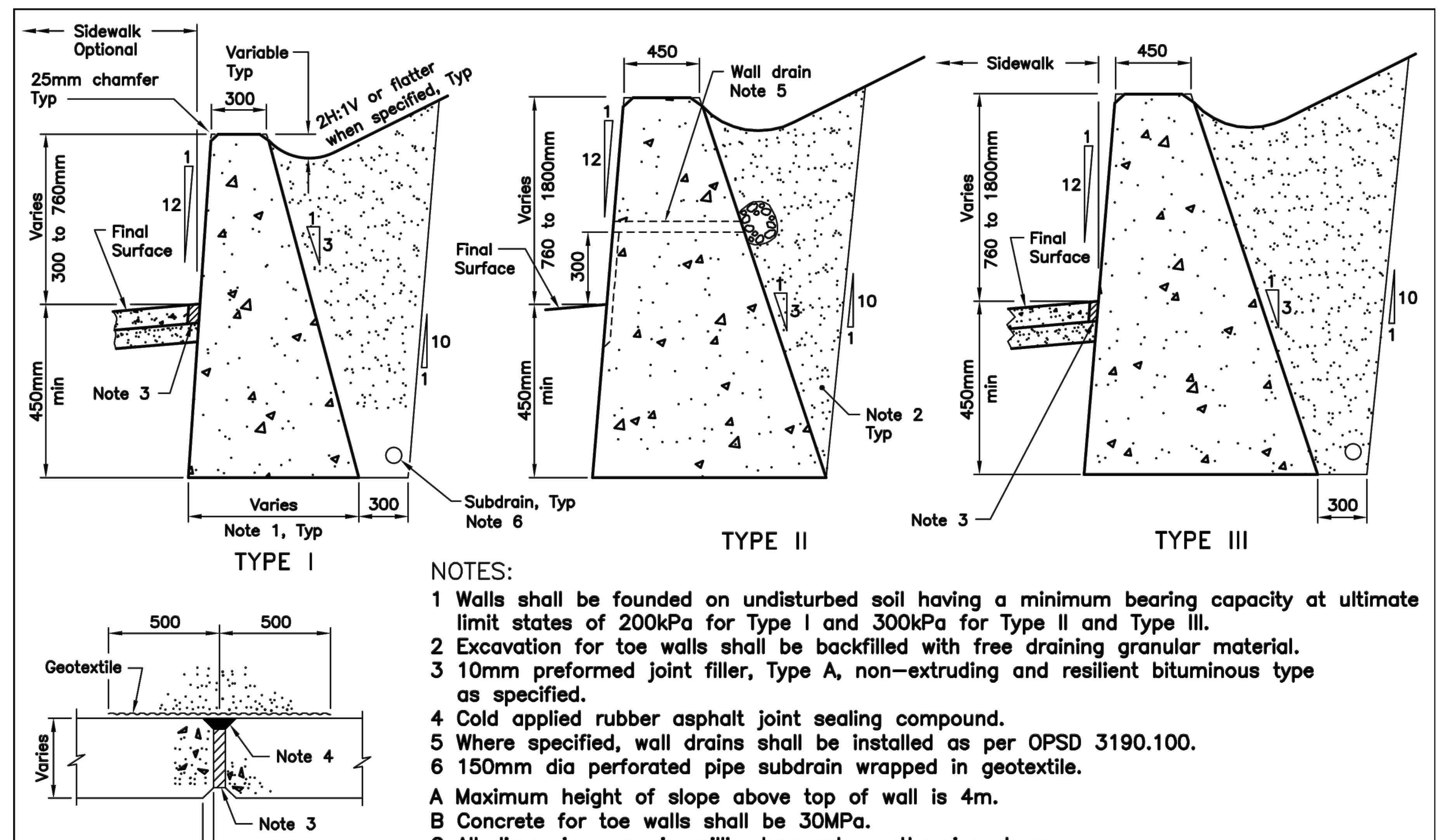
TYPE B – WITH GEOTEXTILE

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 2018 | Rev 3

GENERAL RIP–RAP LAYOUT
FOR SEWER AND CULVERT OUTLETS

OPSD 810.010



TYPE I

TYPE II

TYPE III

PLAN OF JOINT DETAIL IN CONCRETE TOE WALLS AT 3.0m SPACING

NOTES:
1 Walls shall be founded on undisturbed soil having a minimum bearing capacity at ultimate limit states of 200kPa for Type I and 300kPa for Type II and Type III.
2 Excavation for toe walls shall be backfilled with free draining granular material.
3 10mm preformed joint filler, Type A, non–extruding and resilient bituminous type as specified.
4 Cold applied rubber asphalt joint sealing compound.
5 Where specified, wall drains shall be installed as per OPSD 3190.100.
6 150mm dia perforated pipe subdrain wrapped in geotextile.
A Maximum height of slope above top of wall is 4m.
B Concrete for toe walls shall be 30MPa.
C All dimensions are in millimetres unless otherwise shown.

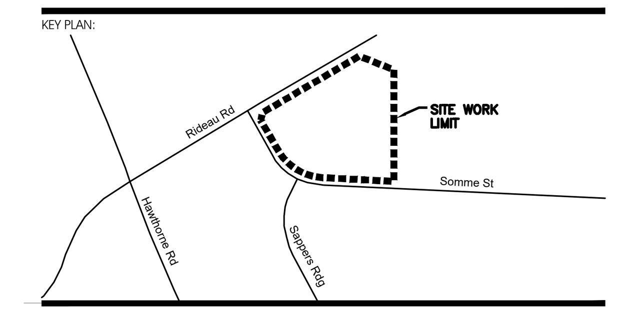
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2010 | Rev 2

WALLS
RETAINING
CONCRETE TOE WALL

OPSD 3120.100

CLIENT LOGO:

KEY PLAN:



TRUE NORTH:

PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NUMBER	REVISION	DATE (MM/DD/YY)
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

ISSUE:

PROFESSIONAL STAMP:
LICENSED PROFESSIONAL ENGINEER
J.A. SAUVE
100200100
PROVINCE OF ONTARIO

PROFESSIONAL STAMP:
LICENSED PROFESSIONAL ENGINEER
C.LAVOIE-LEBEL
100067842
PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC.
14 CHAMBERLAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
T: 613.742.7482
WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

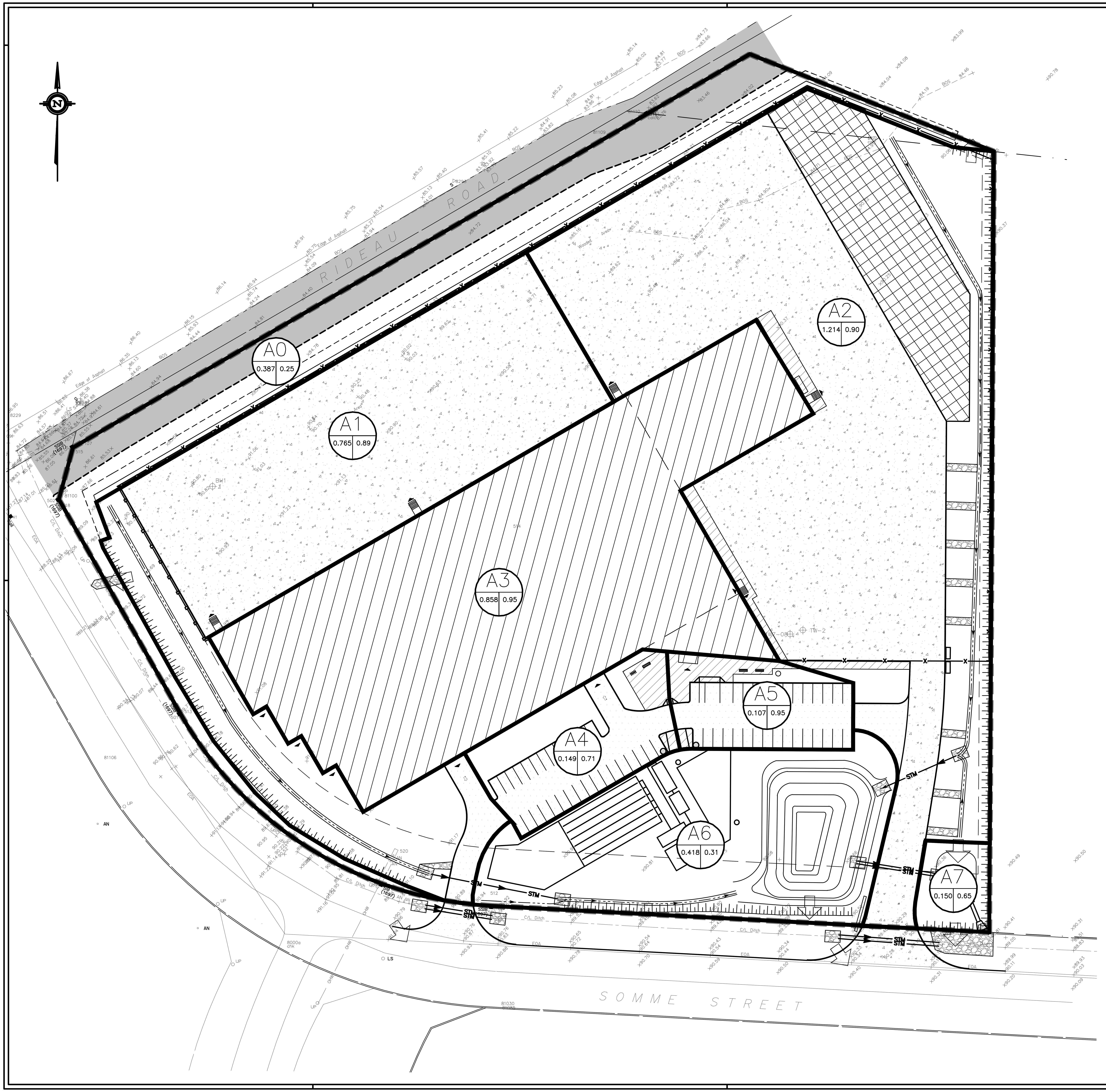
PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE
AND DISTRIBUTION FACILITY
SCALE: NONE
SOMME ST.
OTTAWA, ON

DRAWING TITLE:
DETAILS

DRAWN BY: D.CANN
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PRINT DATE:
ISSUED DATE: AUGUST 13, 2021
DRAWING NUMBER: C018
REVISION NUMBER:
CLIENT PROJECT #:
PROJECT #: A001083

G

Appendix G - Stormwater Management Plan



LEGEND

PROPOSED

STORM DRAINAGE BOUNDARY

AREA ID — A1.1

AREA IN HECTARES — 0.102

RUNOFF COEFFICIENT — 0.20

OVERLAND FLOW

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.

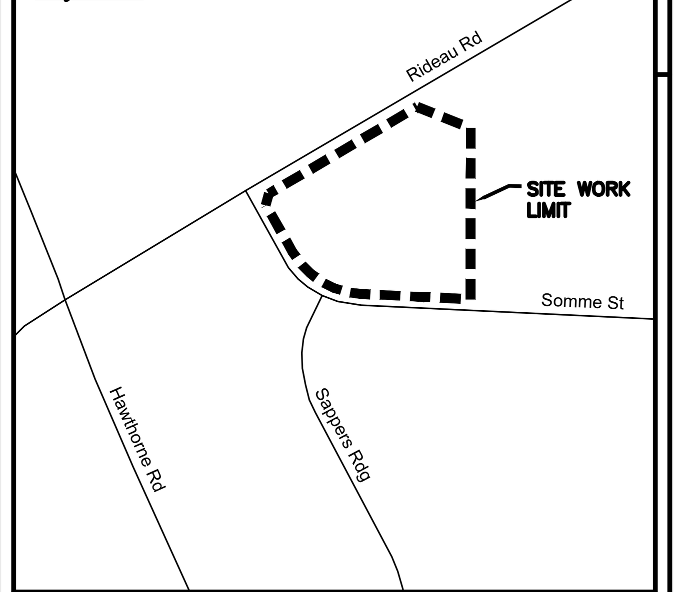
ALL INFORMATION UNDER THE LEGEND 'EXISTING' IS FOR INFORMATION ONLY. COMPLETE OR EXACT LOCATION AND ELEVATION OF UNDERGROUND SERVICES ARE NOT GUARANTEED.

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

consultant

CIMA+

northpoint

professional stamp

project title

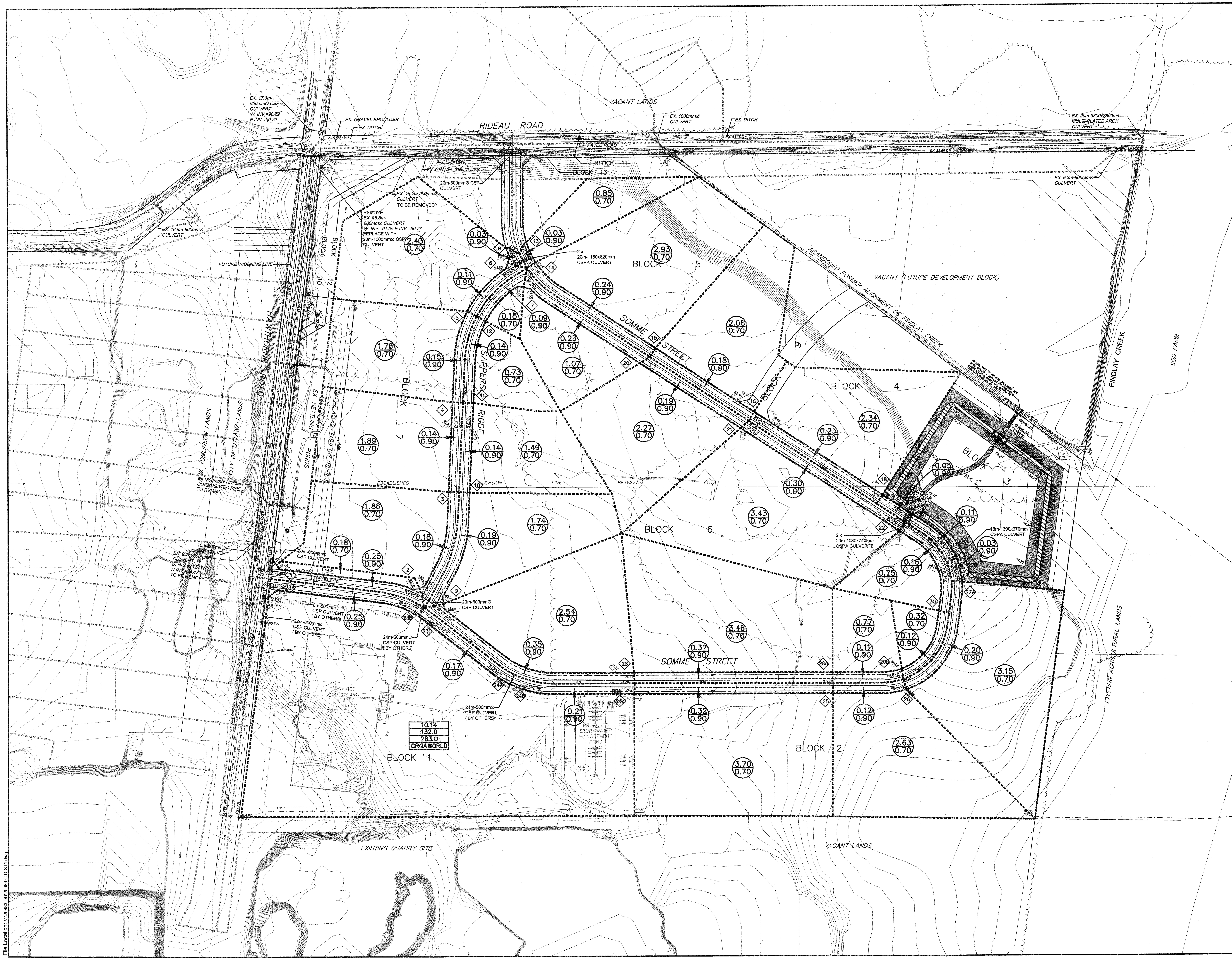
SOMME STREET, OTTAWA, ONTARIO FASTFRATE FACILITY

drawing title

STORMWATER MANAGEMENT PLAN

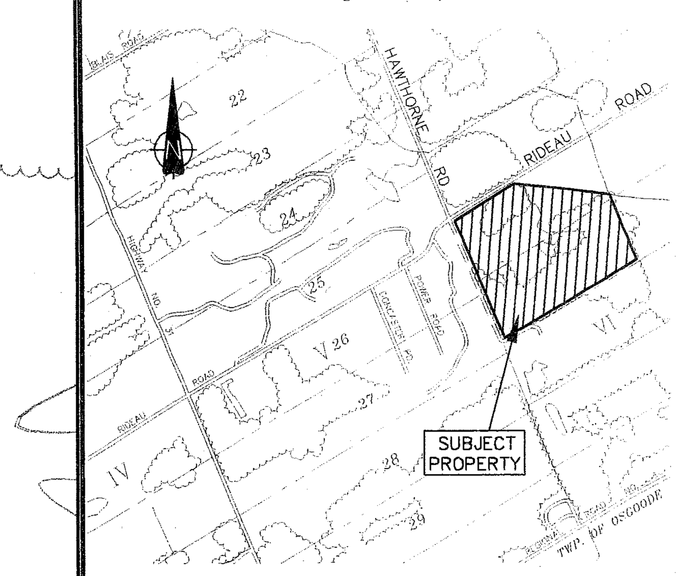
date	MARCH 08, 2021	job. no. A001083
scale	1 : 500	
drawn	D.CANN	drawing no. SWM
approved	J.SAUVÉ	
plot date	1/13/2021 3:31:05 PM	

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



DESIGN: M.B.	DRAWING NO.: D-ST1
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
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

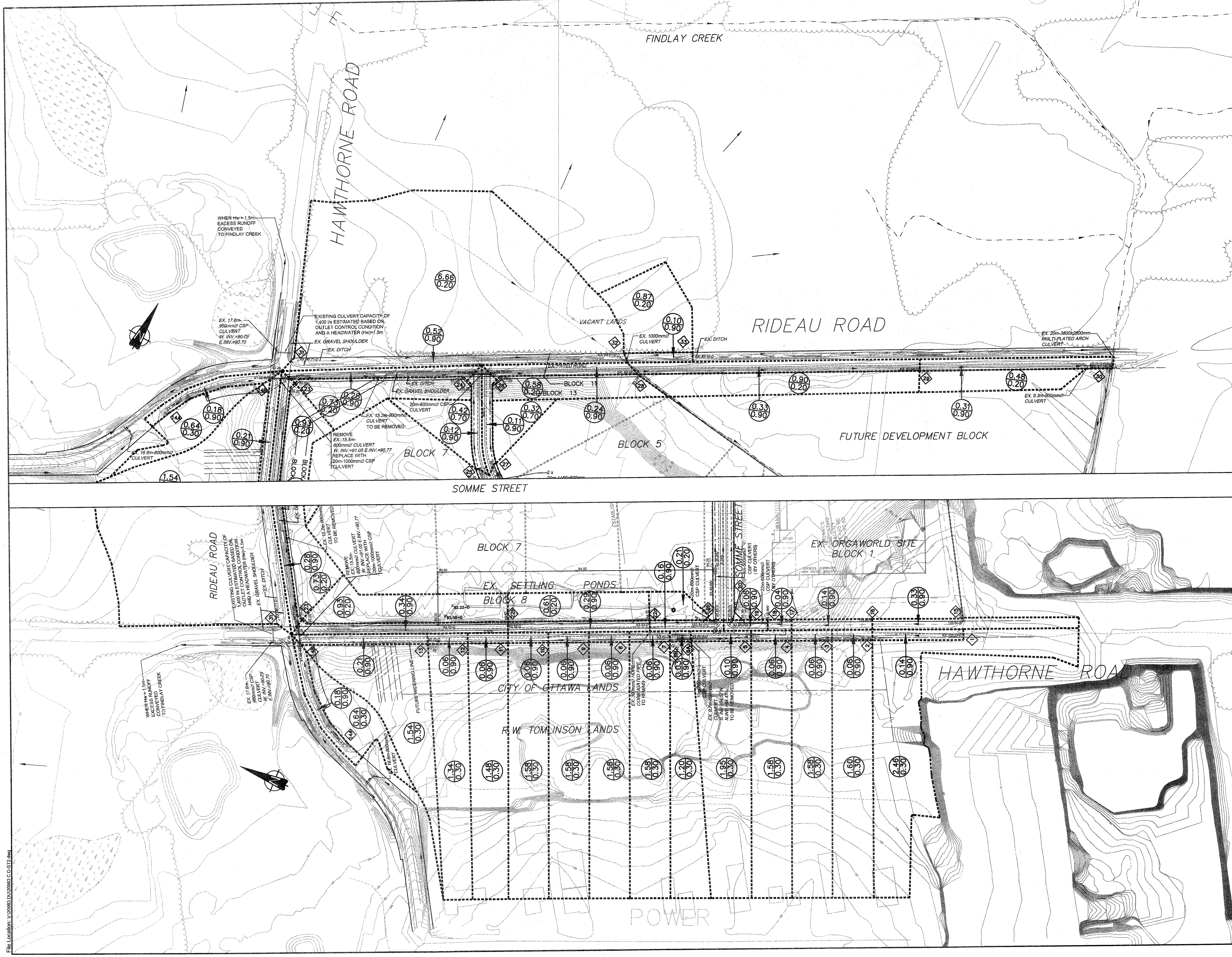
PROJECT:

HAWTHORNE INDUSTRIAL PARK

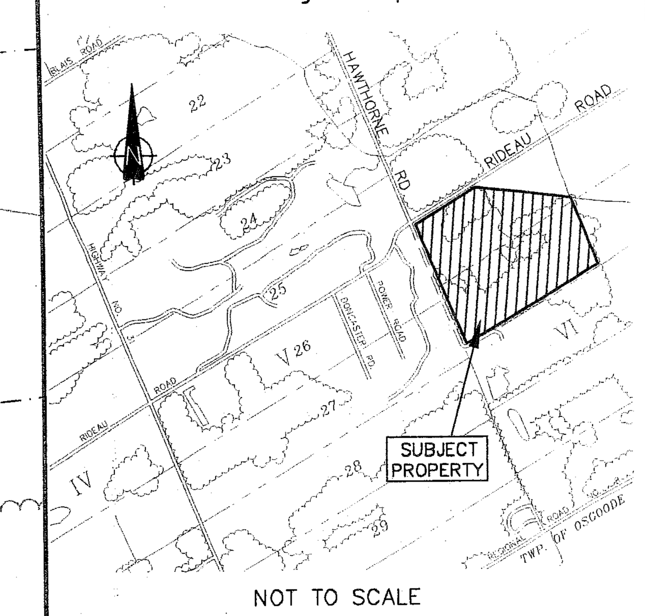
DRAWING:

STORM DRAINAGE AREA PLAN

File Location: V:\20983.0\20983 C D-ST1.dwg



Key Map



NOT TO SCALE

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
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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-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	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																				

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)

1:10 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				
			Area at C of									
	FROM	TO	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
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

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 FROM	NODES TO	DRAINAGE AREA: 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	PEAK FLOW GENERATION: 2.78AR	2.78AR CUM	TIME min.	INTENS. mm/hr	PEAK FL. l/s	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)
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																	

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	U/S	D/S
	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	TIME (min)	Inv (m)	Inv (m)
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	0.00	1.20	3.00	0.61	7702.7	1.78	189.60						1.77	93.65	92.50
CULVERT CROSSING	2	9		0.00	0.00	0.00	0.40	0.00	1.12	16.77	133.71	150.2				0.50			20.00	1	600	-----	NO	YES	0.63	92.50	92.40
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	0.00	1.20	3.00	0.73	8450.7	1.96	272.58						2.32	92.40	90.41
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	0.00	1.20	3.00	0.54	7283.5	1.69	245.24						2.42	90.41	89.08
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	0.00	1.20	3.00	0.53	7212.0	1.67	86.51						0.86	89.08	88.62
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	0.00	1.20	3.00	0.70	8282.1	1.92	94.12						0.82	88.62	87.96
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	0.00	1.20	3.00	0.97	9748.4	2.26	124.55						0.92	87.96	86.75
										24.75																	
CULVERT CROSSING	22	19		0.00	0.00	0.00	19.16	0.00	53.26	24.75	104.53	5567.5				0.50			20.00	2	-----	1.03 X 0.74	YES	NO	0.04	86.85	86.75
										24.79																	
POND INLET	19	POND		0.00	0.00	0.00	44.32	0.00	123.22	25.80	101.69	12813.8	3.09	0.55	5.00	5.68	13135.2	4.09	22.00						0.09	86.75	85.50
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	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																																
EST 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
EST 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
EST 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
EST 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
EST 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
EST 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
EST 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
EST 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																																
AST 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
AST 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
AST 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
AST 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																				

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

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				
	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
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									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)			
NORTH CATCHMENT AREA																		
NORTH SIDE RIDEAU ROAD (31–32)	0.00	0.58	1.50	3.00	1.93	1974.3	24880.1	1.96	400.00							3.41	90.71	83.01
(33–32)	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 (32–28)					-0.15				20.00	1	1000					0.14	83.01	83.04
SOUTH CATCHMENT AREA																		
SOUTH SIDE RIDEAU ROAD (28–29)	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)	0.00	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]

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	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																													
			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 (m^3/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)

H

Appendix H - 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

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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) (b) (c)	1174.184 6.014 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

CIMA+	**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) (b) (c)	1735.688 6.014 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
PEO No.: 100530467
Date: July 20, 2021

Verified by: Christian Lavoie-Lebel, P.Eng.
PEO No.: 100067842
Date: July 20, 2021

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) (b) (c)	1735.688 6.014 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' Date: July 21, 2021
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 21, 2021
PEO No.: 100067842

Date: **2021-08-06**

Fastfrate Warehouse Development
Industrial/Commercial Development
A001083 (360)
STORM WATER MANAGEMENT - SUMMARY - FULL 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	90.96	-90.19	0.76	0.00	10.001	2294	184.959	0	
A2	12138	3641	10.000	10.001	0.001	1.21	148.91	-147.69	1.21	0.00	10.001	3641	293.621	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	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	14.70	-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	117.565	0	
A7	1497	449	10.000	10.001	0.001	0.15	8.81	-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 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 = 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

ment

Date:

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	241.93	184.98	50482
A2	241.93	293.66	80141
A3 - Building	247.78	212.64	57298
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

2021-08-06

STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:36

File Location: \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Water Management - Storage and Drawdown_full

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9344526 L/s/ha

Area :	A1	0.7646	ha
Runoff Coefficient C (unfactorec		0.71	
C_runoff factor:		1.25	
Runoff Coefficient C :		0.8875	
Rainfall Event :		100	year
Discharge Flow Q :		0.184983082	m³/s
Discharge Factor K :		1	

Design Volume:	**90.96 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	0.810	0.810	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	0.820	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	55.4949247	81.75
10.0	178.56	201.95	110.989849	90.96
15.0	142.89	242.41	166.484774	75.93
20.0	119.95	271.32	221.979699	49.34
25.0	103.85	293.62	277.474624	16.15
30.0	91.87	311.70	332.969548	-21.27
35.0	82.58	326.88	388.464473	-61.59
40.0	75.15	339.95	443.959398	-104.01
45.0	69.05	351.42	499.454323	-148.03
50.0	63.95	361.65	554.949247	-193.30
55.0	59.62	370.88	610.444172	-239.56
60.0	55.89	379.29	665.939097	-286.65
65.0	52.65	387.02	721.434021	-334.41
70.0	49.79	394.17	776.928946	-382.75
75.0	47.26	400.83	832.423871	-431.59
80.0	44.99	407.07	887.918796	-480.85
85.0	42.95	412.93	943.41372	-530.49
90.0	41.11	418.46	998.908645	-580.45
95.0	39.43	423.70	1054.40357	-630.71
100.0	37.90	428.67	1109.89849	-681.23
105.0	36.50	433.41	1165.39342	-731.98
110.0	35.20	437.94	1220.88834	-782.95
115.0	34.01	442.28	1276.38327	-834.10
120.0	32.89	446.44	1331.87819	-885.44
125.0	31.86	450.44	1387.37312	-936.94
130.0	30.90	454.28	1442.86804	-988.58
135.0	30.00	458.00	1498.36297	-1040.37
140.0	29.15	461.58	1553.85789	-1092.28
145.0	28.36	465.05	1609.35282	-1144.31
150.0	27.61	468.40	1664.84774	-1196.44
155.0	26.91	471.66	1720.34267	-1248.69
160.0	26.24	474.81	1775.83759	-1301.02
165.0	25.61	477.88	1831.33252	-1353.45
170.0	25.01	480.87	1886.82744	-1405.96
175.0	24.44	483.77	1942.32237	-1458.55
180.0	23.90	486.60	1997.81729	-1511.22
185.0	23.39	489.35	2053.31221	-1563.96
190.0	22.90	492.04	2108.80714	-1616.77
195.0	22.43	494.67	2164.30206	-1669.64
200.0	21.98	497.23	2219.79699	-1722.57
205.0	21.55	499.74	2275.29191	-1775.55
210.0	21.14	502.19	2330.78684	-1828.60
215.0	20.75	504.59	2386.28176	-1881.69
220.0	20.37	506.94	2441.77669	-1934.84
225.0	20.01	509.24	2497.27161	-1988.03
230.0	19.66	511.50	2552.76654	-2041.27
235.0	19.33	513.71	2608.26146	-2094.55
240.0	19.01	515.88	2663.75639	-2147.88

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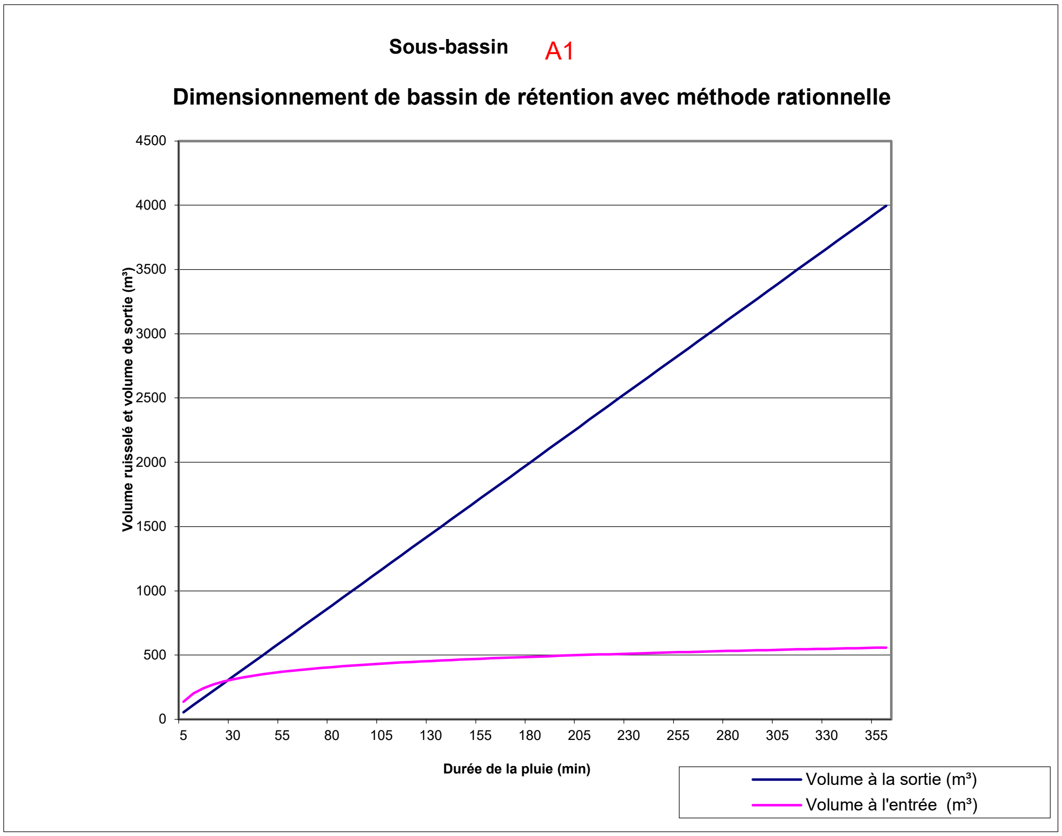
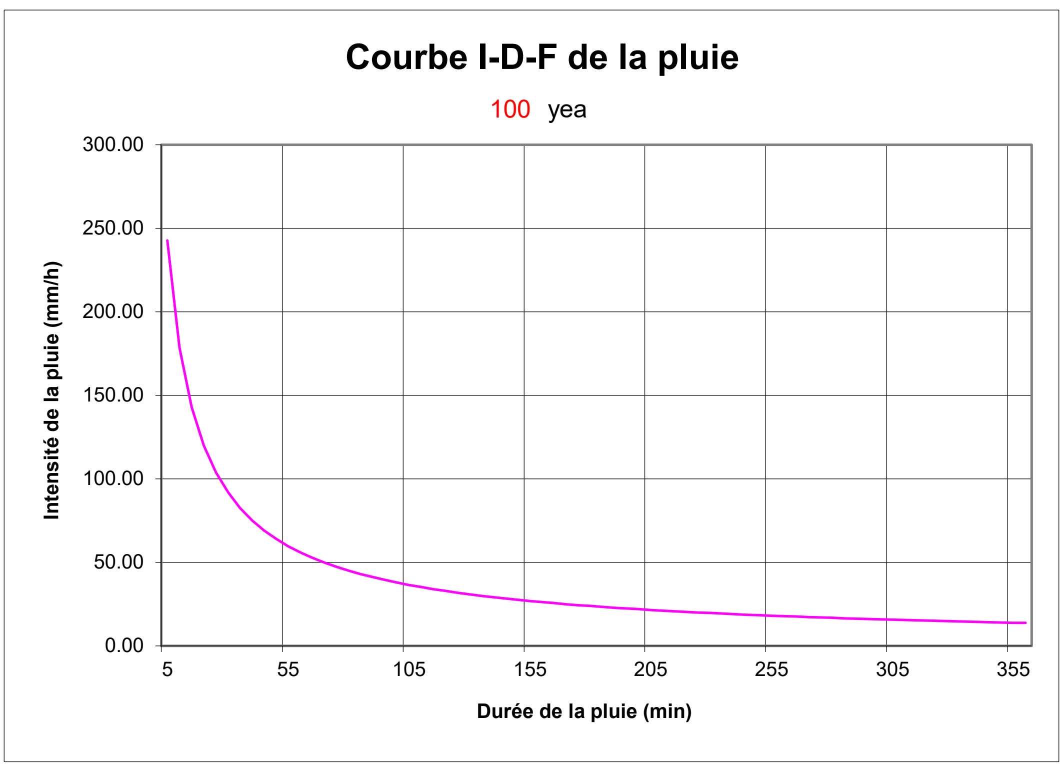
245.0	18.69	518.01	2719.25131	-2201.24
250.0	18.39	520.10	2774.74624	-2254.65
255.0	18.11	522.15	2830.24116	-2308.09
260.0	17.83	524.17	2885.73609	-2361.56
265.0	17.56	526.16	2941.23101	-2415.07
270.0	17.29	528.11	2996.72594	-2468.62
275.0	17.04	530.03	3052.22086	-2522.19
280.0	16.80	531.92	3107.71578	-2575.80
285.0	16.56	533.78	3163.21071	-2629.44
290.0	16.33	535.61	3218.70563	-2683.10
295.0	16.11	537.41	3274.20056	-2736.79
300.0	15.89	539.18	3329.69548	-2790.51
305.0	15.68	540.93	3385.19041	-2844.26
310.0	15.48	542.66	3440.68533	-2898.03
315.0	15.28	544.36	3496.18026	-2951.82
320.0	15.09	546.03	3551.67518	-3005.64
325.0	14.90	547.69	3607.17011	-3059.48
330.0	14.72	549.32	3662.66503	-3113.35
335.0	14.54	550.93	3718.15996	-3167.23
340.0	14.37	552.52	3773.65488	-3221.14
345.0	14.20	554.08	3829.14981	-3275.07
350.0	14.04	555.63	3884.64473	-3329.01
355.0	13.88	557.16	3940.13966	-3382.98
360.0	13.72	558.67	3995.63458	-3436.96
Max Volume (V max):				90.96
Design Volume (V design) :				**90.96**

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: 2021-08-06 9:36

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9344526 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 :		0.293660039	m³/s
Discharge Factor K :		1	

Design Volume:	**148.91 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

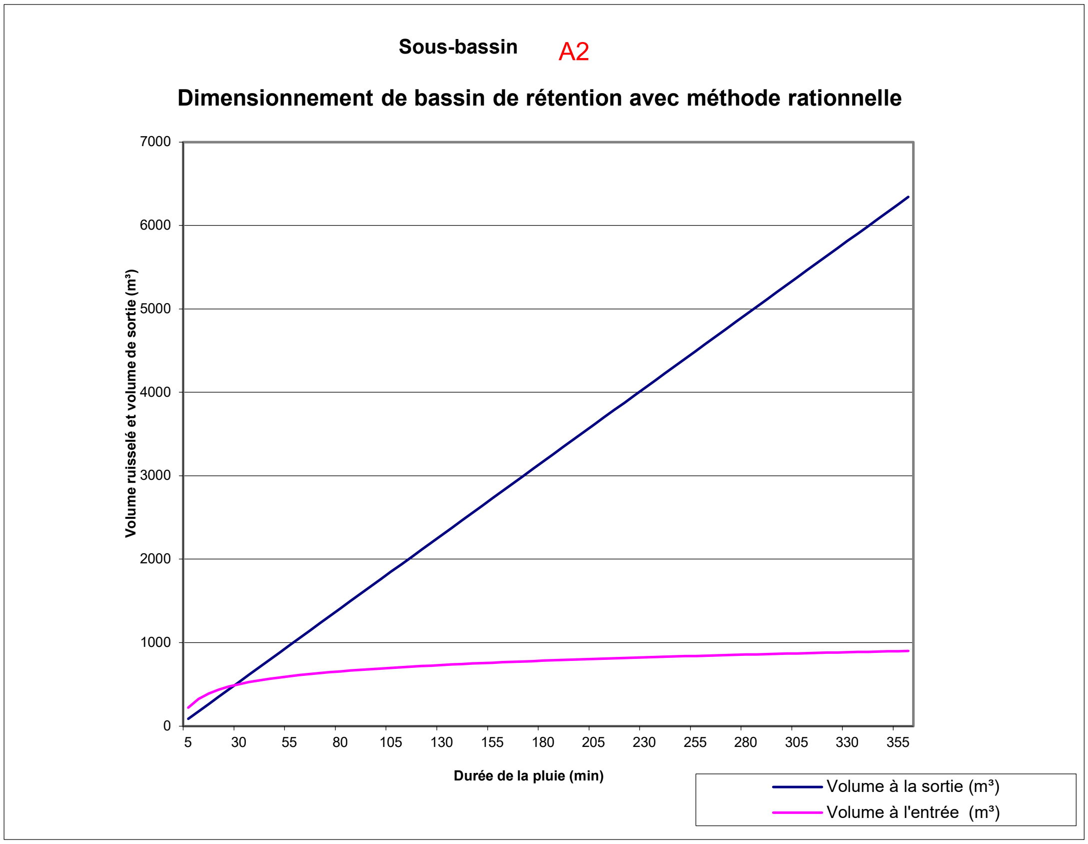
Prepared by: Guillaume LeBlond, M.A.Sc., EIT
PEO No.: 100530467
Date: July 22, 2021

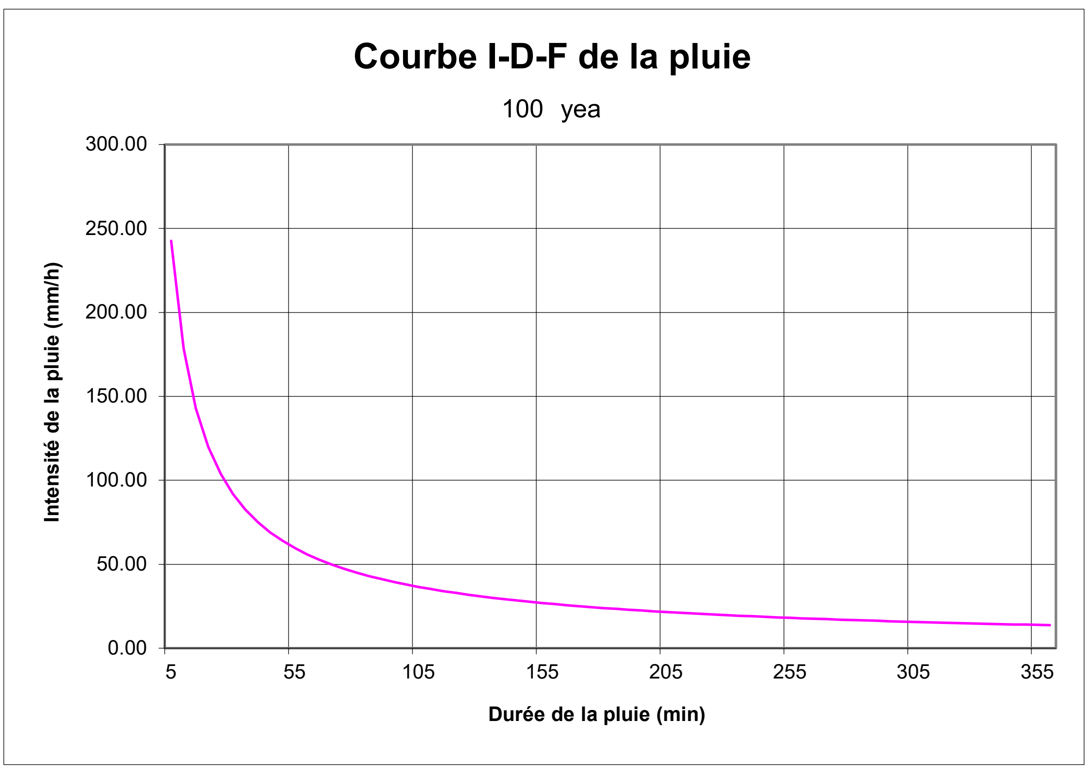
Verified by: Christian Lavoie-Lebel, P.Eng.
PEO No.: 100067842
Date: July 22, 2021

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	88.0980116	132.85
10.0	178.56	325.10	176.196023	148.91
15.0	142.89	390.25	264.294035	125.96
20.0	119.95	436.79	352.392046	84.40
25.0	103.85	472.69	440.490058	32.20
30.0	91.87	501.79	528.588069	-26.79
35.0	82.58	526.23	616.686081	-90.46
40.0	75.15	547.27	704.784092	-157.52
45.0	69.05	565.74	792.882104	-227.14
50.0	63.95	582.21	880.980116	-298.77
55.0	59.62	597.06	969.078127	-372.01
60.0	55.89	610.60	1057.17614	-446.57
65.0	52.65	623.05	1145.27415	-522.23
70.0	49.79	634.56	1233.37216	-598.81
75.0	47.26	645.29	1321.47017	-676.18
80.0	44.99	655.32	1409.56818	-754.25
85.0	42.95	664.75	1497.6662	-832.91
90.0	41.11	673.66	1585.76421	-912.11
95.0	39.43	682.09	1673.86222	-991.77
100.0	37.90	690.10	1761.96023	-1071.86
105.0	36.50	697.73	1850.05824	-1152.32
110.0	35.20	705.02	1938.15625	-1233.13
115.0	34.01	712.00	2026.25427	-1314.25
120.0	32.89	718.70	2114.35228	-1395.65
125.0	31.86	725.14	2202.45029	-1477.31
130.0	30.90	731.33	2290.5483	-1559.22
135.0	30.00	737.31	2378.64631	-1641.34
140.0	29.15	743.08	2466.74432	-1723.67
145.0	28.36	748.66	2554.84234	-1806.18
150.0	27.61	754.06	2642.94035	-1888.88
155.0	26.91	759.30	2731.03836	-1971.74
160.0	26.24	764.38	2819.13637	-2054.75
165.0	25.61	769.32	2907.23438	-2137.91
170.0	25.01	774.12	2995.33239	-2221.21
175.0	24.44	778.80	3083.4304	-2304.63
180.0	23.90	783.35	3171.52842	-2388.18
185.0	23.39	787.79	3259.62643	-2471.84
190.0	22.90	792.12	3347.72444	-2555.61
195.0	22.43	796.34	3435.82245	-2639.48
200.0	21.98	800.47	3523.92046	-2723.45
205.0	21.55	804.50	3612.01847	-2807.51
210.0	21.14	808.45	3700.11649	-2891.66
215.0	20.75	812.31	3788.2145	-2975.90
220.0	20.37	816.10	3876.31251	-3060.22
225.0	20.01	819.80	3964.41052	-3144.61
230.0	19.66	823.43	4052.50853	-3229.07
235.0	19.33	827.00	4140.60654	-3313.61
240.0	19.01	830.49	4228.70455	-3398.21

245.0	18.69	833.92	4316.80257	-3482.88
250.0	18.39	837.29	4404.90058	-3567.61
255.0	18.11	840.59	4492.99859	-3652.41
260.0	17.83	843.84	4581.0966	-3737.25
265.0	17.56	847.04	4669.19461	-3822.16
270.0	17.29	850.18	4757.29262	-3907.11
275.0	17.04	853.27	4845.39064	-3992.12
280.0	16.80	856.31	4933.48865	-4077.18
285.0	16.56	859.30	5021.58666	-4162.29
290.0	16.33	862.25	5109.68467	-4247.44
295.0	16.11	865.15	5197.78268	-4332.63
300.0	15.89	868.01	5285.88069	-4417.87
305.0	15.68	870.82	5373.9787	-4503.15
310.0	15.48	873.60	5462.07672	-4588.48
315.0	15.28	876.34	5550.17473	-4673.84
320.0	15.09	879.04	5638.27274	-4759.24
325.0	14.90	881.70	5726.37075	-4844.67
330.0	14.72	884.32	5814.46876	-4930.15
335.0	14.54	886.91	5902.56677	-5015.65
340.0	14.37	889.47	5990.66479	-5101.19
345.0	14.20	892.00	6078.7628	-5186.77
350.0	14.04	894.49	6166.86081	-5272.37
355.0	13.88	896.95	6254.95882	-5358.01
360.0	13.72	899.38	6343.05683	-5443.67
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: 2021-08-06 9:36

File Location: ***\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Water Management - Storage and Drawdown_full RR.xlsx]A3***

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 Pluviometry	2 year		5 year		10 year	
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 Pluviometry	25 year		50 year		100 year	
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

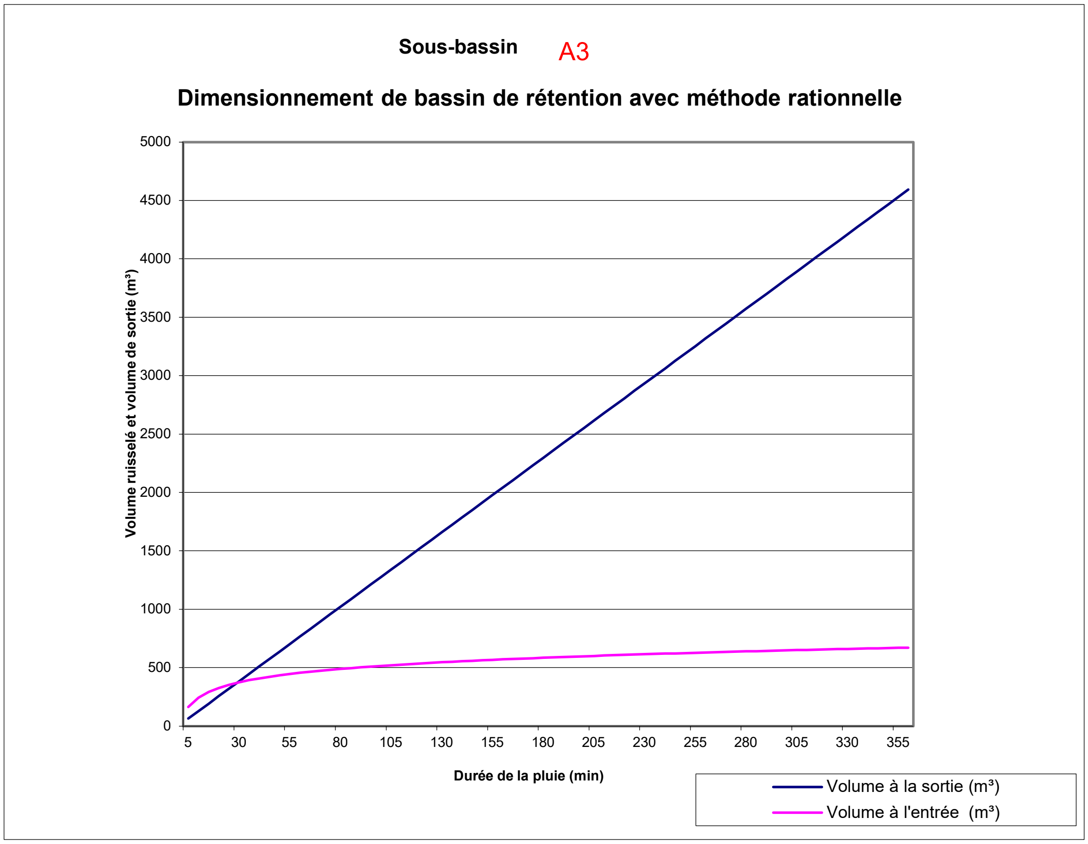
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 22, 2021
PEO No.: 100530467

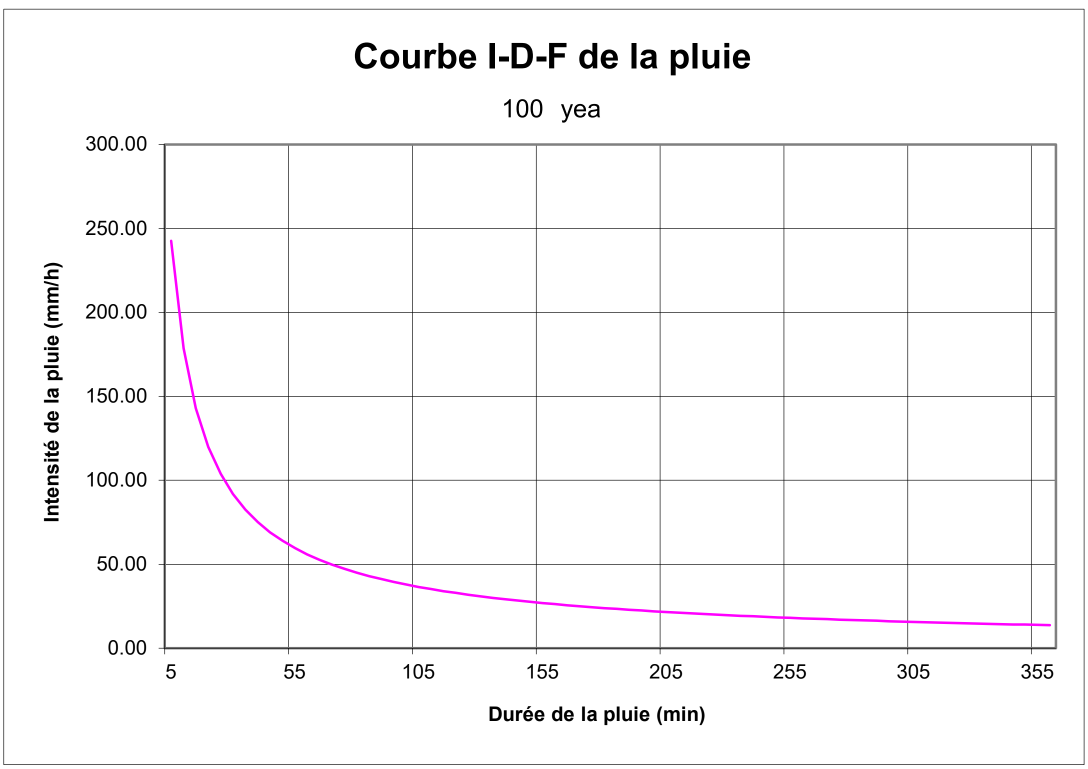
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 22, 2021
PEO No.: 100067842

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	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: 2021-08-06 9:36

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9344526 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 :	0.03595146	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

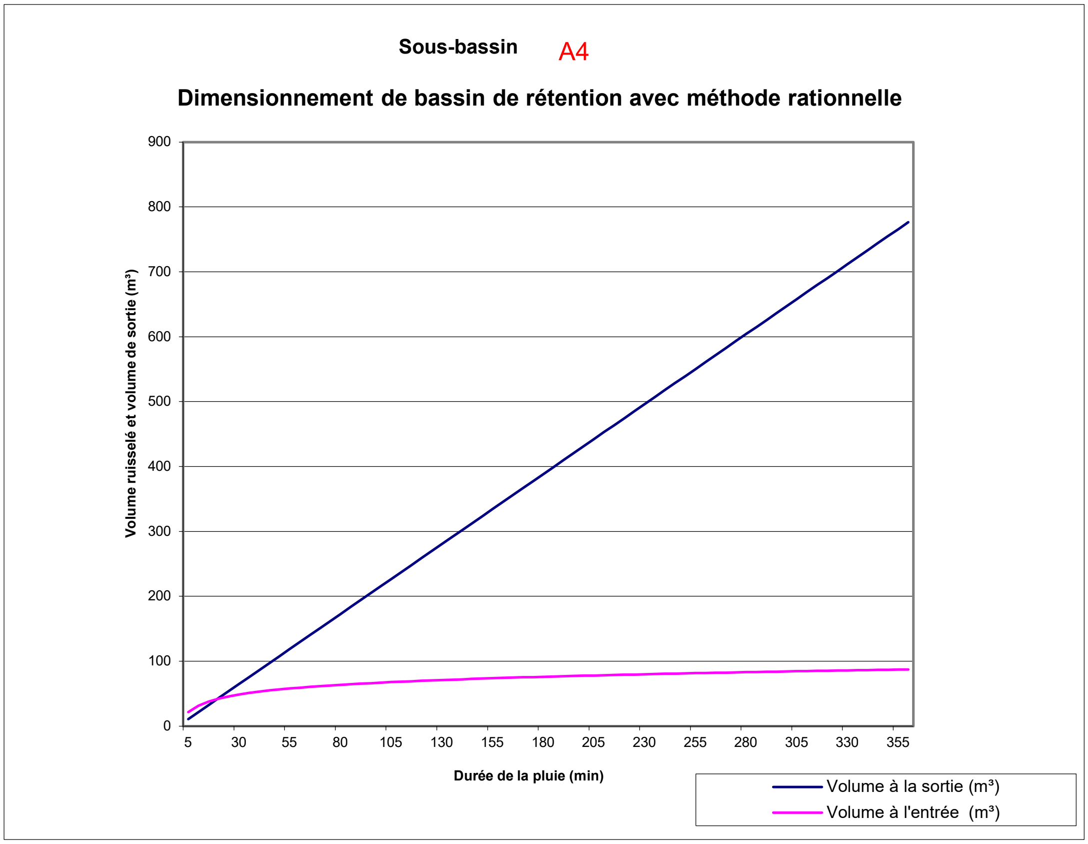
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

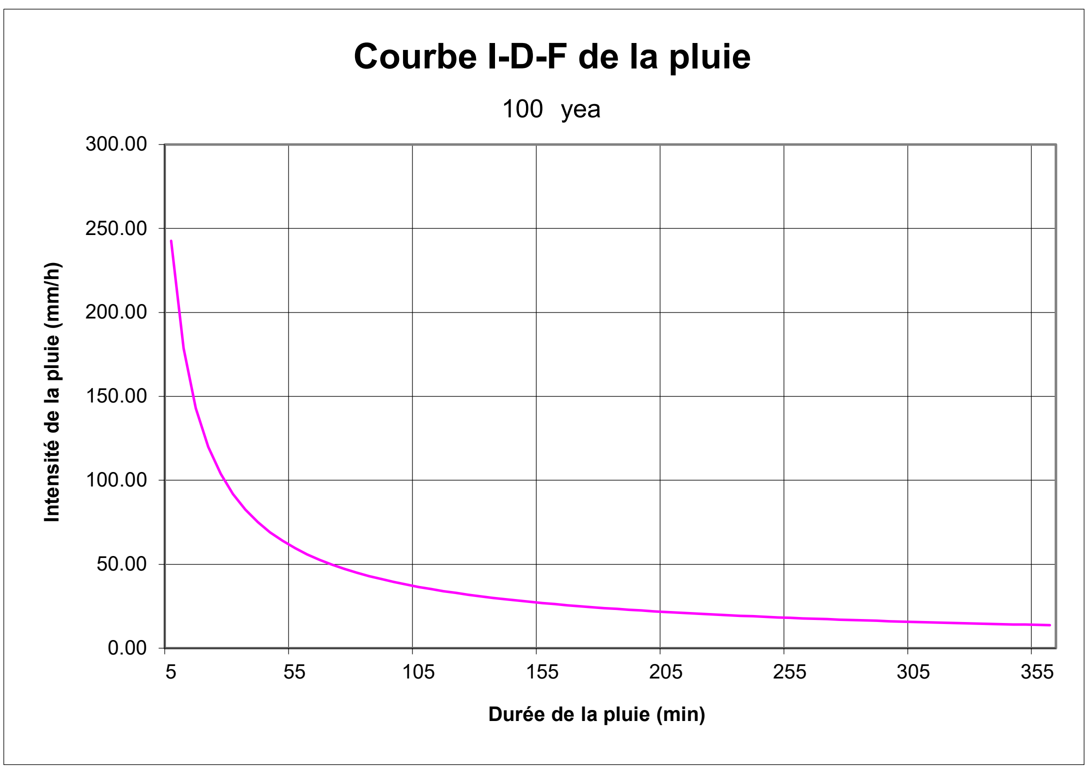
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

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	10.7854379	10.63
10.0	178.56	31.51	21.5708758	9.94
15.0	142.89	37.82	32.3563137	5.47
20.0	119.95	42.33	43.1417516	-0.81
25.0	103.85	45.81	53.9271895	-8.11
30.0	91.87	48.63	64.7126274	-16.08
35.0	82.58	51.00	75.4980653	-24.50
40.0	75.15	53.04	86.2835032	-33.24
45.0	69.05	54.83	97.0689411	-42.24
50.0	63.95	56.43	107.854379	-51.43
55.0	59.62	57.87	118.639817	-60.77
60.0	55.89	59.18	129.425255	-70.25
65.0	52.65	60.39	140.210693	-79.82
70.0	49.79	61.50	150.996131	-89.49
75.0	47.26	62.54	161.781568	-99.24
80.0	44.99	63.51	172.567006	-109.05
85.0	42.95	64.43	183.352444	-118.92
90.0	41.11	65.29	194.137882	-128.85
95.0	39.43	66.11	204.92332	-138.82
100.0	37.90	66.88	215.708758	-148.82
105.0	36.50	67.62	226.494196	-158.87
110.0	35.20	68.33	237.279634	-168.95
115.0	34.01	69.01	248.065072	-179.06
120.0	32.89	69.66	258.850509	-189.19
125.0	31.86	70.28	269.635947	-199.36
130.0	30.90	70.88	280.421385	-209.54
135.0	30.00	71.46	291.206823	-219.75
140.0	29.15	72.02	301.992261	-229.97
145.0	28.36	72.56	312.777699	-240.22
150.0	27.61	73.08	323.563137	-250.48
155.0	26.91	73.59	334.348575	-260.76
160.0	26.24	74.08	345.134013	-271.05
165.0	25.61	74.56	355.919451	-281.36
170.0	25.01	75.03	366.704888	-291.68
175.0	24.44	75.48	377.490326	-302.01
180.0	23.90	75.92	388.275764	-312.35
185.0	23.39	76.35	399.061202	-322.71
190.0	22.90	76.77	409.84664	-333.07
195.0	22.43	77.18	420.632078	-343.45
200.0	21.98	77.58	431.417516	-353.84
205.0	21.55	77.97	442.202954	-364.23
210.0	21.14	78.36	452.988392	-374.63
215.0	20.75	78.73	463.773829	-385.04
220.0	20.37	79.10	474.559267	-395.46
225.0	20.01	79.46	485.344705	-405.89
230.0	19.66	79.81	496.130143	-416.32
235.0	19.33	80.15	506.915581	-426.76
240.0	19.01	80.49	517.701019	-437.21

245.0	18.69	80.82	528.486457	-447.66
250.0	18.39	81.15	539.271895	-458.12
255.0	18.11	81.47	550.057333	-468.59
260.0	17.83	81.79	560.842771	-479.06
265.0	17.56	82.10	571.628208	-489.53
270.0	17.29	82.40	582.413646	-500.01
275.0	17.04	82.70	593.199084	-510.50
280.0	16.80	82.99	603.984522	-520.99
285.0	16.56	83.28	614.76996	-531.49
290.0	16.33	83.57	625.555398	-541.99
295.0	16.11	83.85	636.340836	-552.49
300.0	15.89	84.13	647.126274	-563.00
305.0	15.68	84.40	657.911712	-573.51
310.0	15.48	84.67	668.697149	-584.03
315.0	15.28	84.93	679.482587	-594.55
320.0	15.09	85.20	690.268025	-605.07
325.0	14.90	85.45	701.053463	-615.60
330.0	14.72	85.71	711.838901	-626.13
335.0	14.54	85.96	722.624339	-636.66
340.0	14.37	86.21	733.409777	-647.20
345.0	14.20	86.45	744.195215	-657.74
350.0	14.04	86.69	754.980653	-668.29
355.0	13.88	86.93	765.766091	-678.83
360.0	13.72	87.17	776.551528	-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: 2021-08-06 9:36

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9344526 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 : 0.025862793 m³/s
Discharge Factor K : 1

Design Volume: **14.70 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

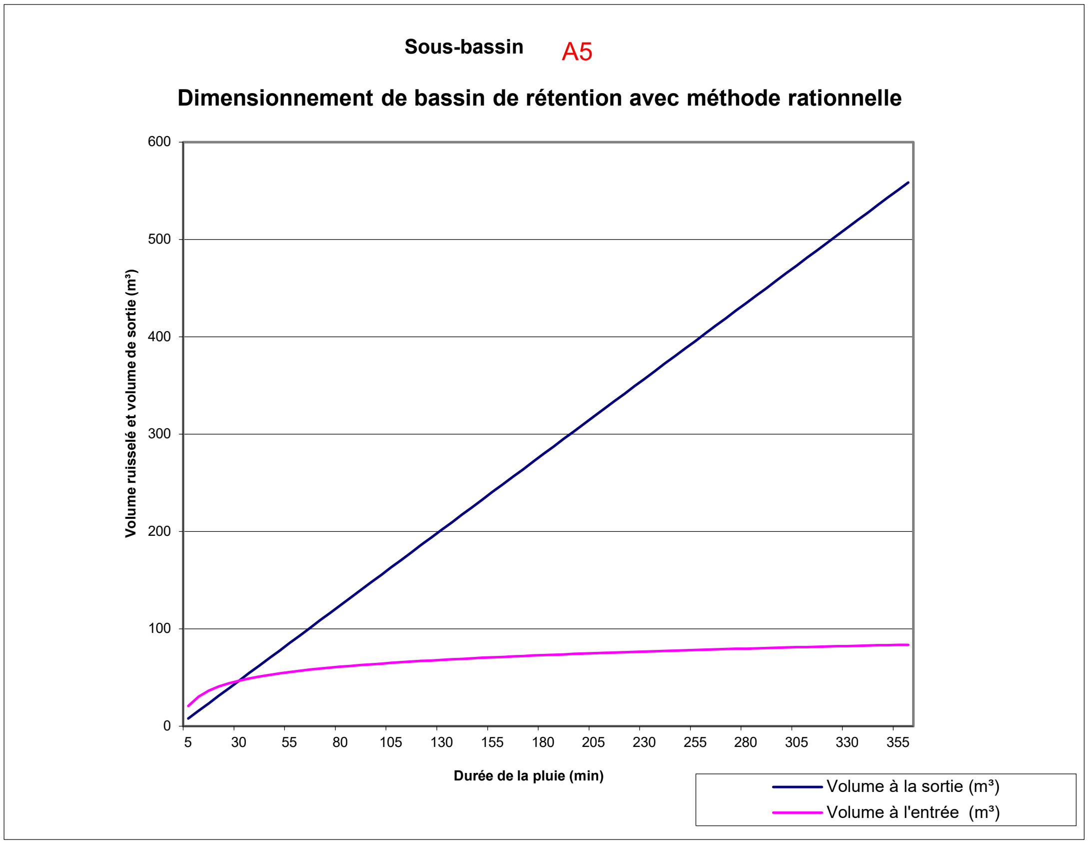
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 22, 2021
PEO No.: 100530467

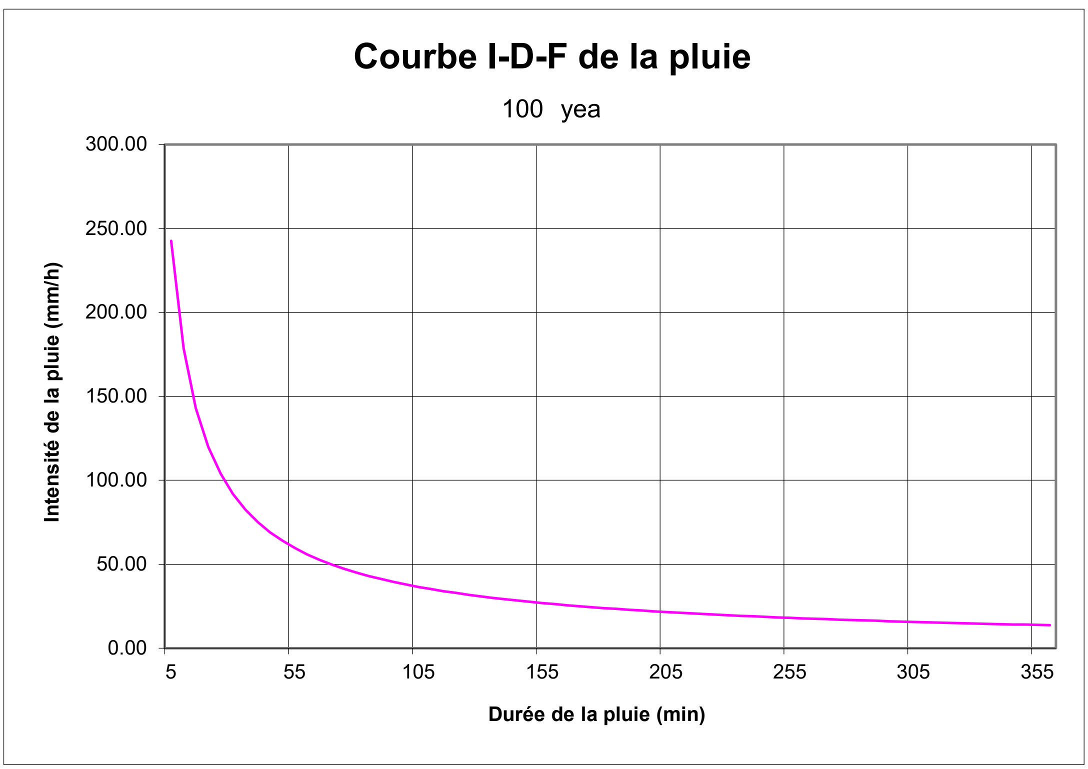
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 22, 2021
PEO No.: 100067842

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	20.54	7.75883789	12.78
10.0	178.56	30.22	15.5176758	14.70
15.0	142.89	36.28	23.2765137	13.00
20.0	119.95	40.61	31.0353516	9.57
25.0	103.85	43.94	38.7941895	5.15
30.0	91.87	46.65	46.5530274	0.10
35.0	82.58	48.92	54.3118653	-5.39
40.0	75.15	50.88	62.0707031	-11.19
45.0	69.05	52.59	69.829541	-17.24
50.0	63.95	54.12	77.5883789	-23.46
55.0	59.62	55.51	85.3472168	-29.84
60.0	55.89	56.76	93.1060547	-36.34
65.0	52.65	57.92	100.864893	-42.94
70.0	49.79	58.99	108.623731	-49.63
75.0	47.26	59.99	116.382568	-56.39
80.0	44.99	60.92	124.141406	-63.22
85.0	42.95	61.80	131.900244	-70.10
90.0	41.11	62.63	139.659082	-77.03
95.0	39.43	63.41	147.41792	-84.01
100.0	37.90	64.15	155.176758	-91.02
105.0	36.50	64.86	162.935596	-98.07
110.0	35.20	65.54	170.694434	-105.15
115.0	34.01	66.19	178.453272	-112.26
120.0	32.89	66.81	186.212109	-119.40
125.0	31.86	67.41	193.970947	-126.56
130.0	30.90	67.99	201.729785	-133.74
135.0	30.00	68.54	209.488623	-140.95
140.0	29.15	69.08	217.247461	-148.17
145.0	28.36	69.60	225.006299	-155.41
150.0	27.61	70.10	232.765137	-162.67
155.0	26.91	70.59	240.523975	-169.94
160.0	26.24	71.06	248.282813	-177.22
165.0	25.61	71.52	256.04165	-184.52
170.0	25.01	71.97	263.800488	-191.84
175.0	24.44	72.40	271.559326	-199.16
180.0	23.90	72.82	279.318164	-206.50
185.0	23.39	73.24	287.077002	-213.84
190.0	22.90	73.64	294.83584	-221.20
195.0	22.43	74.03	302.594678	-228.56
200.0	21.98	74.41	310.353516	-235.94
205.0	21.55	74.79	318.112354	-243.32
210.0	21.14	75.16	325.871192	-250.71
215.0	20.75	75.52	333.630029	-258.11
220.0	20.37	75.87	341.388867	-265.52
225.0	20.01	76.21	349.147705	-272.94
230.0	19.66	76.55	356.906543	-280.36
235.0	19.33	76.88	364.665381	-287.79
240.0	19.01	77.21	372.424219	-295.22

245.0	18.69	77.52	380.183057	-302.66
250.0	18.39	77.84	387.941895	-310.11
255.0	18.11	78.14	395.700733	-317.56
260.0	17.83	78.45	403.45957	-325.01
265.0	17.56	78.74	411.218408	-332.47
270.0	17.29	79.04	418.977246	-339.94
275.0	17.04	79.32	426.736084	-347.41
280.0	16.80	79.61	434.494922	-354.89
285.0	16.56	79.88	442.25376	-362.37
290.0	16.33	80.16	450.012598	-369.86
295.0	16.11	80.43	457.771436	-377.34
300.0	15.89	80.69	465.530274	-384.84
305.0	15.68	80.95	473.289111	-392.33
310.0	15.48	81.21	481.047949	-399.84
315.0	15.28	81.47	488.806787	-407.34
320.0	15.09	81.72	496.565625	-414.85
325.0	14.90	81.97	504.324463	-422.36
330.0	14.72	82.21	512.083301	-429.87
335.0	14.54	82.45	519.842139	-437.39
340.0	14.37	82.69	527.600977	-444.91
345.0	14.20	82.92	535.359815	-452.44
350.0	14.04	83.15	543.118653	-459.96
355.0	13.88	83.38	550.87749	-467.49
360.0	13.72	83.61	558.636328	-475.03
Max Volume (V max):				14.70
Design Volume (V design) :				**14.70**

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: 2021-08-06 9:36

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Water Management - Storage and Drawdown_full*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9344526 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 :		0.117580144	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

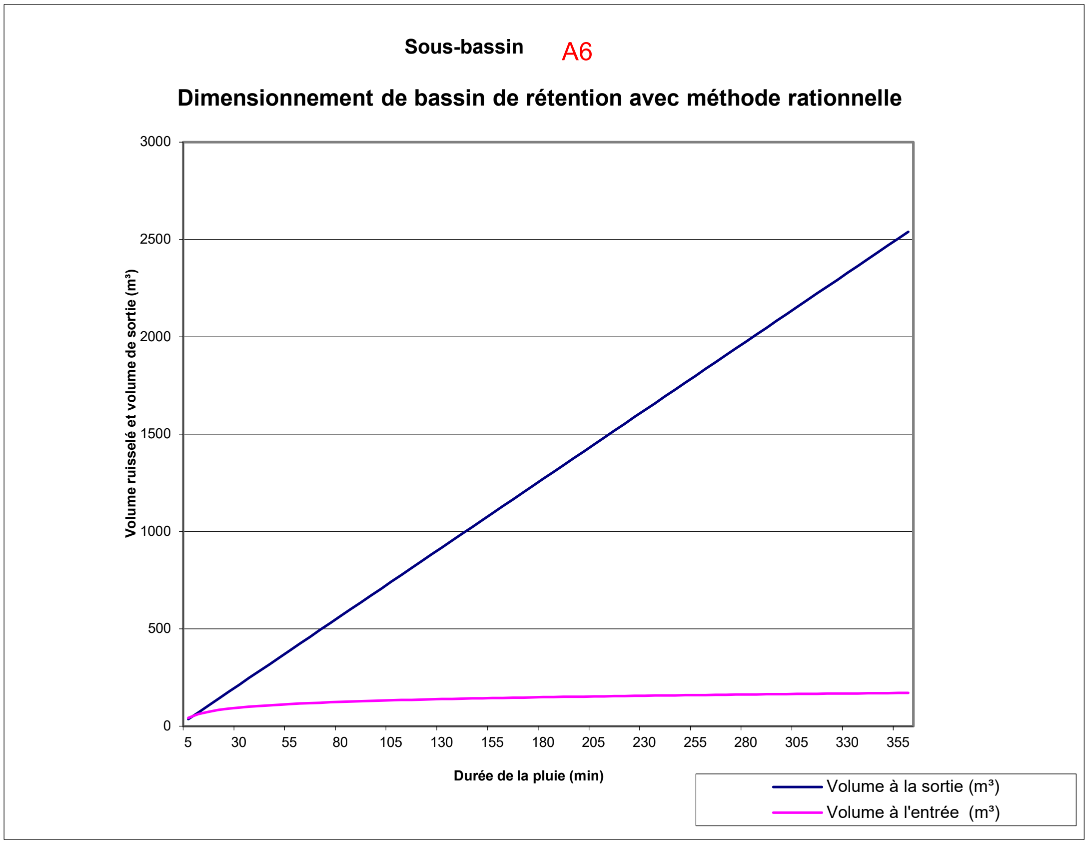
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

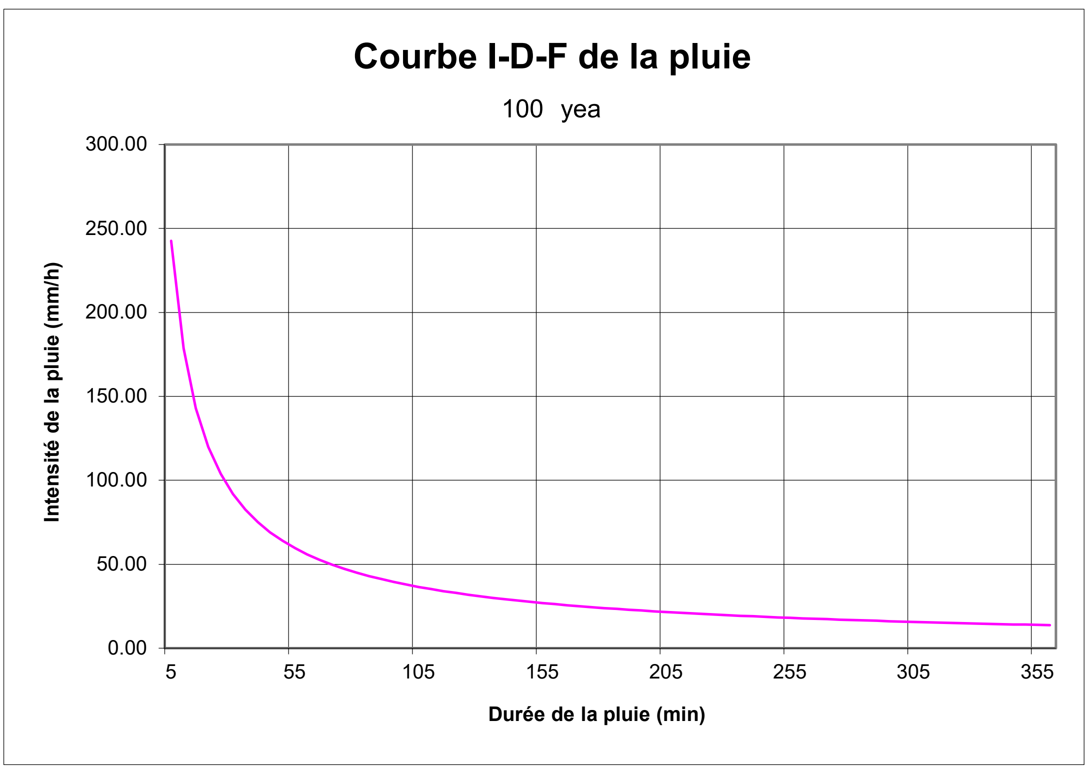
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

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	35.2740432	6.50
10.0	178.56	61.47	70.5480864	-9.08
15.0	142.89	73.79	105.82213	-32.04
20.0	119.95	82.59	141.096173	-58.51
25.0	103.85	89.37	176.370216	-87.00
30.0	91.87	94.88	211.644259	-116.77
35.0	82.58	99.50	246.918302	-147.42
40.0	75.15	103.48	282.192345	-178.72
45.0	69.05	106.97	317.466389	-210.50
50.0	63.95	110.08	352.740432	-242.66
55.0	59.62	112.89	388.014475	-275.12
60.0	55.89	115.45	423.288518	-307.84
65.0	52.65	117.80	458.562561	-340.76
70.0	49.79	119.98	493.836605	-373.86
75.0	47.26	122.01	529.110648	-407.10
80.0	44.99	123.91	564.384691	-440.48
85.0	42.95	125.69	599.658734	-473.97
90.0	41.11	127.37	634.932777	-507.56
95.0	39.43	128.97	670.20682	-541.24
100.0	37.90	130.48	705.480864	-575.00
105.0	36.50	131.92	740.754907	-608.83
110.0	35.20	133.30	776.02895	-642.73
115.0	34.01	134.62	811.302993	-676.68
120.0	32.89	135.89	846.577036	-710.69
125.0	31.86	137.11	881.85108	-744.75
130.0	30.90	138.28	917.125123	-778.85
135.0	30.00	139.41	952.399166	-812.99
140.0	29.15	140.50	987.673209	-847.18
145.0	28.36	141.55	1022.94725	-881.39
150.0	27.61	142.57	1058.2213	-915.65
155.0	26.91	143.57	1093.49534	-949.93
160.0	26.24	144.53	1128.76938	-984.24
165.0	25.61	145.46	1164.04343	-1018.58
170.0	25.01	146.37	1199.31747	-1052.95
175.0	24.44	147.25	1234.59151	-1087.34
180.0	23.90	148.11	1269.86555	-1121.75
185.0	23.39	148.95	1305.1396	-1156.19
190.0	22.90	149.77	1340.41364	-1190.64
195.0	22.43	150.57	1375.68768	-1225.12
200.0	21.98	151.35	1410.96173	-1259.61
205.0	21.55	152.11	1446.23577	-1294.12
210.0	21.14	152.86	1481.50981	-1328.65
215.0	20.75	153.59	1516.78386	-1363.19
220.0	20.37	154.30	1552.0579	-1397.75
225.0	20.01	155.00	1587.33194	-1432.33
230.0	19.66	155.69	1622.60599	-1466.91
235.0	19.33	156.36	1657.88003	-1501.52
240.0	19.01	157.03	1693.15407	-1536.13

245.0	18.69	157.67	1728.42812	-1570.75
250.0	18.39	158.31	1763.70216	-1605.39
255.0	18.11	158.94	1798.9762	-1640.04
260.0	17.83	159.55	1834.25025	-1674.70
265.0	17.56	160.15	1869.52429	-1709.37
270.0	17.29	160.75	1904.79833	-1744.05
275.0	17.04	161.33	1940.07238	-1778.74
280.0	16.80	161.91	1975.34642	-1813.44
285.0	16.56	162.47	2010.62046	-1848.15
290.0	16.33	163.03	2045.8945	-1882.86
295.0	16.11	163.58	2081.16855	-1917.59
300.0	15.89	164.12	2116.44259	-1952.32
305.0	15.68	164.65	2151.71663	-1987.07
310.0	15.48	165.18	2186.99068	-2021.81
315.0	15.28	165.69	2222.26472	-2056.57
320.0	15.09	166.20	2257.53876	-2091.33
325.0	14.90	166.71	2292.81281	-2126.11
330.0	14.72	167.20	2328.08685	-2160.88
335.0	14.54	167.69	2363.36089	-2195.67
340.0	14.37	168.18	2398.63494	-2230.46
345.0	14.20	168.65	2433.90898	-2265.25
350.0	14.04	169.13	2469.18302	-2300.06
355.0	13.88	169.59	2504.45707	-2334.87
360.0	13.72	170.05	2539.73111	-2369.68
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:	2021-08-06 9:36

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210719_Storm Water Management - Storage and Drawdown_full RR.xlsx]A7*

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 241.9344526 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 :		0.036217588	m³/s
Discharge Factor K :		1	

Design Volume: **8.81 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

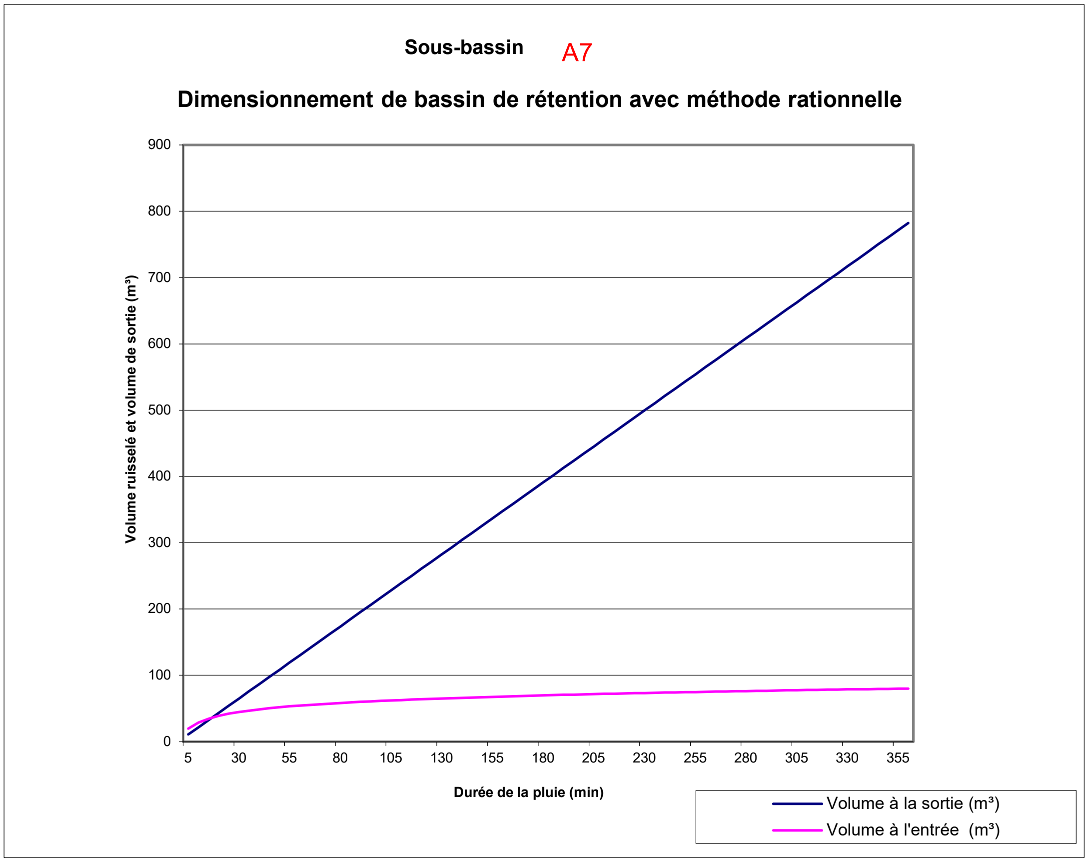
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 22, 2021
PEO No.: 100530467

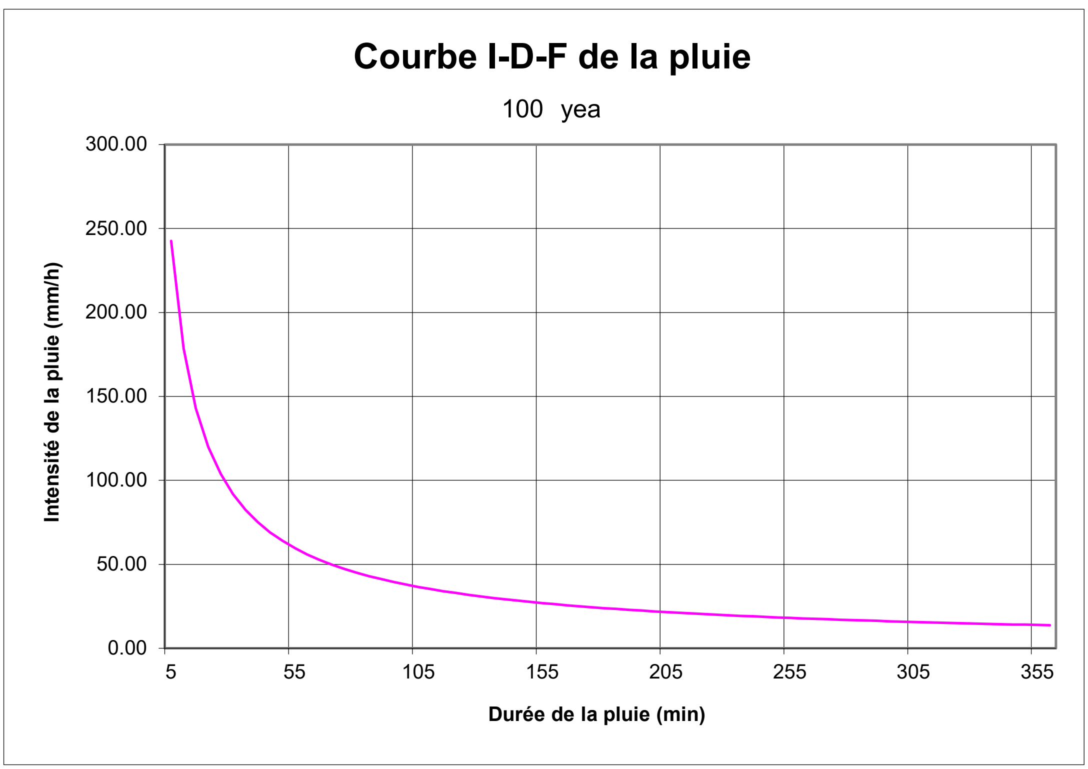
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 22, 2021
PEO No.: 100067842

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	19.68	10.8652763	8.81
10.0	178.56	28.96	21.7305525	7.23
15.0	142.89	34.76	32.5958288	2.16
20.0	119.95	38.91	43.4611051	-4.56
25.0	103.85	42.10	54.3263813	-12.22
30.0	91.87	44.70	65.1916576	-20.50
35.0	82.58	46.87	76.0569338	-29.18
40.0	75.15	48.75	86.9222101	-38.18
45.0	69.05	50.39	97.7874864	-47.40
50.0	63.95	51.86	108.652763	-56.79
55.0	59.62	53.18	119.518039	-66.34
60.0	55.89	54.39	130.383315	-76.00
65.0	52.65	55.50	141.248591	-85.75
70.0	49.79	56.52	152.113868	-95.59
75.0	47.26	57.48	162.979144	-105.50
80.0	44.99	58.37	173.84442	-115.47
85.0	42.95	59.21	184.709696	-125.50
90.0	41.11	60.00	195.574973	-135.57
95.0	39.43	60.76	206.440249	-145.68
100.0	37.90	61.47	217.305525	-155.84
105.0	36.50	62.15	228.170802	-166.02
110.0	35.20	62.80	239.036078	-176.24
115.0	34.01	63.42	249.901354	-186.48
120.0	32.89	64.02	260.76663	-196.75
125.0	31.86	64.59	271.631907	-207.04
130.0	30.90	65.14	282.497183	-217.36
135.0	30.00	65.67	293.362459	-227.69
140.0	29.15	66.19	304.227735	-238.04
145.0	28.36	66.69	315.093012	-248.41
150.0	27.61	67.17	325.958288	-258.79
155.0	26.91	67.63	336.823564	-269.19
160.0	26.24	68.09	347.68884	-279.60
165.0	25.61	68.53	358.554117	-290.03
170.0	25.01	68.95	369.419393	-300.47
175.0	24.44	69.37	380.284669	-310.91
180.0	23.90	69.78	391.149946	-321.37
185.0	23.39	70.17	402.015222	-331.84
190.0	22.90	70.56	412.880498	-342.32
195.0	22.43	70.93	423.745774	-352.81
200.0	21.98	71.30	434.611051	-363.31
205.0	21.55	71.66	445.476327	-373.82
210.0	21.14	72.01	456.341603	-384.33
215.0	20.75	72.36	467.206879	-394.85
220.0	20.37	72.69	478.072156	-405.38
225.0	20.01	73.02	488.937432	-415.92
230.0	19.66	73.35	499.802708	-426.46
235.0	19.33	73.66	510.667984	-437.01

240.0	19.01	73.97	521.533261	-447.56
245.0	18.69	74.28	532.398537	-458.12
250.0	18.39	74.58	543.263813	-468.68
255.0	18.11	74.87	554.129089	-479.26
260.0	17.83	75.16	564.994366	-489.83
265.0	17.56	75.45	575.859642	-500.41
270.0	17.29	75.73	586.724918	-511.00
275.0	17.04	76.00	597.590195	-521.59
280.0	16.80	76.27	608.455471	-532.18
285.0	16.56	76.54	619.320747	-542.78
290.0	16.33	76.80	630.186023	-553.38
295.0	16.11	77.06	641.0513	-563.99
300.0	15.89	77.32	651.916576	-574.60
305.0	15.68	77.57	662.781852	-585.22
310.0	15.48	77.81	673.647128	-595.83
315.0	15.28	78.06	684.512405	-606.45
320.0	15.09	78.30	695.377681	-617.08
325.0	14.90	78.54	706.242957	-627.71
330.0	14.72	78.77	717.108233	-638.34
335.0	14.54	79.00	727.97351	-648.97
340.0	14.37	79.23	738.838786	-659.61
345.0	14.20	79.45	749.704062	-670.25
350.0	14.04	79.67	760.569338	-680.89
355.0	13.88	79.89	771.434615	-691.54
360.0	13.72	80.11	782.299891	-702.19
Max Volume (V max):				8.81
Design Volume (V design) :				**8.81**

Fastfrate Warehouse Development
Industrial/Commercial Development





Date: **2021-08-06**

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						

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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 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

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Date:

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

STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:33

File Location: ***\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[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

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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	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

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**

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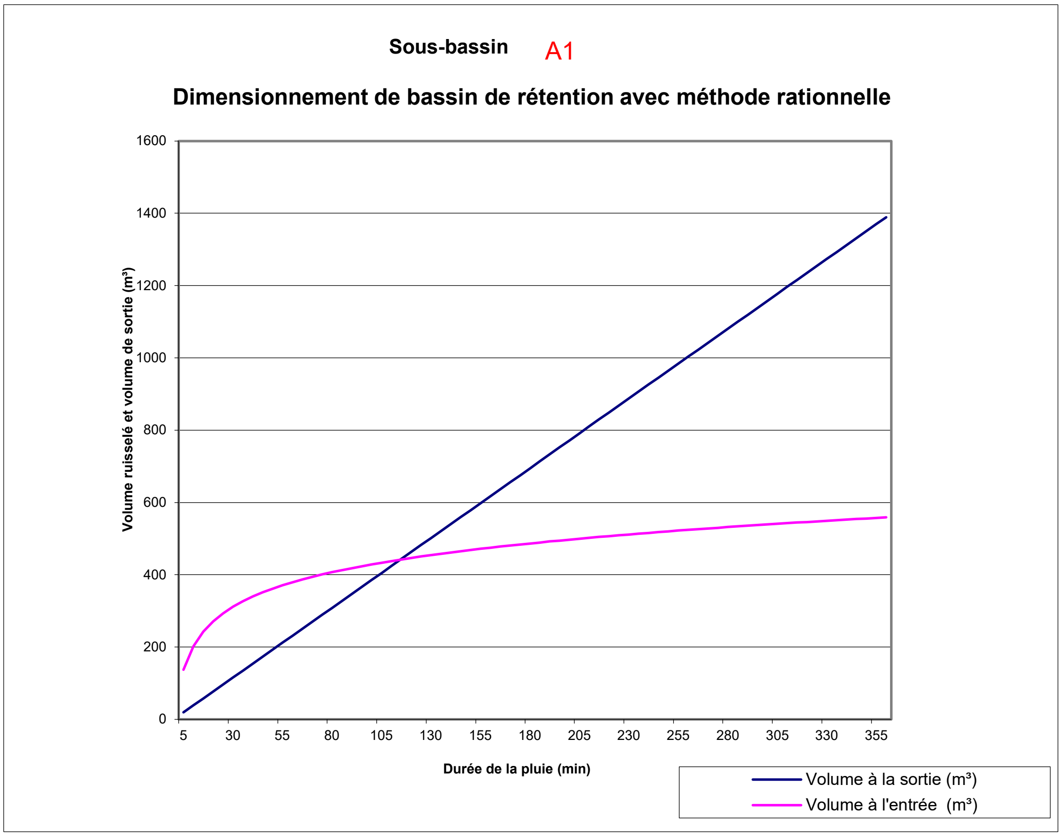
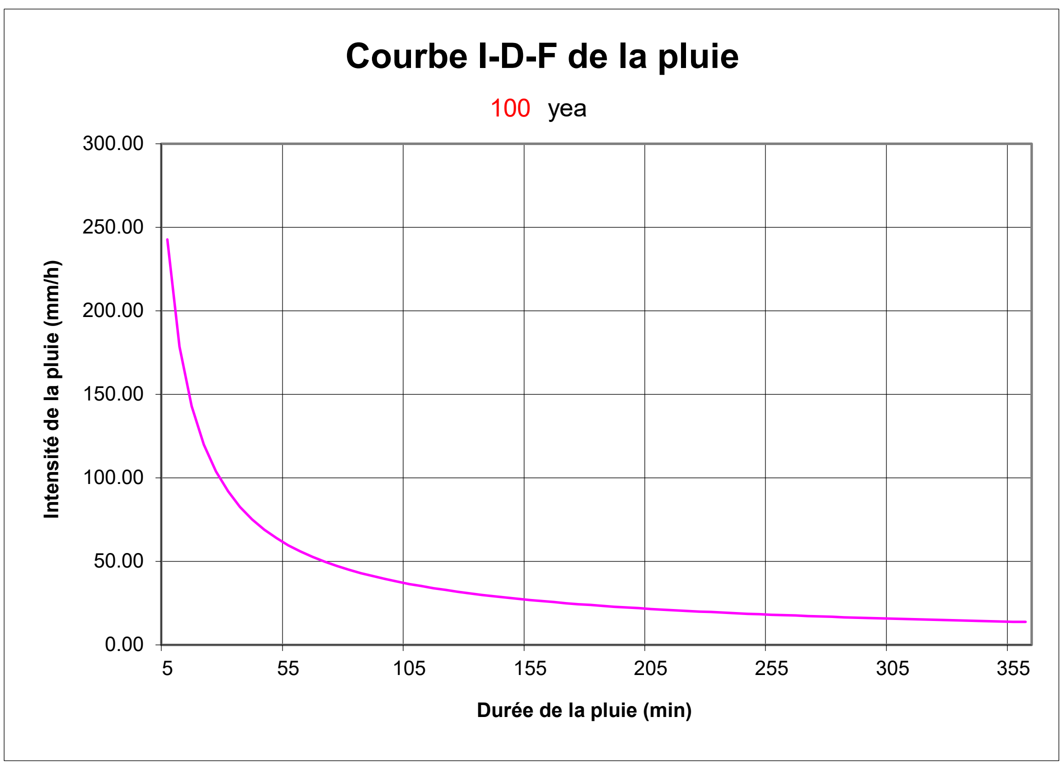
Fastfrate Warehouse Development
Industrial/Commercial Development





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STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:33

File Location: ***\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[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	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

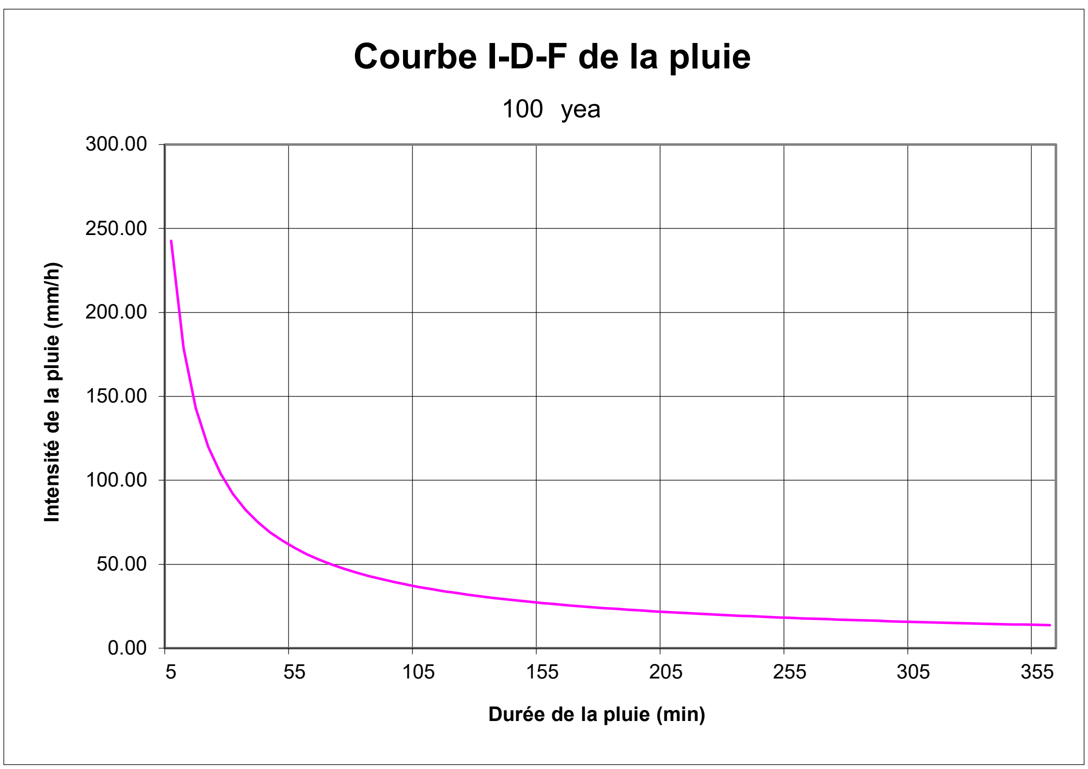
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 23, 2021
PEO No.: 100530467

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 (m³) $CIAT$ (4)	Output Volume (m³) kQT (5)	Retention Volume (m³) (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: 2021-08-06 9:33

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[210723_Storm Water Management - Storage and Drawdown_half RR.xlsx]A3*

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 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

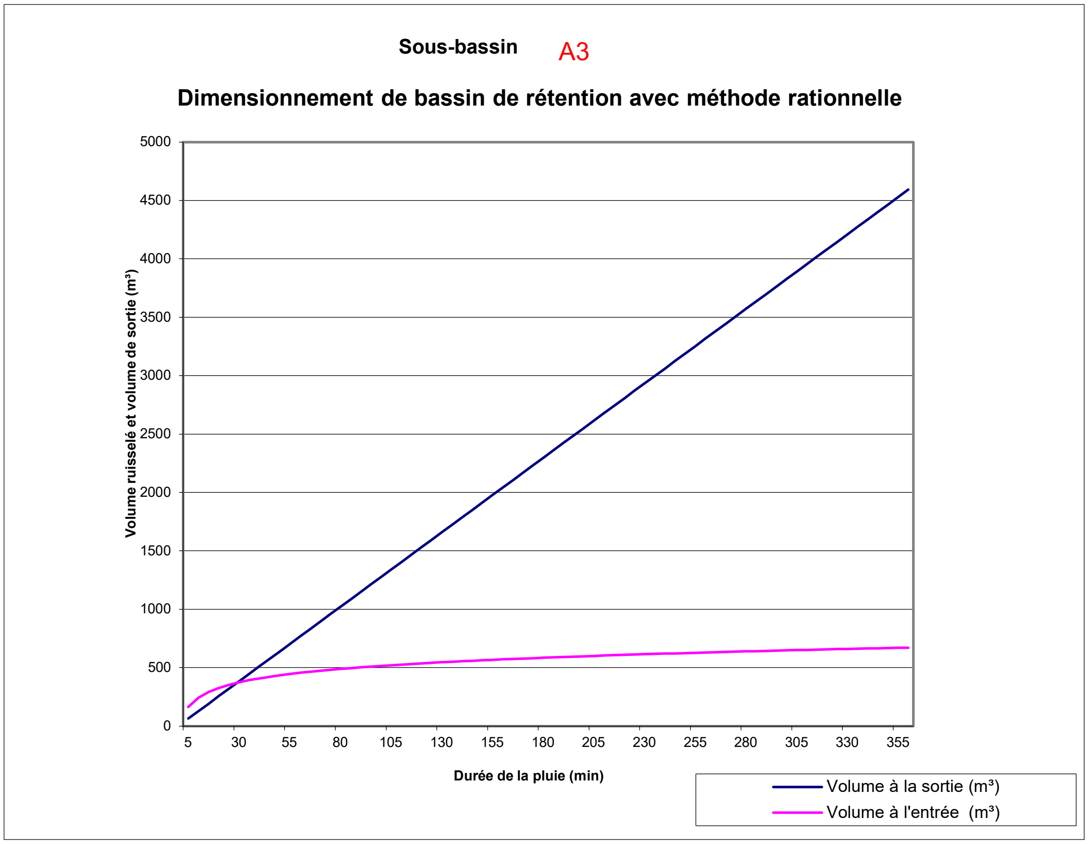
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 23, 2021
PEO No.: 100530467

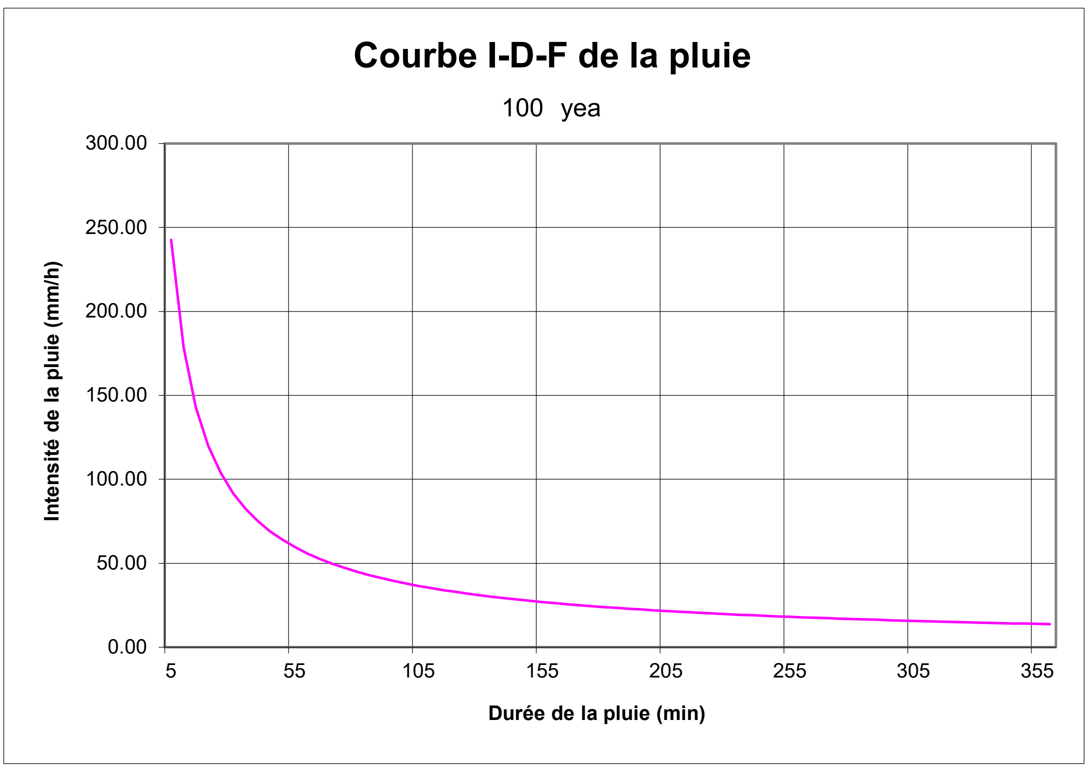
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 23, 2021
PEO No.: 100067842

Rainfall Duration (min) *T* (1)	Rainfall Intensity (mm/h) *I* (2)	Runoff Volume (m³) *CIAT* (4)	Output Volume (m³) *kQT* (5)	Retention Volume (m³) *(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: 2021-08-06 9:33

File Location: ***\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[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

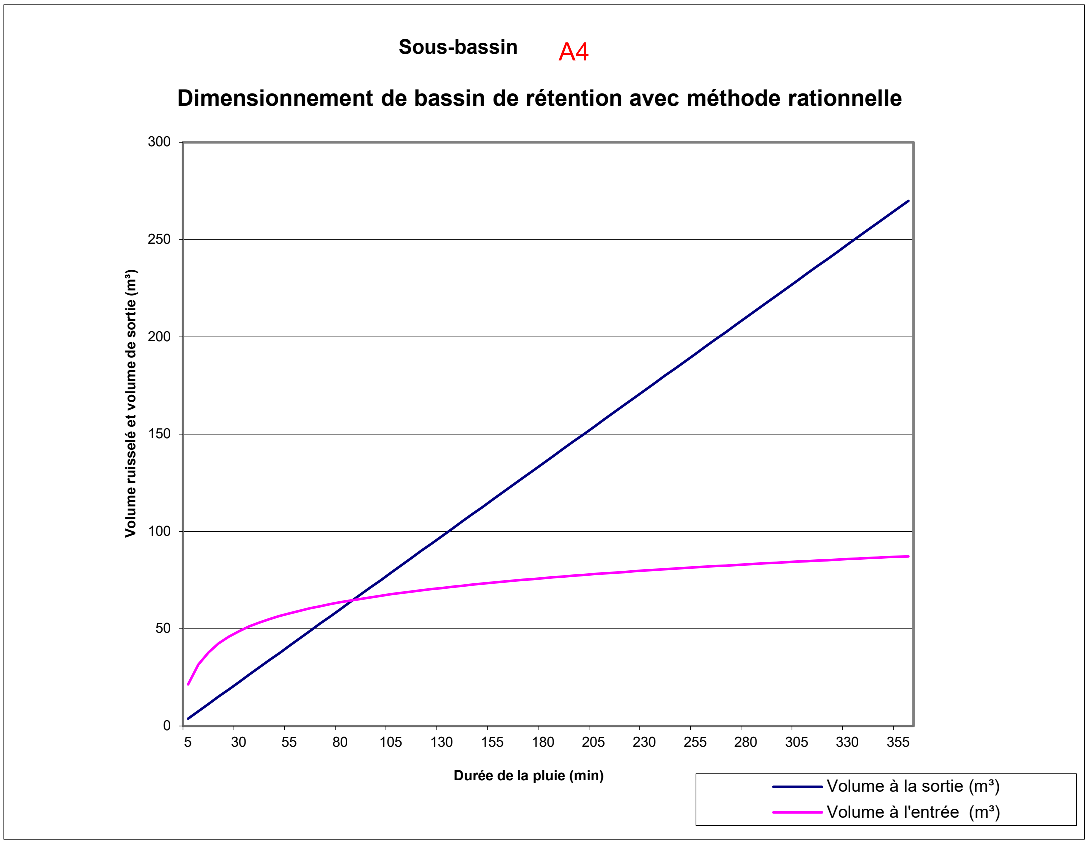
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 23, 2021
PEO No.: 100530467

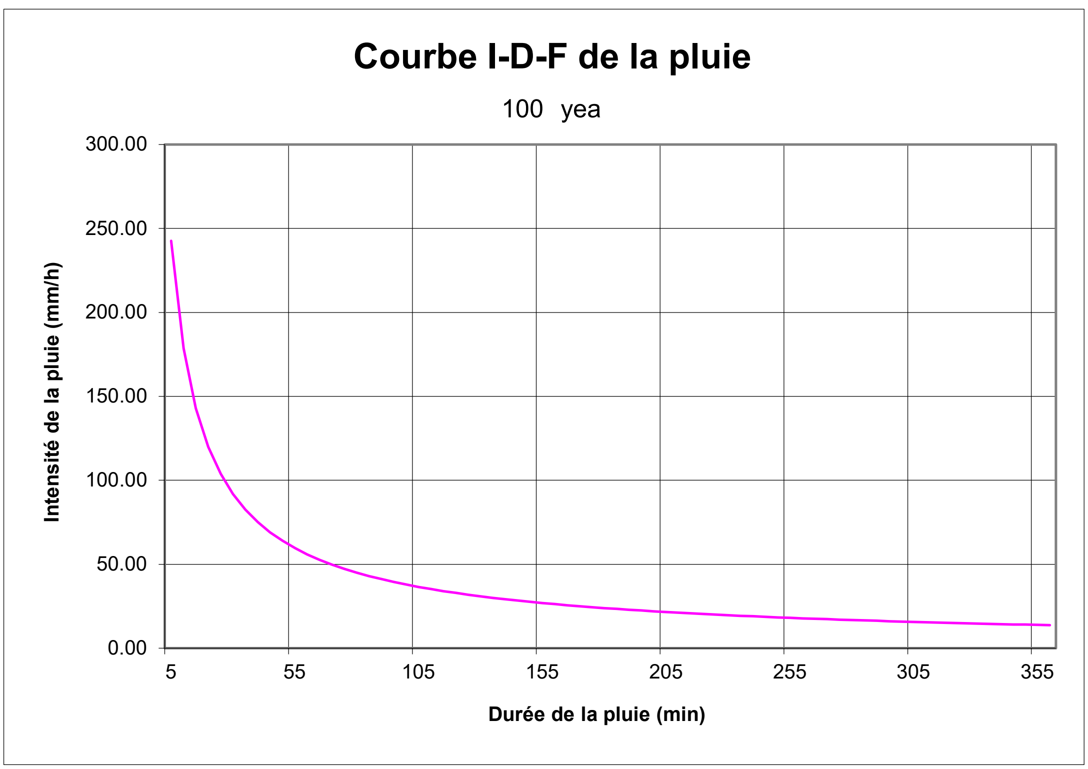
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 23, 2021
PEO No.: 100067842

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: 2021-08-06 9:33

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[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

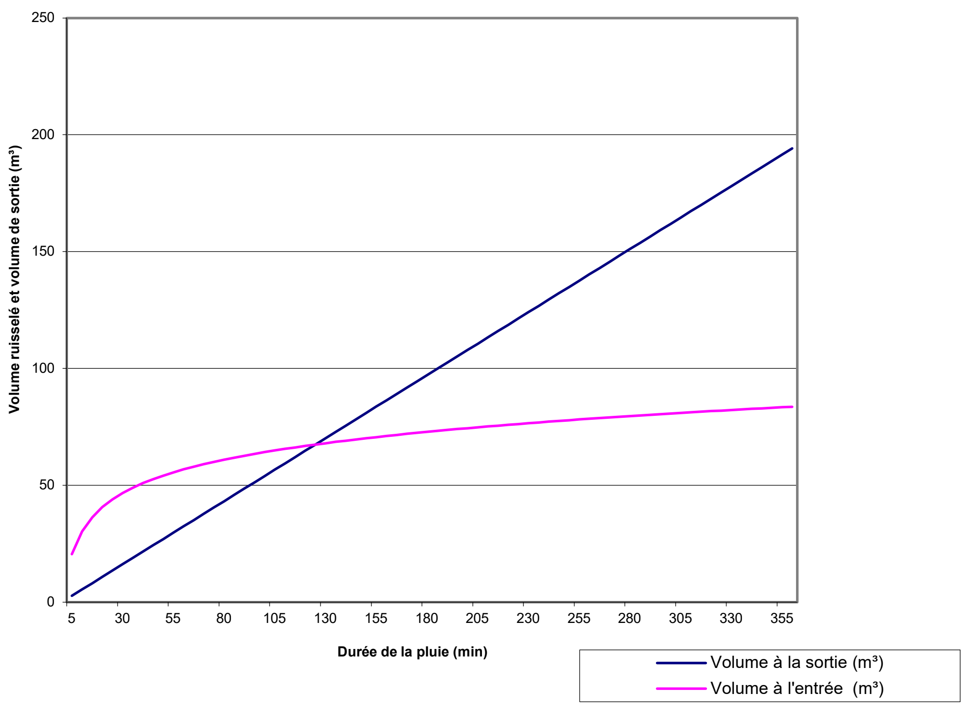
Rainfall Duration (min) T (1)	Rainfall Intensity (mm/h) I (2)	Runoff Volume (m^3) $CIAT$ (4)	Output Volume (m^3) kQT (5)	Retention Volume (m^3) *(4)-(5)* (6)
5.0	242.70	20.54	2.69733002	17.84
10.0	178.56	30.22	5.39466004	24.83
15.0	142.89	36.28	8.09199005	28.19
20.0	119.95	40.61	10.7893201	29.82
25.0	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

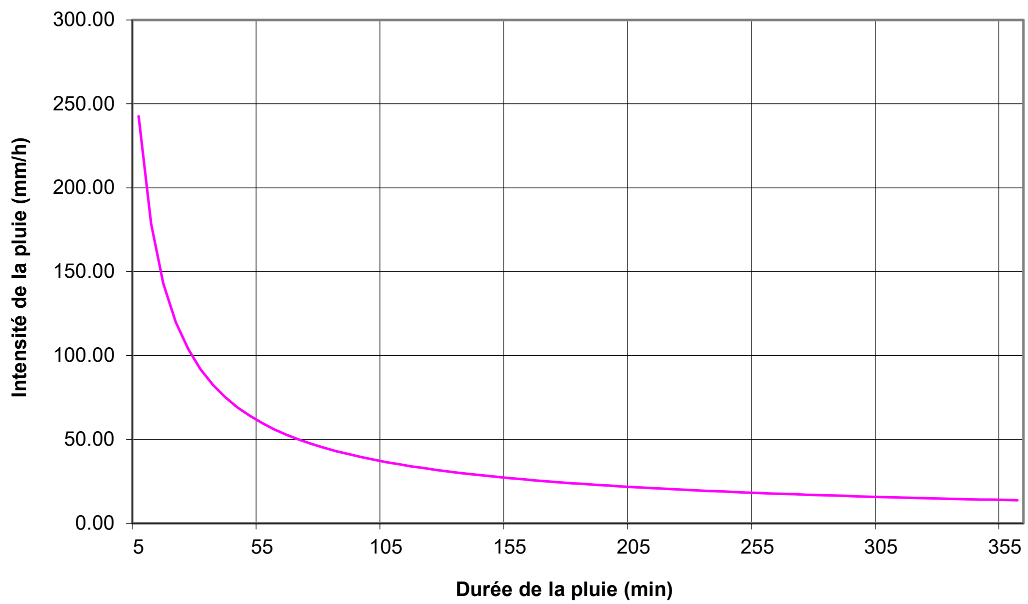
Sous-bassin A5

Dimensionnement de bassin de rétention avec méthode rationnelle



Courbe I-D-F de la pluie

100 yea



STORAGE VOLUME CALCULATIONS

Project: Fastfrate Warehouse Development
Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:33

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[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	m³/s
Discharge Factor K :	1	

Design Volume:	**37.00 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

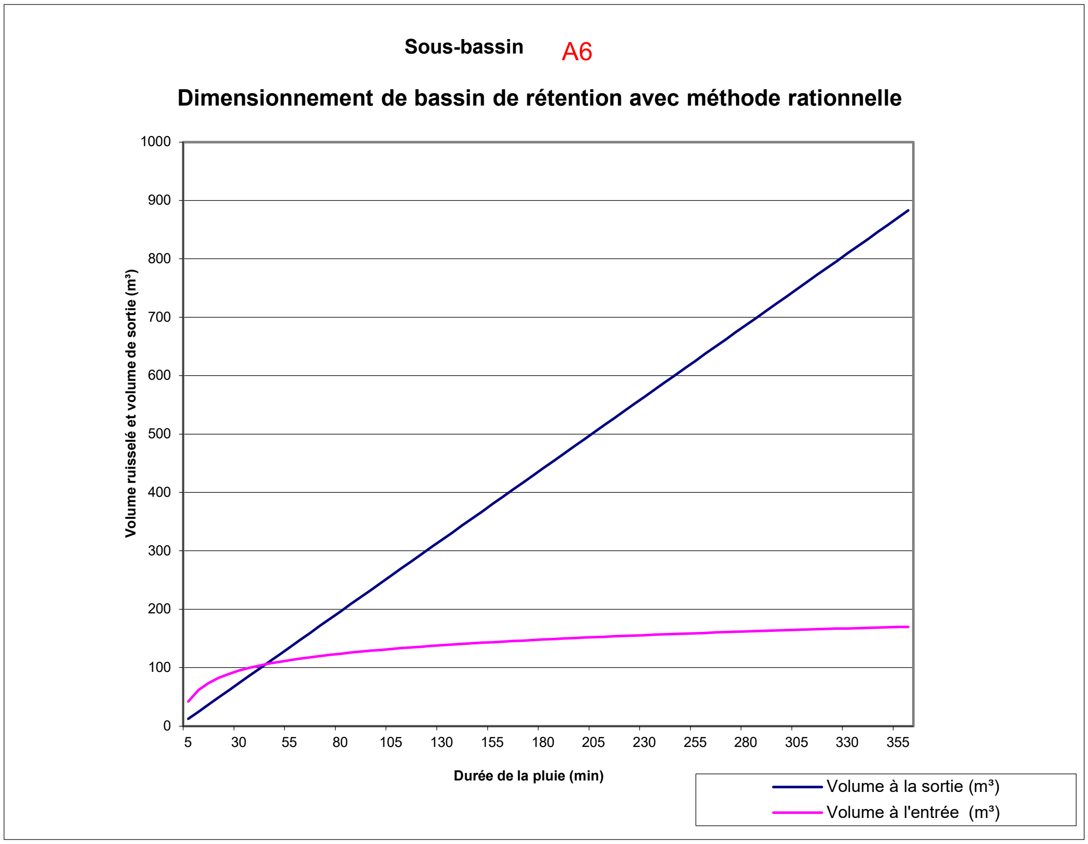
Prepared by: Guillaume LeBlond, M.A.Sc., EIT Date: July 23, 2021
PEO No.: 100530467

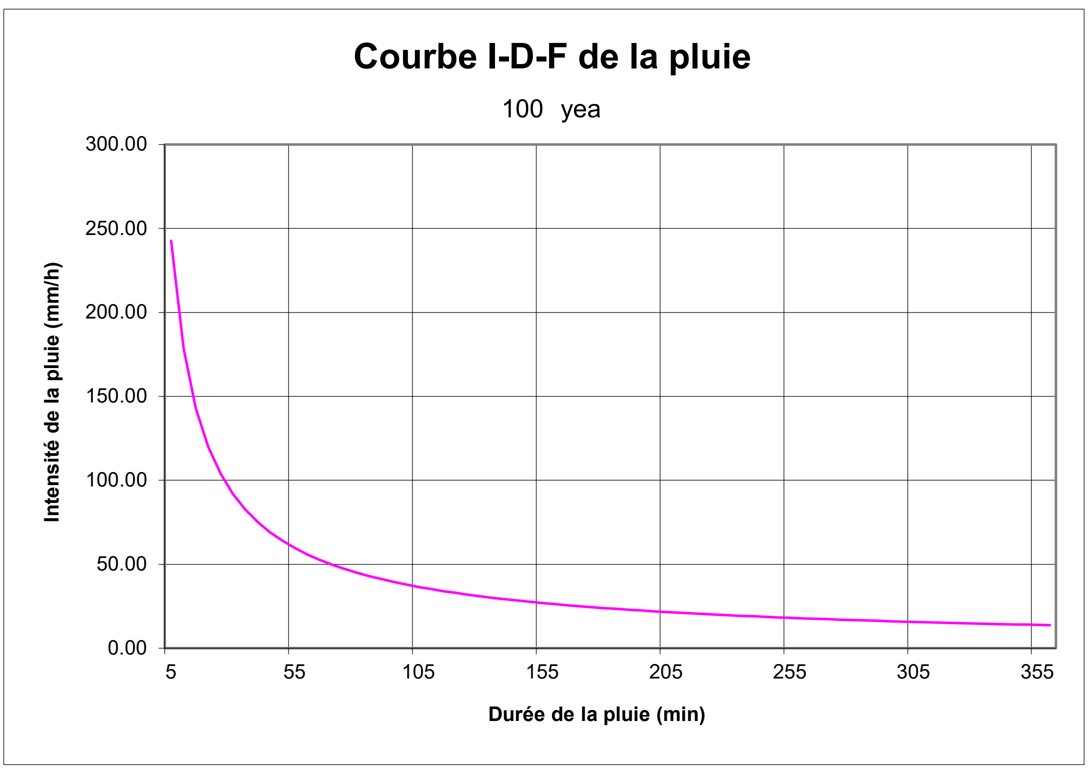
Verified by: Christian Lavoie-Lebel, P.Eng. Date: July 23, 2021
PEO No.: 100067842

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	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: 2021-08-06 9:33

File Location: *\\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse Development\300\360_Civil\01-SWM\[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

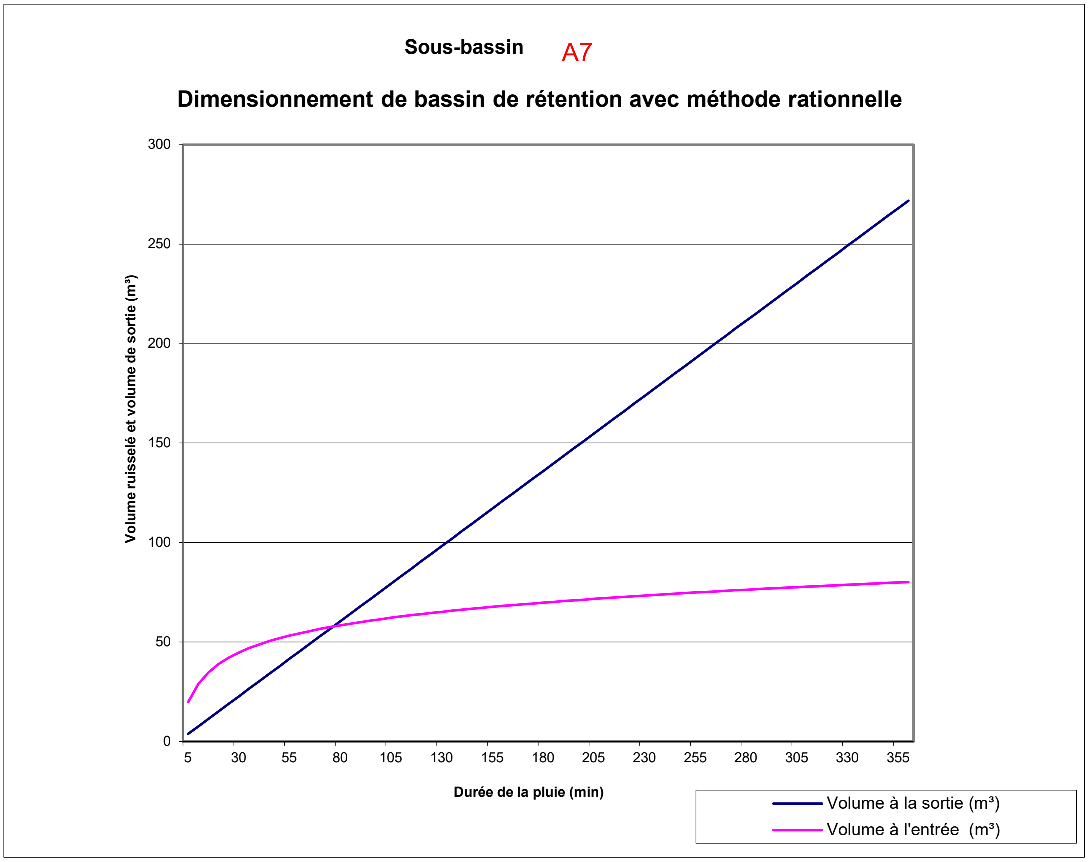
Prepared by: Guillaume LeBlond, M.A.Sc., EIT   Date: July 23, 2021
PEO No.: 100530467

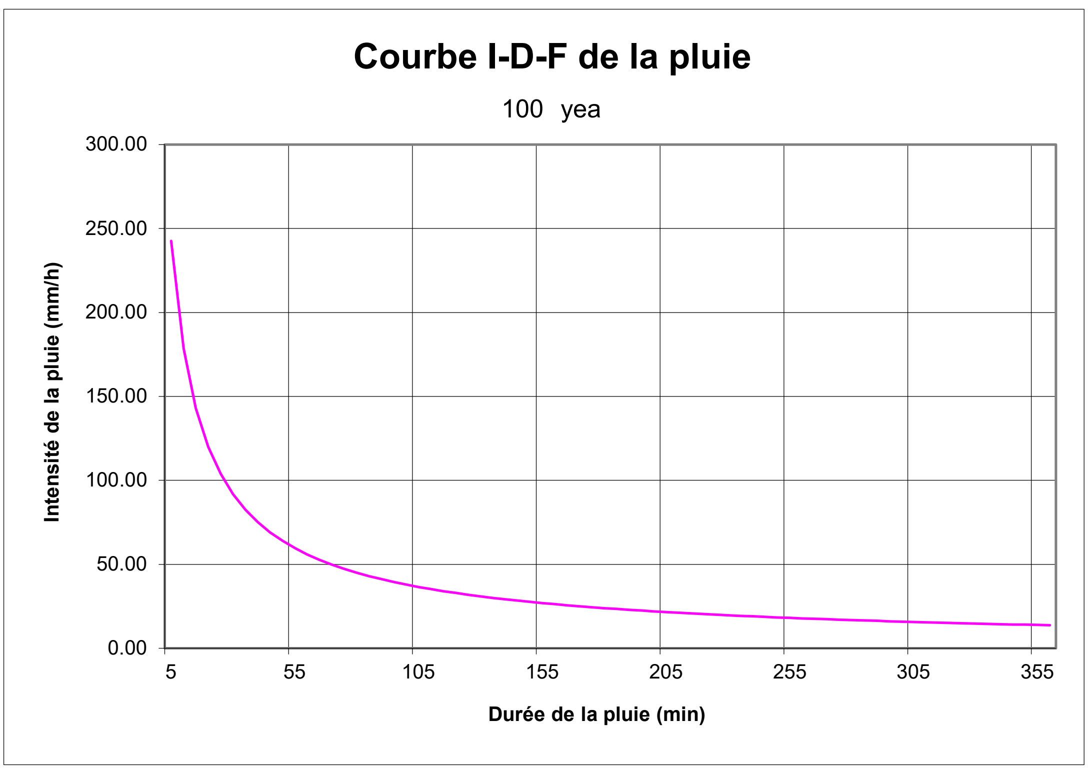
Verified by: Christian Lavoie-Lebel, P.Eng.   Date: July 23, 2021
PEO No.: 100067842

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





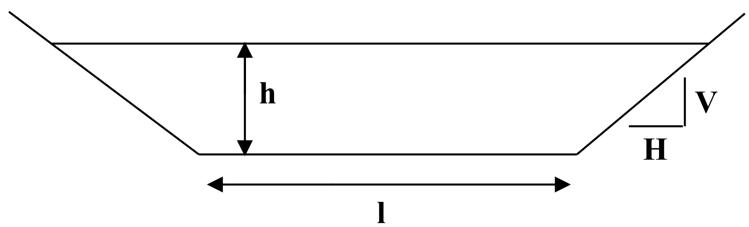
Date: 2021-08-13

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)	m³/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

##

CALCUL DE LA LIGNE PIÉZOMÉTRIQUE
Feuille de calcul

Effacer | Graphique

Titre du projet:	Fastfrate Warehouse Development		**Secteur:**	Outfall	
No. de projet:	A001083 (360)		**Rue:**	n.a.	
Design par:	Guillaume LeBlond, M.A.Sc.	**Date:** 2021-07-23	**Niveau d'eau initial (m):**	90.07	**LGE_s initiale (m):**
Vérifié par:	Christian Lavoie-Lebel, P.En	**Date:** 2021-07-23	**Vitesse initiale (m/s):**	1.4	**LGH initiale (m):**
			n de Manning:	0.013	

No. de regard	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)	LGE_s (m)	K	$K(V^2/2g)$ (m)	LGE_e (m)	LGH_e (m)	Él. cour. (amont) (m)	Él. Surface (m)	Type d'écoulement	Él. Surface - 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	torrentiel	
STM 900	900	0.907	0.0022	6.1	1.537	0.788	0.5903	0.555	0.120	0.002	0.013	90.204	0.5	0.060	90.264	90.144	90.19342	91	fluvial	0.856

Commentaires:

CALCUL DE LA LIGNE PIÉZOMÉTRIQUE
Feuille de calcul

Aquapraxis

Effacer | Graphique

Titre du projet: Fastfrate Warehouse Development
No. de projet: A001083 (360)
Design par: Guillaume LeBlond, M.A.Sc. **Date:** 2021-07-23
Vérifié par: Christian Lavoie-Lebel, P.En **Date:** 2021-07-23

Secteur: Outfall
Rue: n.a.
Niveau d'eau initial (m): 89.11
Vitesse initiale (m/s): 0.3
n de Manning: 0.013

LGE_s initiale (m):
LGH initiale (m):

No. de regard	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)	LGE_s (m)	K	$K(V^2/2g)$ (m)	LGE_e (m)	LGH_e (m)	Él. cour. (amont) (m)	Él. Surface (m)	Type d'écoulement	Él. Surface - 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	0.4965			1.4				0.100			90.034			90.030	89.934	90.18	91	torrentiel	
STM 900	900	0.4965	0.0022	6.1	1.367	0.500	0.3631	0.409	0.095	0.002	0.013	90.043	0.5	0.048	90.091	89.996	90.19342	91	fluvial	1.004

Commentaires:

PROJECT NAME:	Fastfrate (Ottawa) Warehouse Development
CIMA+ PROJECT NUMBER:	A001083
CLIENT:	Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS:	90 % Design (Site plan Approval)

Numerical Analysis; Orifice sizing

Prepared by: Guillaume LeBlond, M.A.Sc., EIT — Date: August 9, 2021
PEO No.: 100530467

Extended Detention Control

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)	89.3 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

Retention Control - Freeflow condition

Verified by: Christian Lavoie-Lebel, P.Eng.   Date: August 9, 2021
PEO No.: 100067842

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
PEO No.: 100530467

Date: August 9, 2021

Verified by: Christian Lavoie-Lebel, P.Eng.
PEO No.: 100067842

Date: August 9, 2021

Retention Control - Freeflow condition

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 | Date: August 9, 2021
PEO No.: 100530467

Retention Control - Surcharged 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)	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

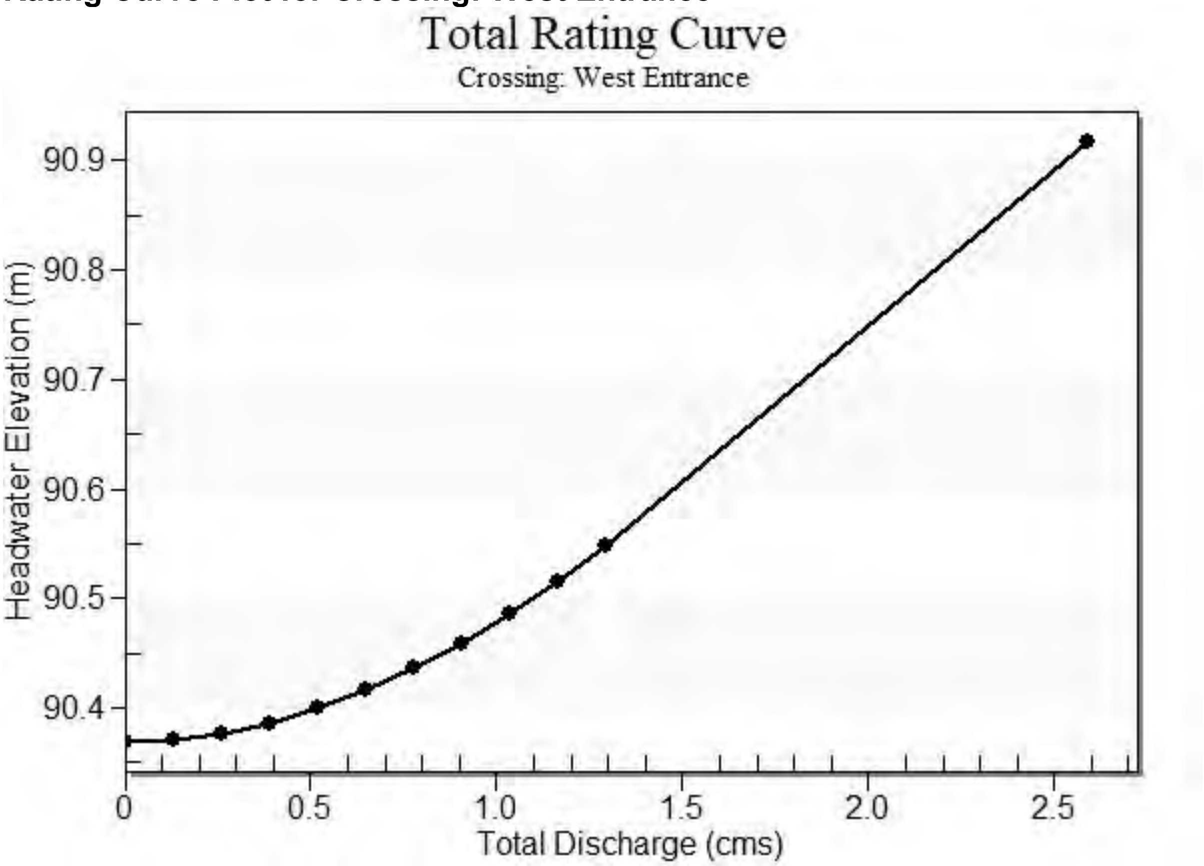


Table 2 - Culvert Summary Table: West Entrance Road Culvert

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

****

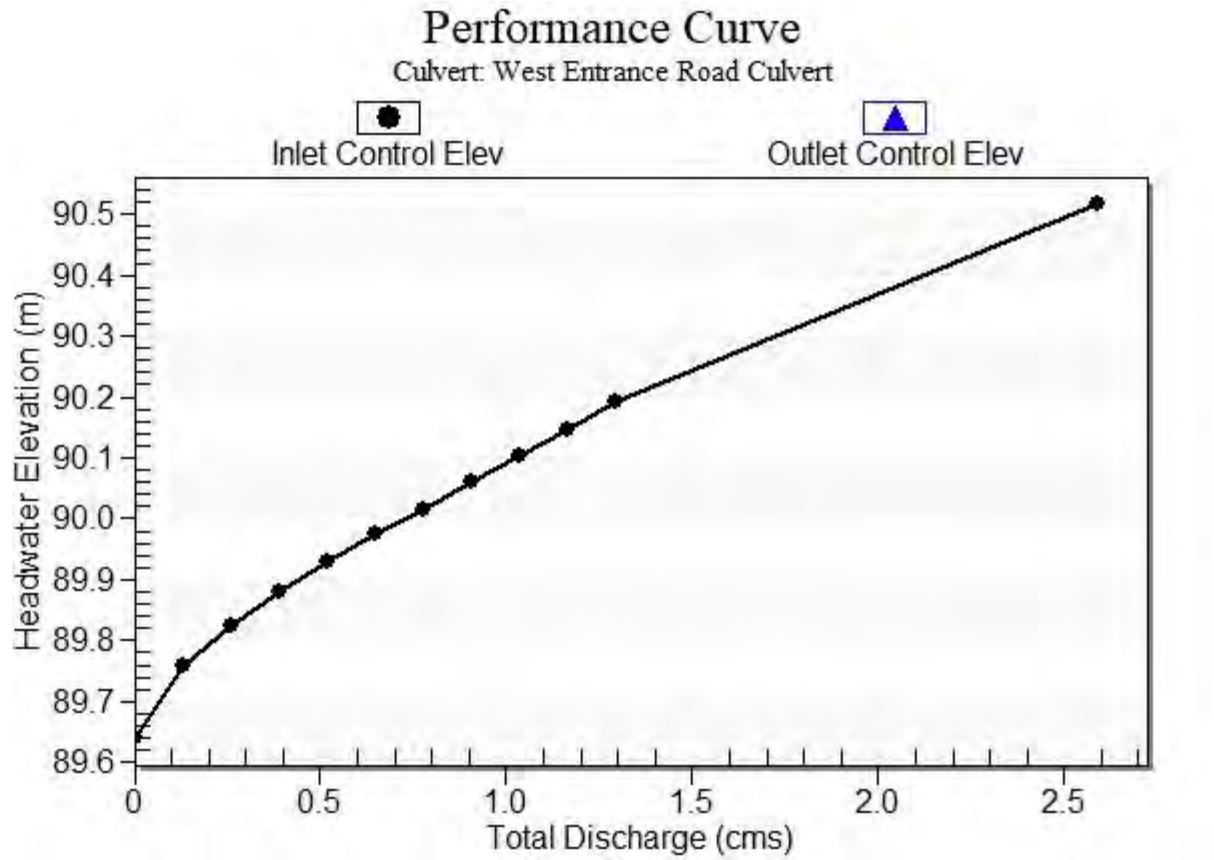
Straight Culvert

Inlet Elevation (invert): 89.64 m, Outlet Elevation (invert): 89.63 m

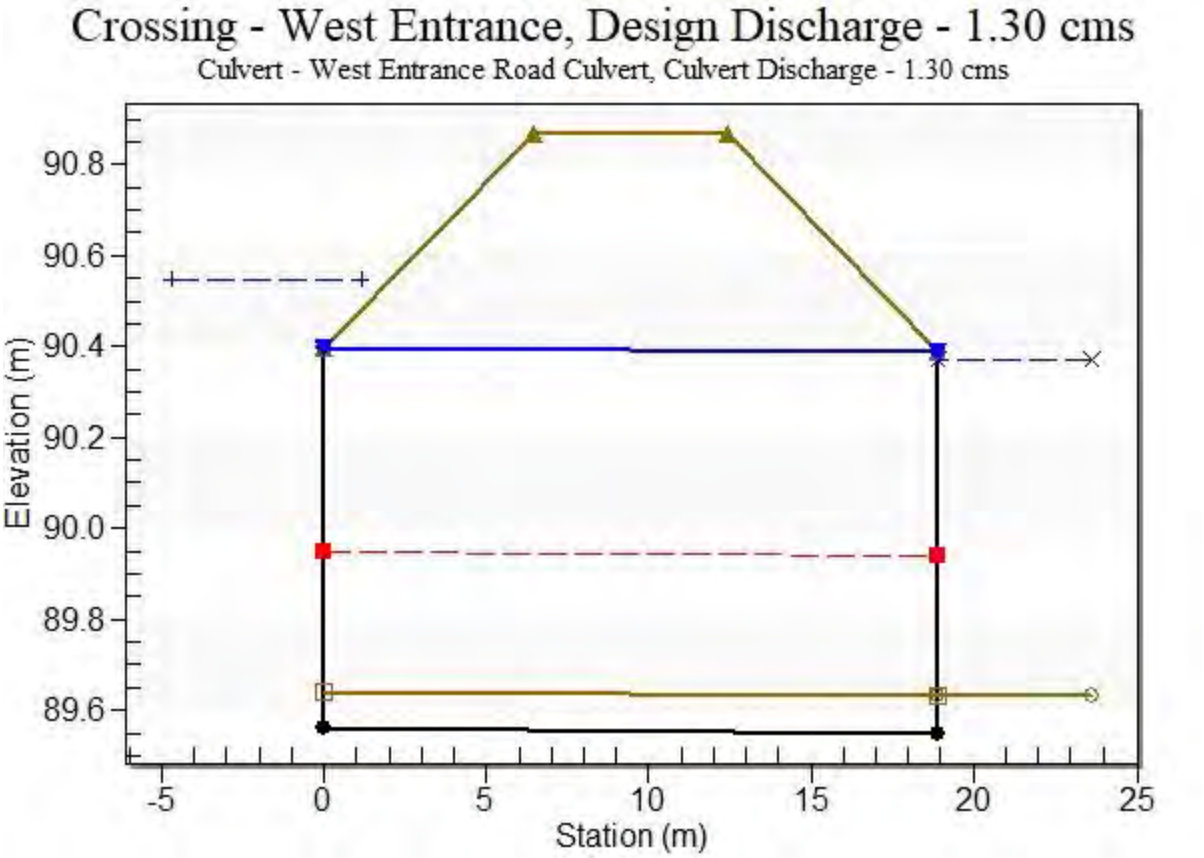
Culvert Length: 18.90 m, Culvert Slope: 0.0005

****

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

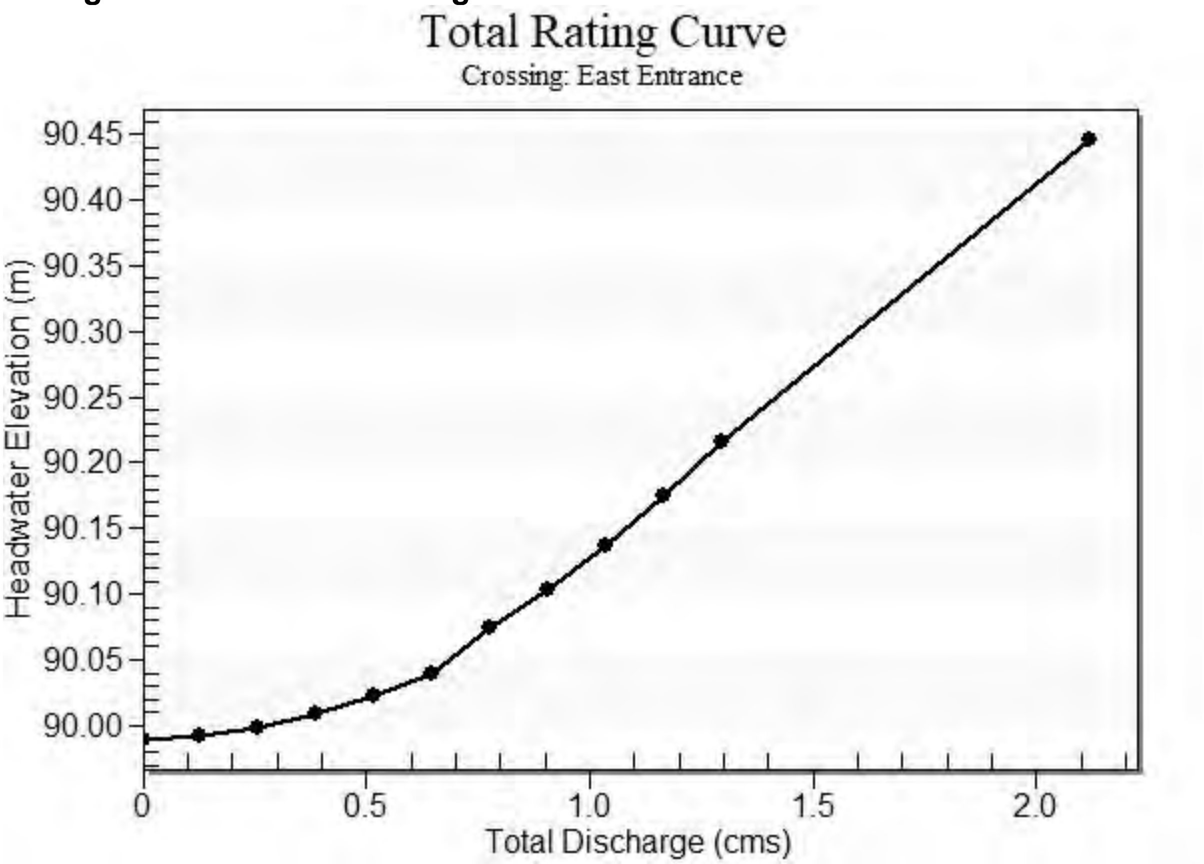
Design Flow: 45.7325 cfs

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

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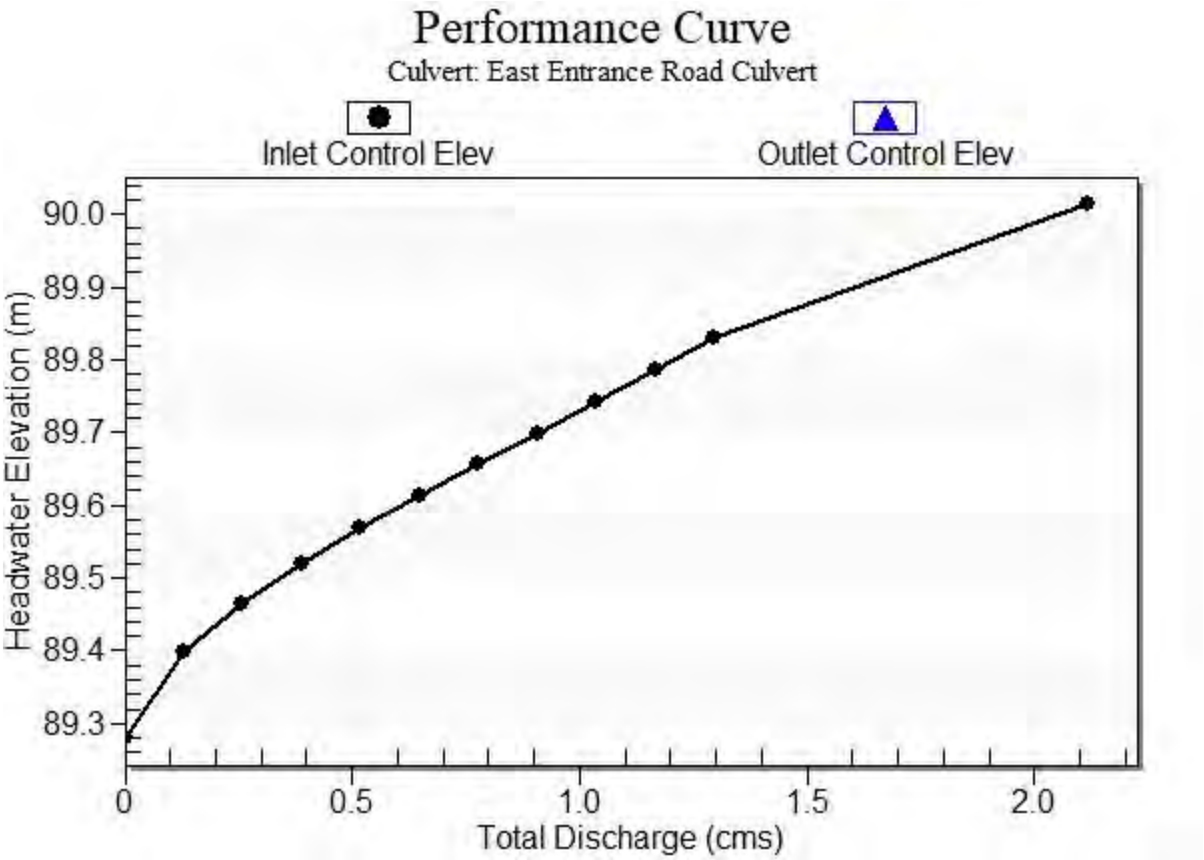
Straight Culvert

Inlet Elevation (invert): 89.28 m,   Outlet Elevation (invert): 89.25 m

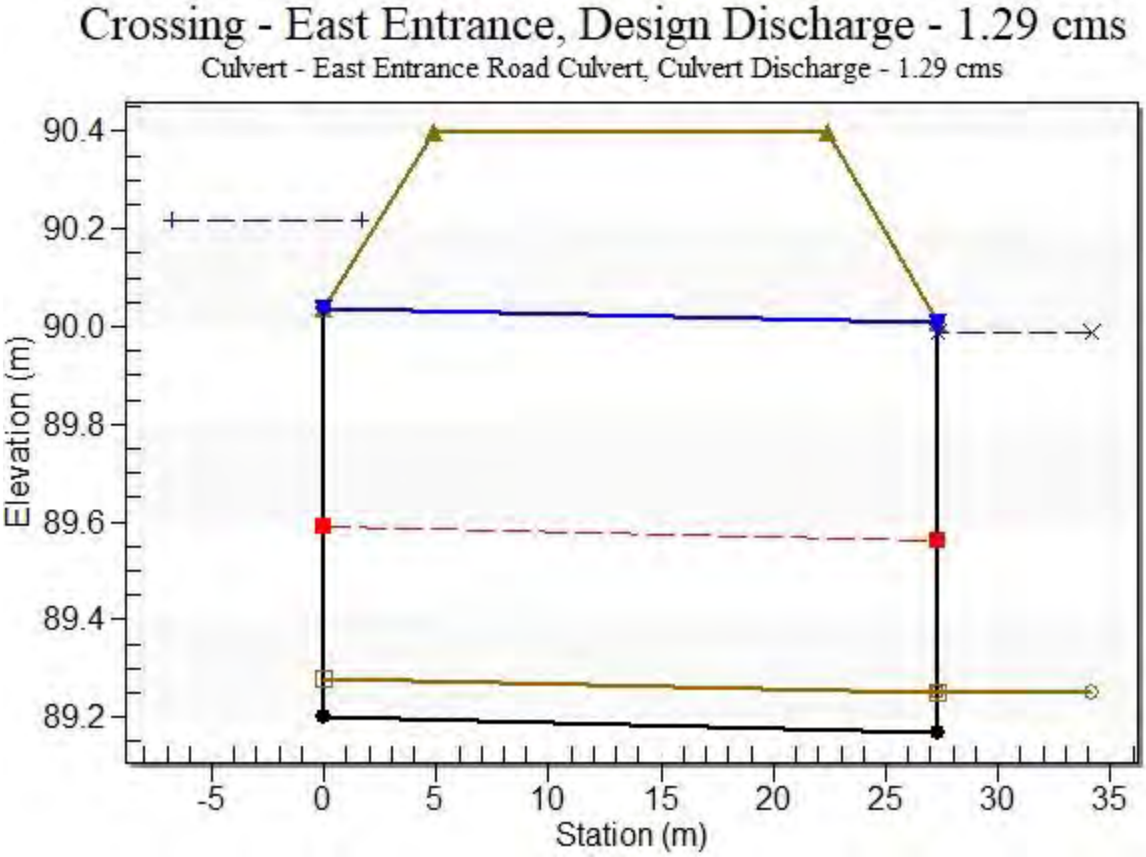
Culvert Length: 27.30 m,   Culvert Slope: 0.0011

****

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

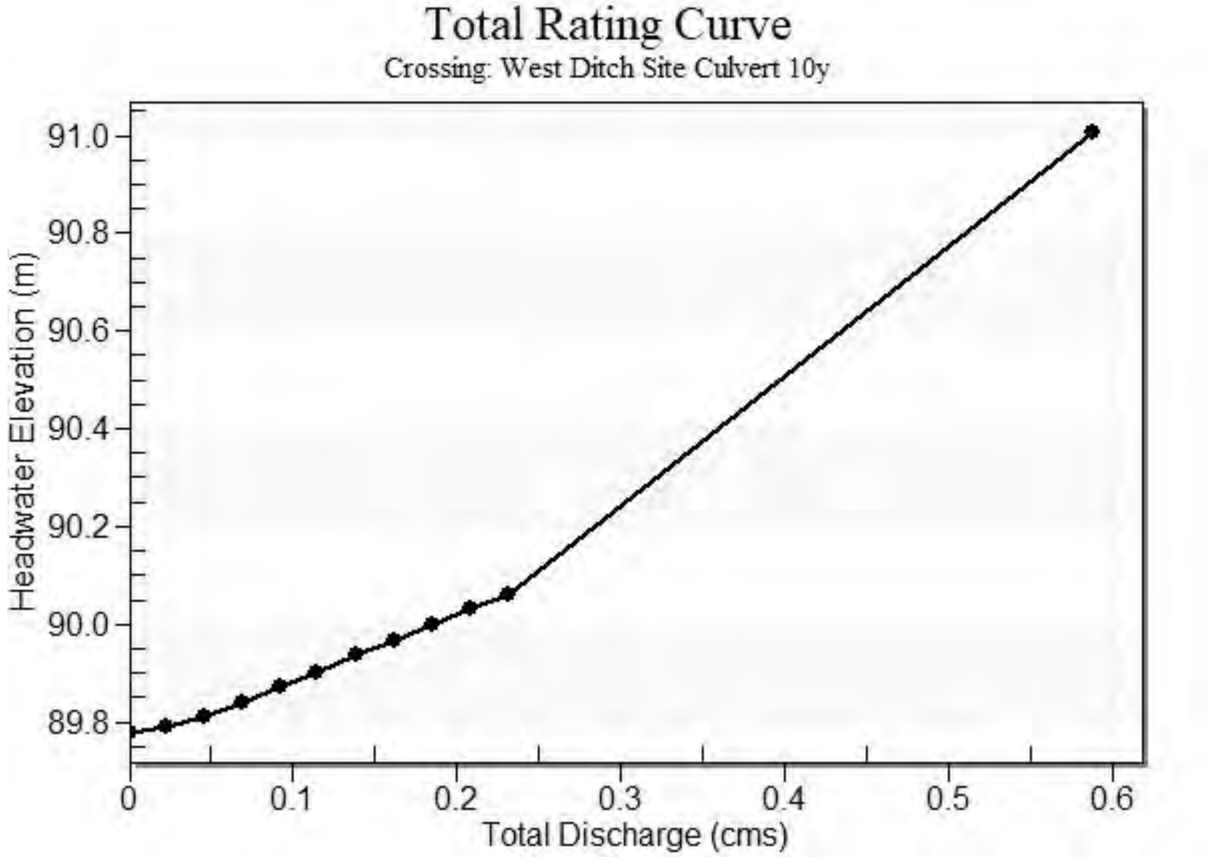


Table 2 - Culvert Summary Table: West Ditch Site Culvert 10y

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

****

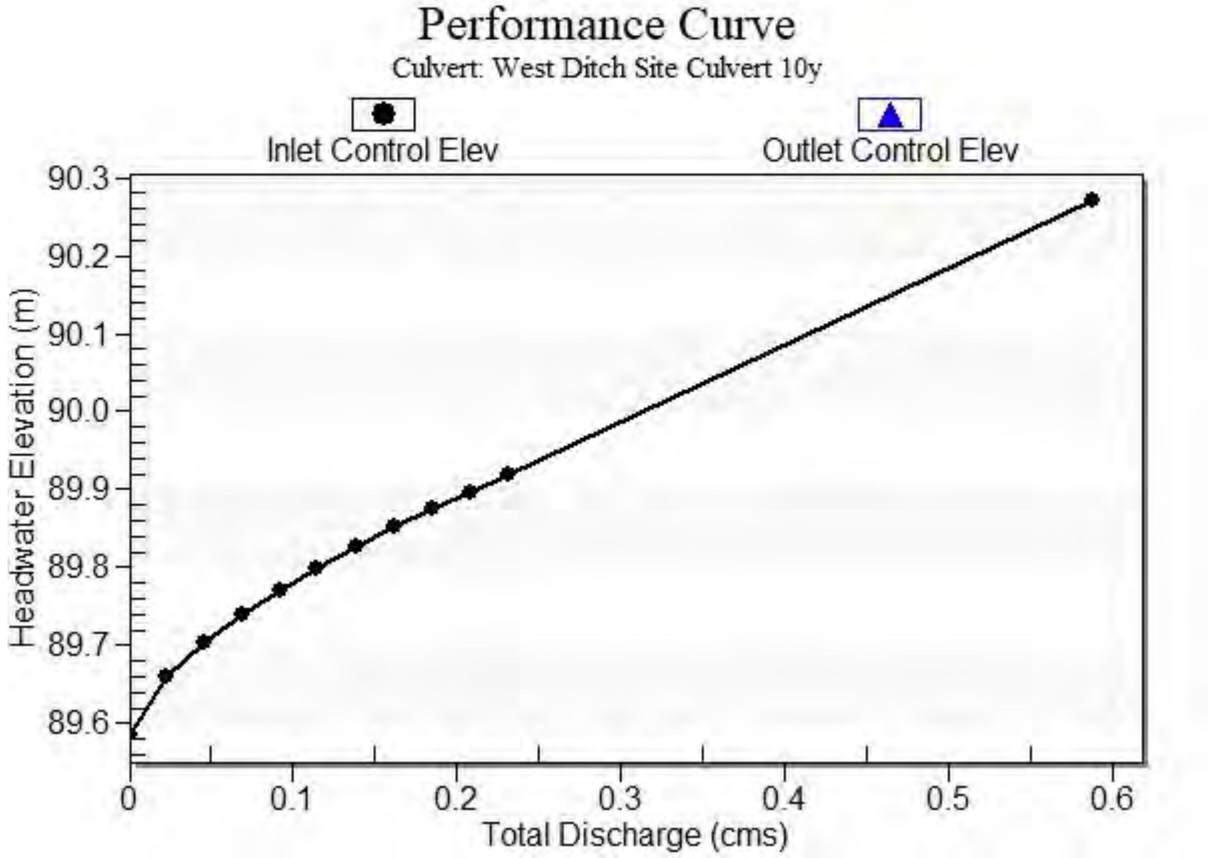
Straight Culvert

Inlet Elevation (invert): 89.58 m,   Outlet Elevation (invert): 89.54 m

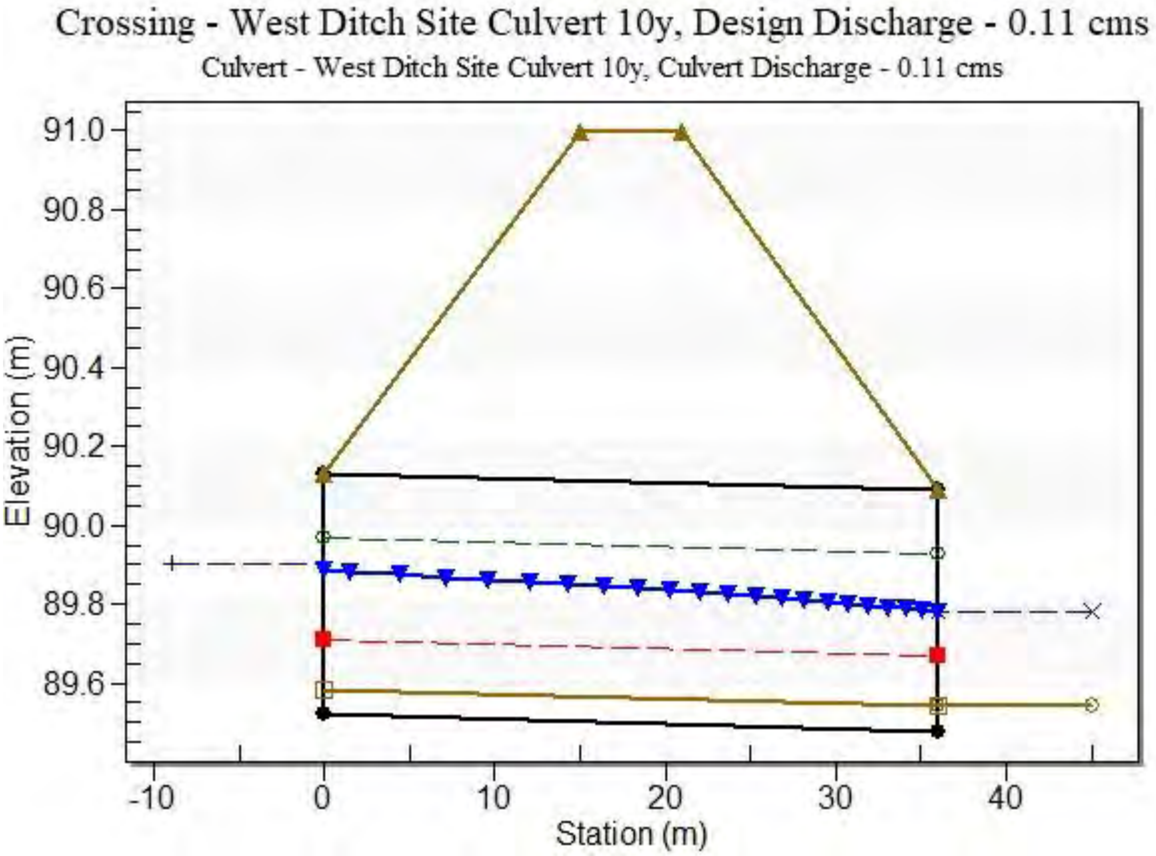
Culvert Length: 36.00 m,   Culvert Slope: 0.0011

****

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

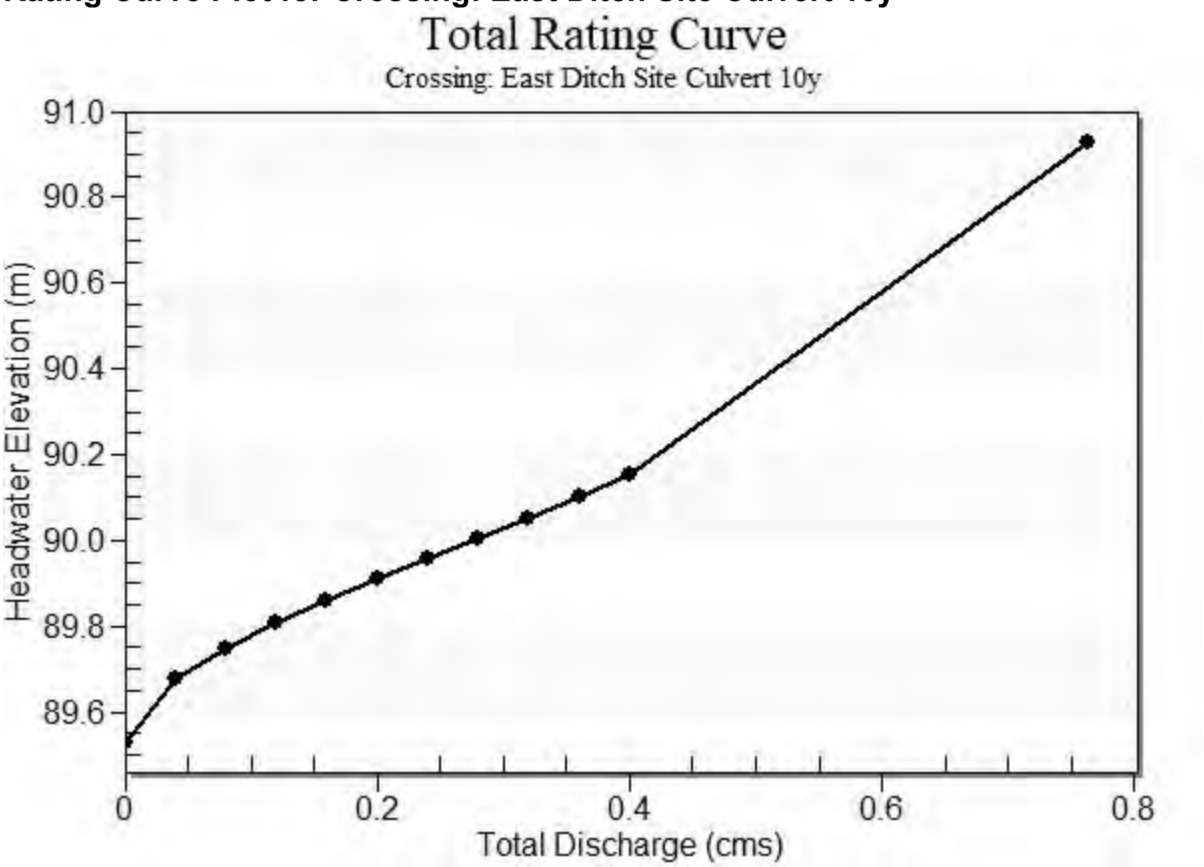


Table 5 - Culvert Summary Table: East Ditch Site Culvert 10y

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

****

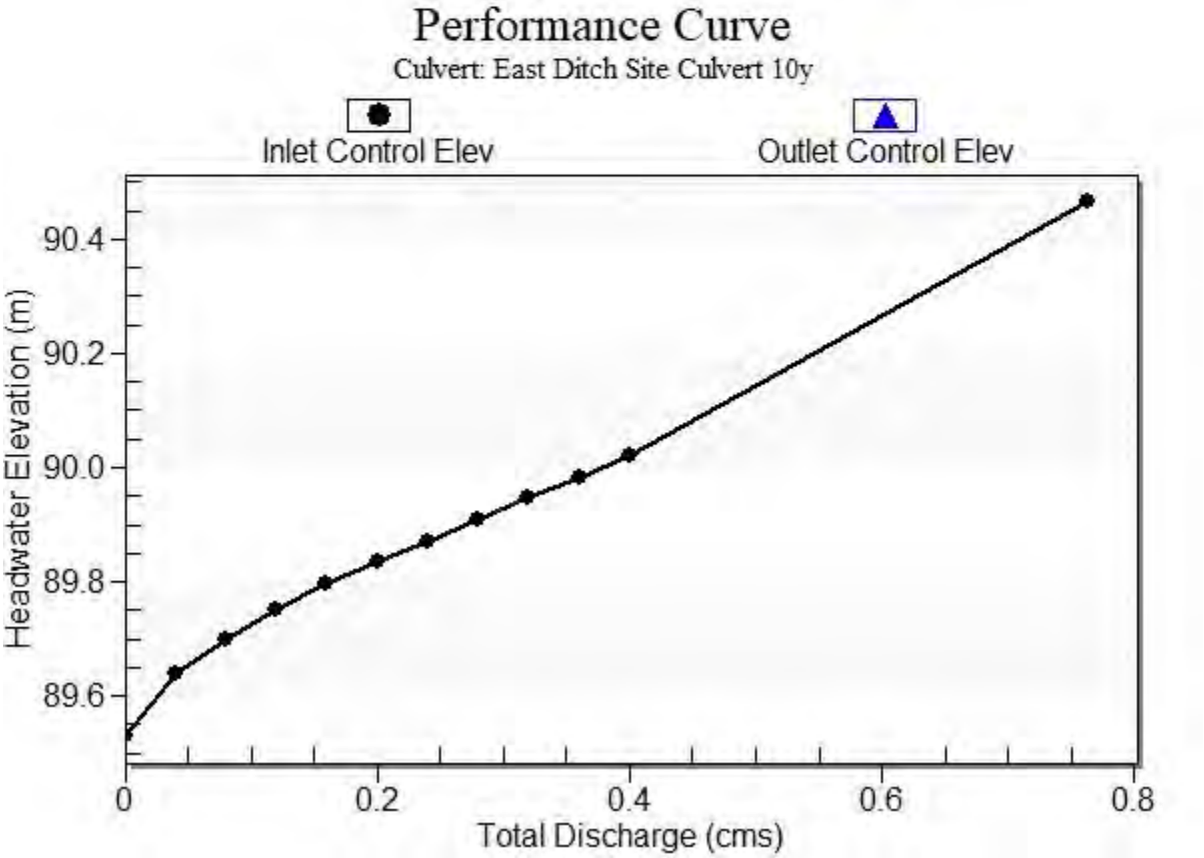
Straight Culvert

Inlet Elevation (invert): 89.53 m, Outlet Elevation (invert): 89.50 m

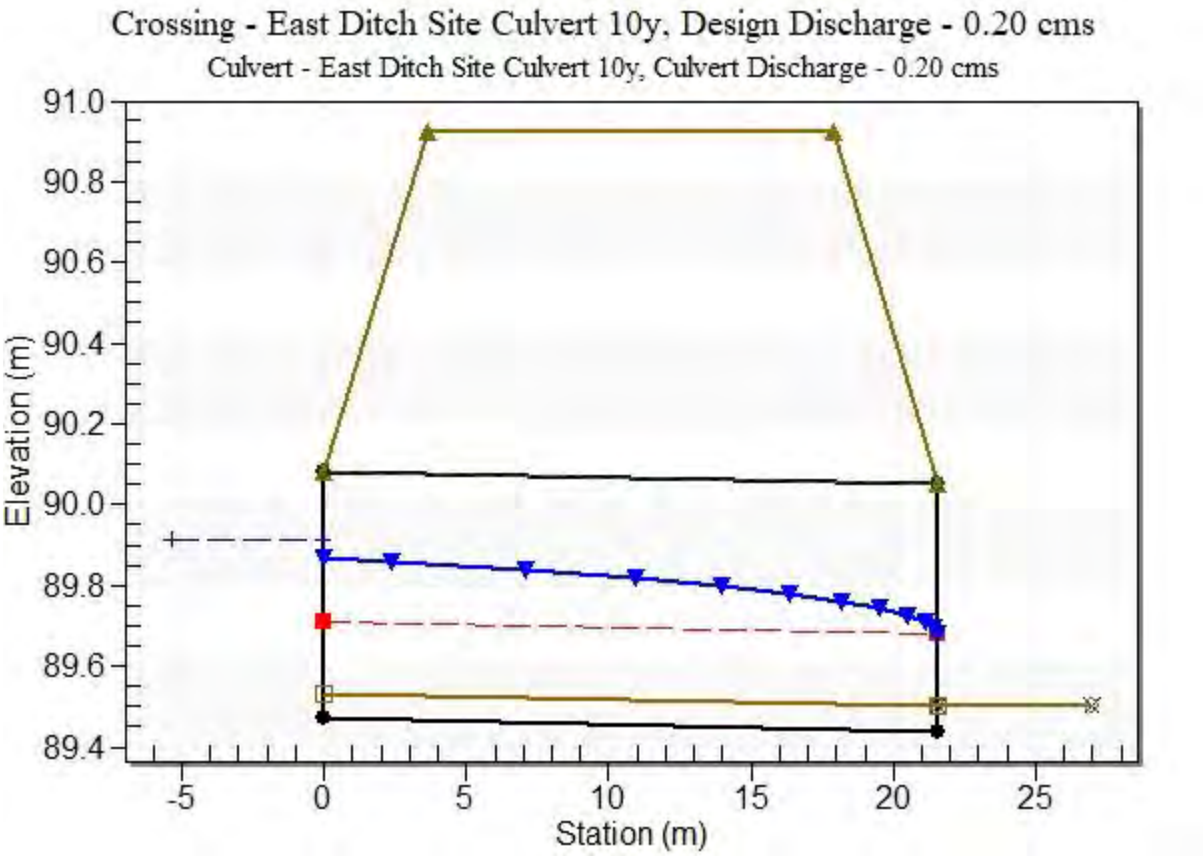
Culvert Length: 21.55 m, Culvert Slope: 0.0014

****

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

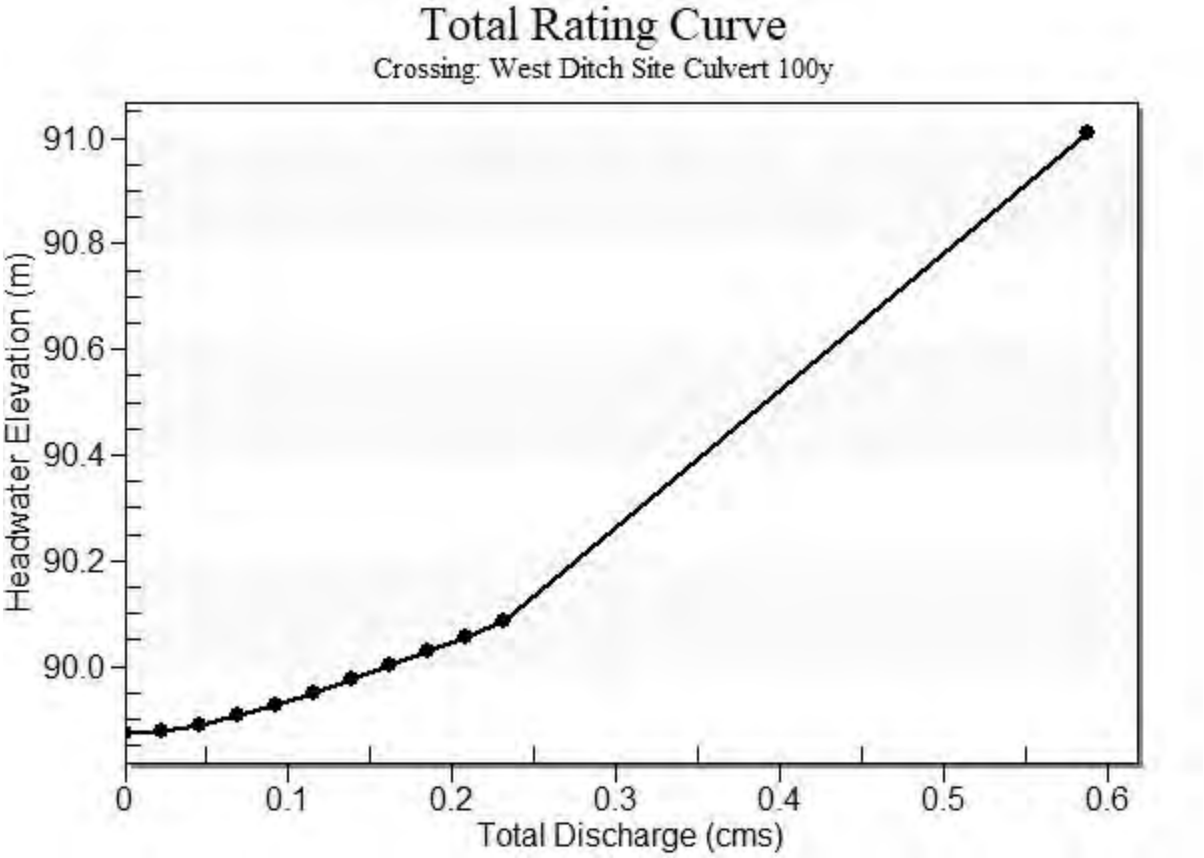


Table 8 - Culvert Summary Table: West Ditch Site Culvert 100y

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

****

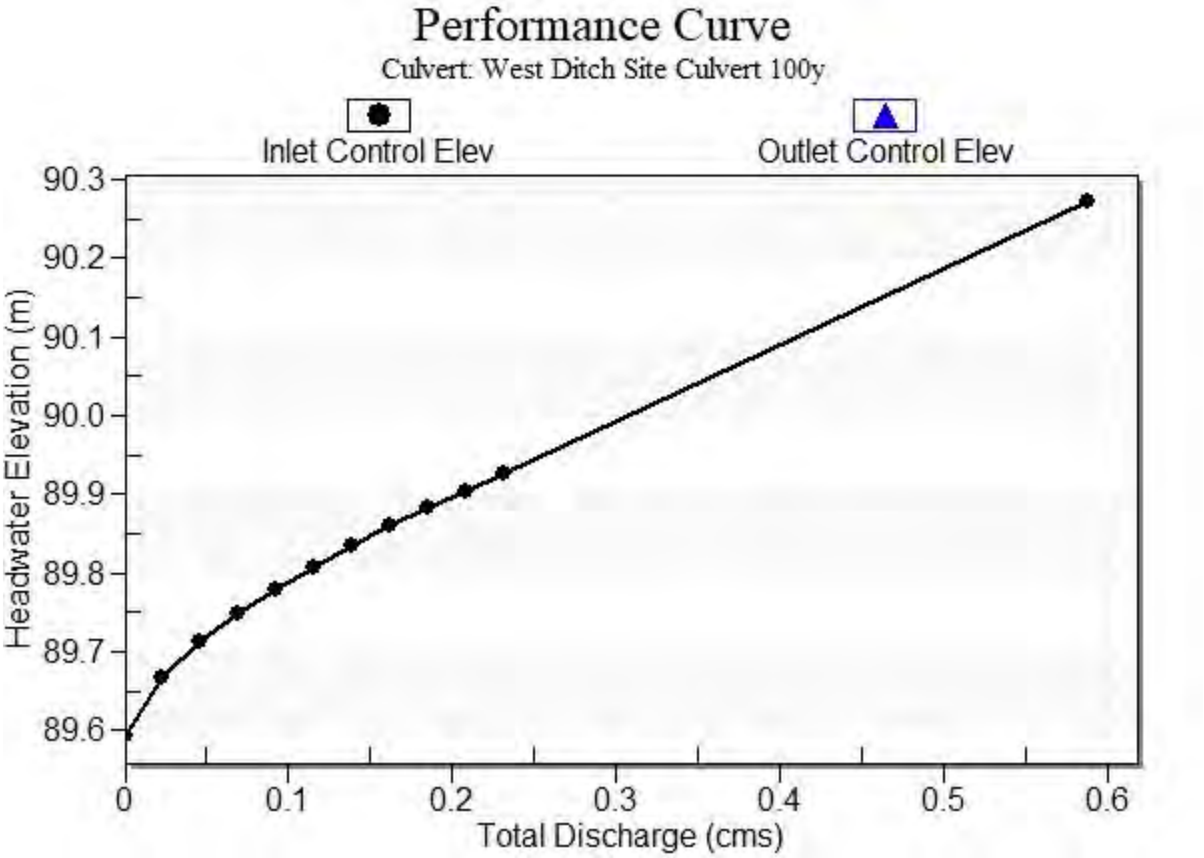
Straight Culvert

Inlet Elevation (invert): 89.59 m, Outlet Elevation (invert): 89.55 m

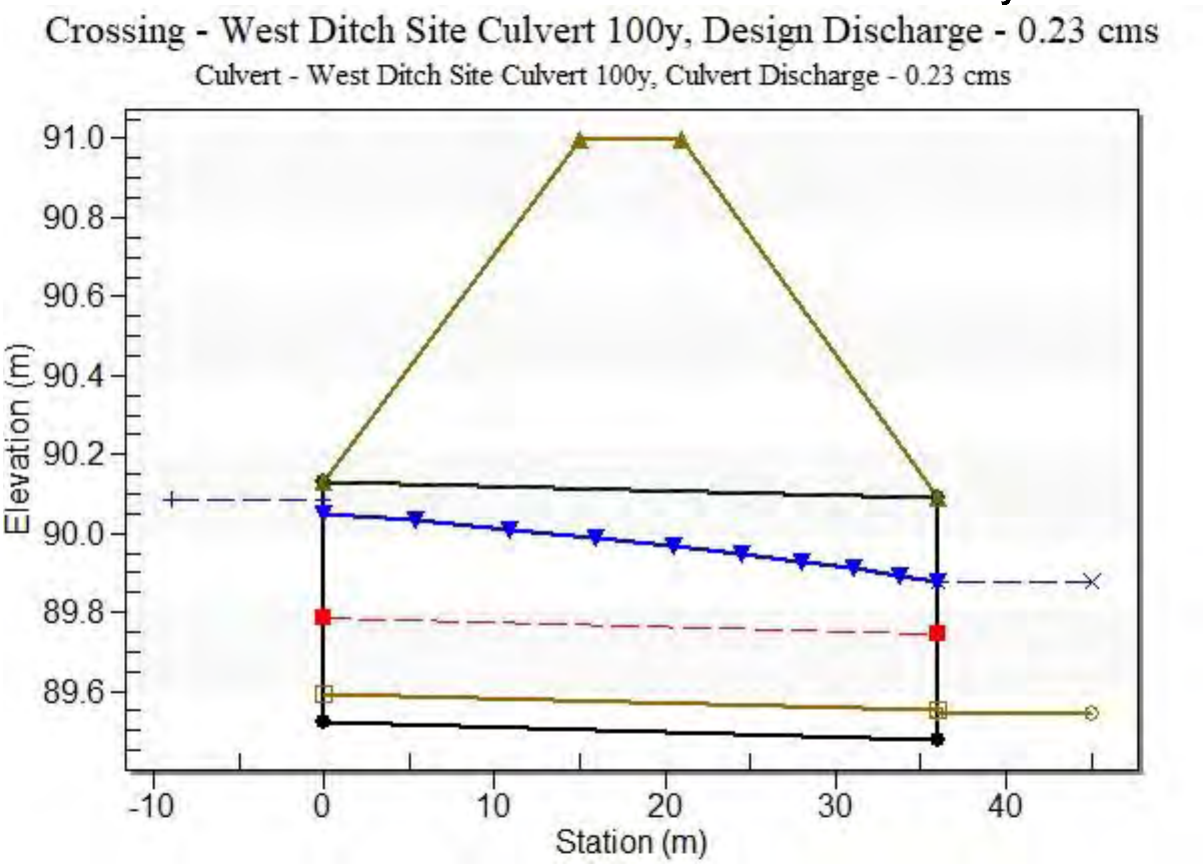
Culvert Length: 36.00 m, Culvert Slope: 0.0011

****

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

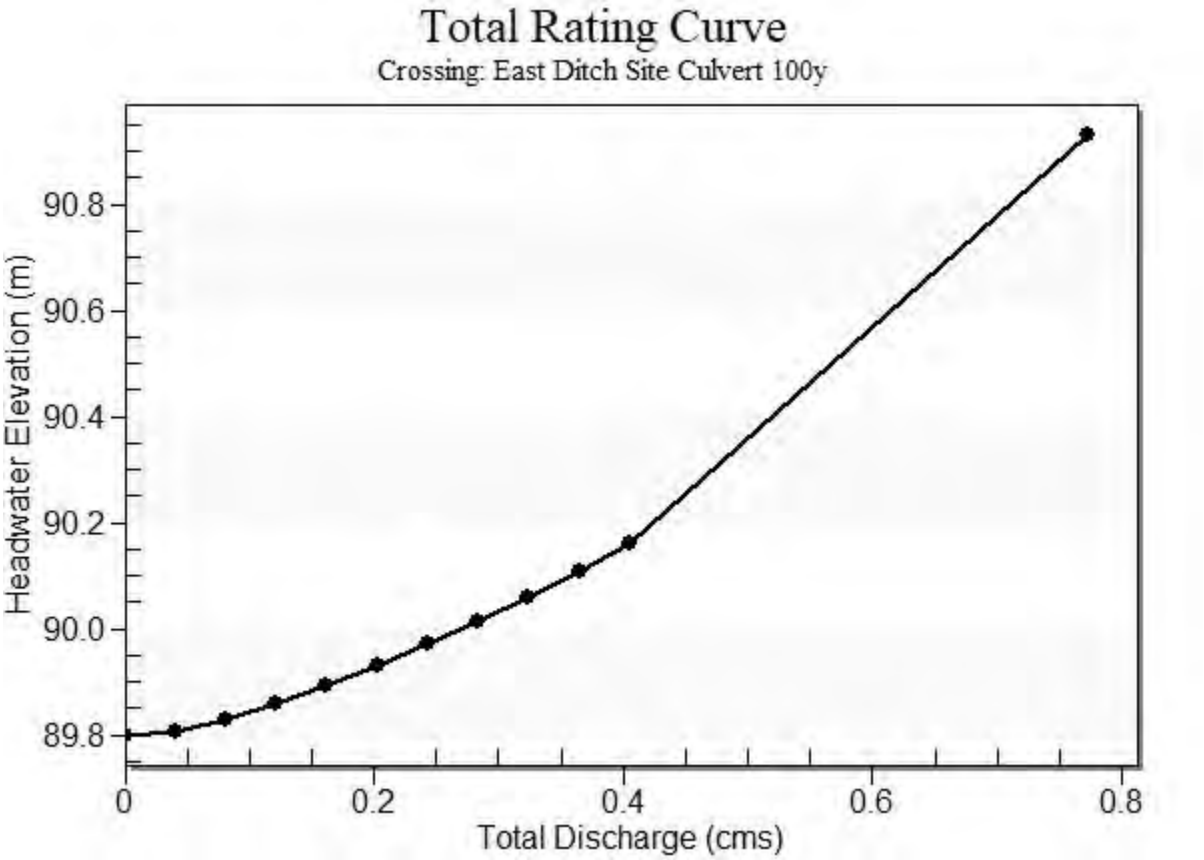


Table 11 - Culvert Summary Table: East Ditch Site Culvert 100y

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

****

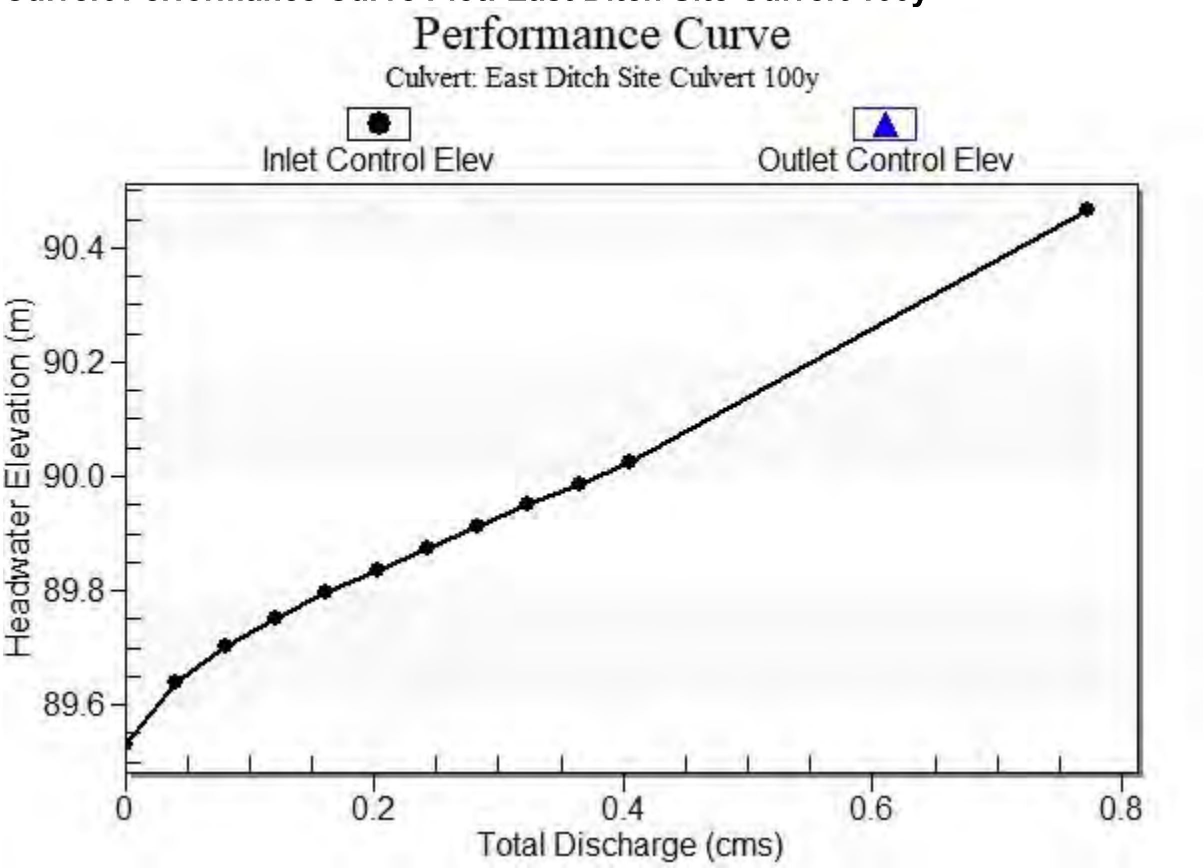
Straight Culvert

Inlet Elevation (invert): 89.53 m,   Outlet Elevation (invert): 89.50 m

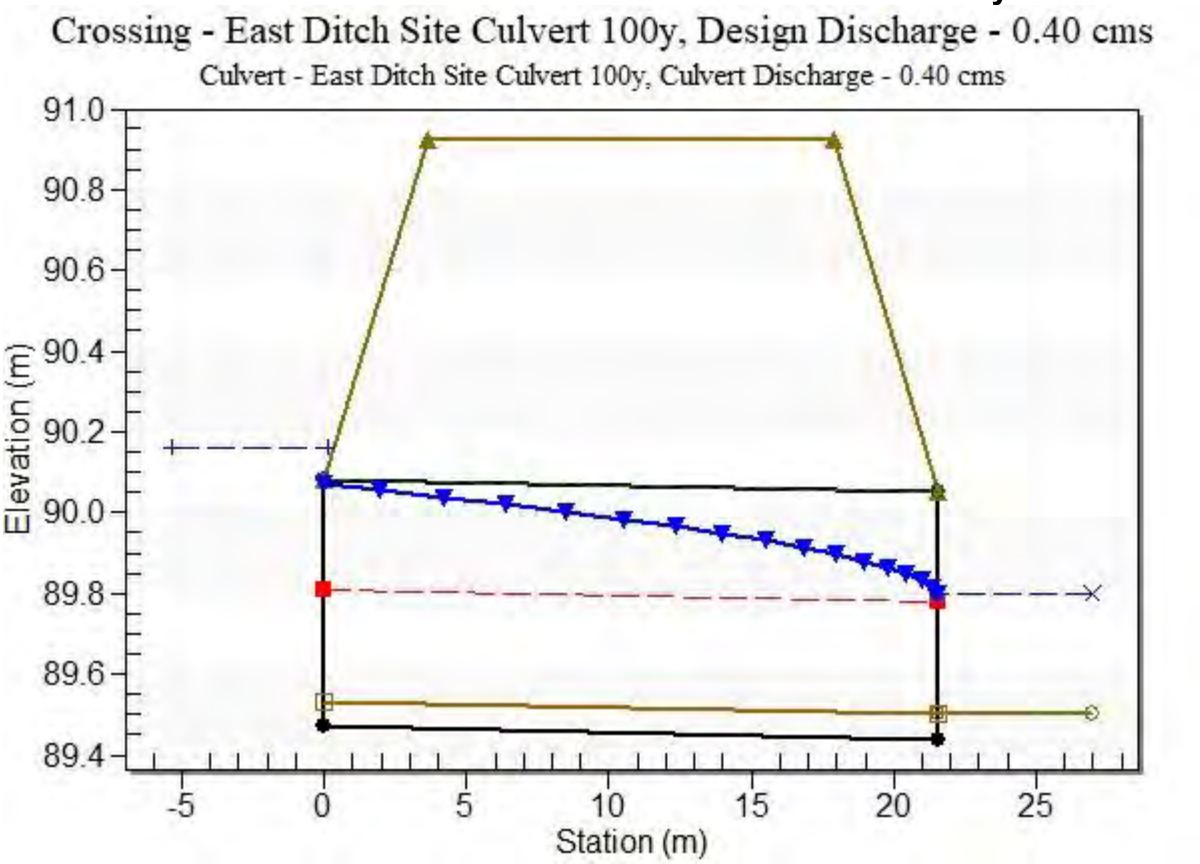
Culvert Length: 21.55 m,   Culvert Slope: 0.0014

****

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

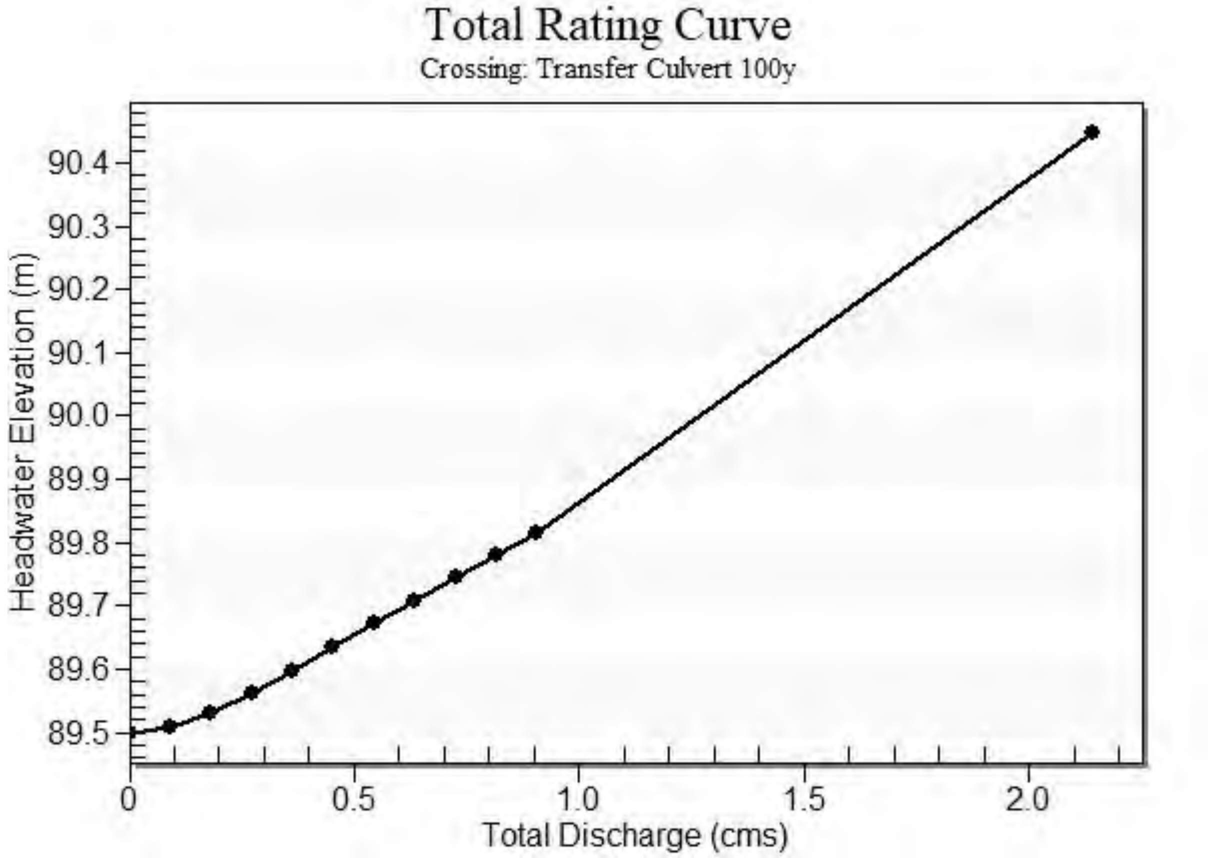


Table 14 - Culvert Summary Table: Transfer Culvert 100y

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

****

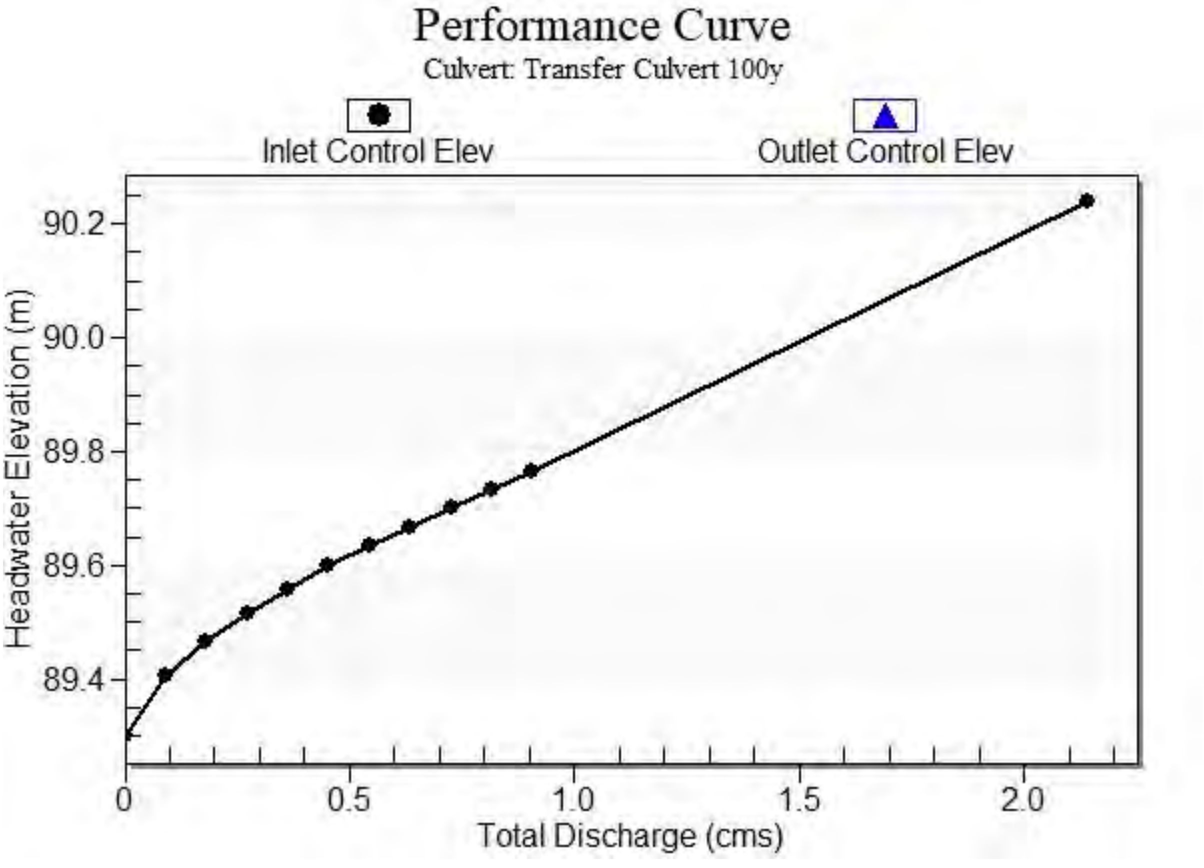
Straight Culvert

Inlet Elevation (invert): 89.30 m, Outlet Elevation (invert): 89.18 m

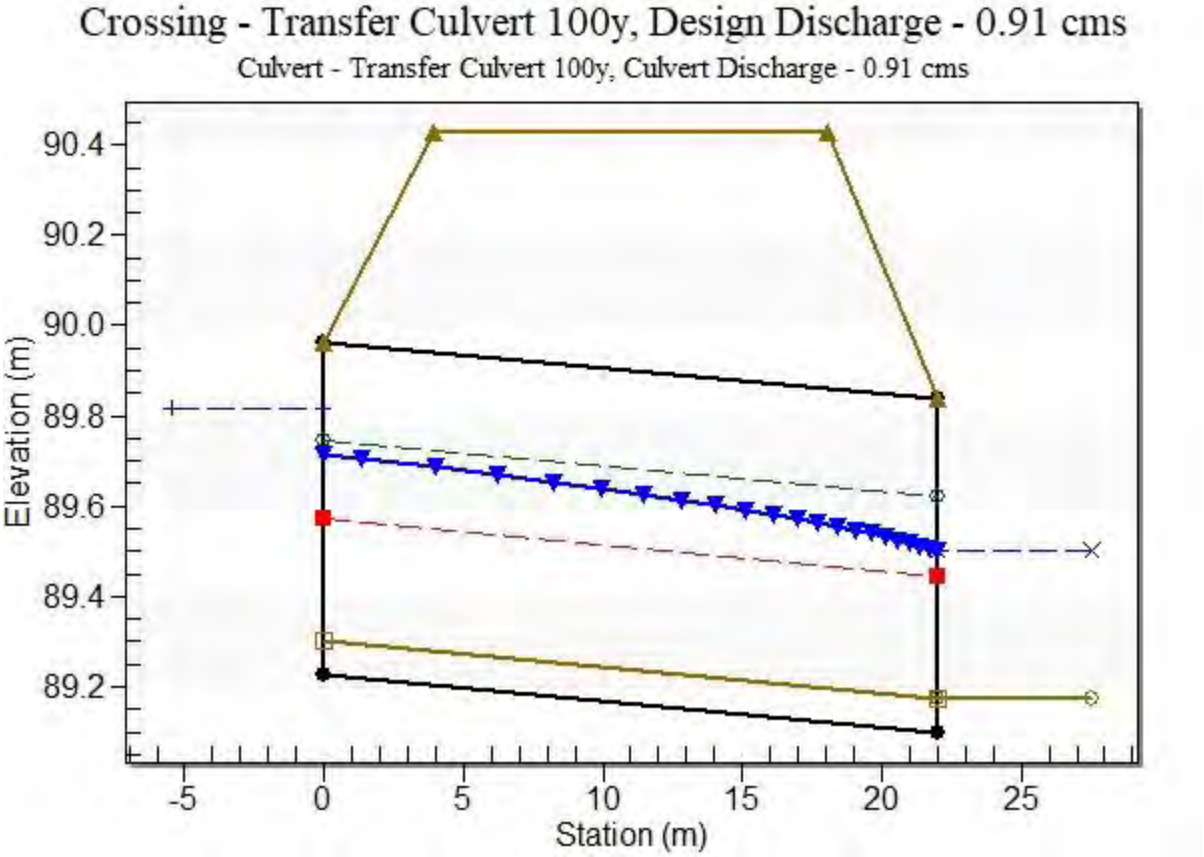
Culvert Length: 22.00 m, Culvert Slope: 0.0057

****

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) m^3/s	Velocity (full) m/s	Flow m^3/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

Appendix I -
Potable Water & Fire Protection Calculations.

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

	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)

$$\boxed{F = 220C\sqrt{A}}$$

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
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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
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS: 90 % Design (Site Plan Approval)

July 25, 2021

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

J

Appendix J -
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**

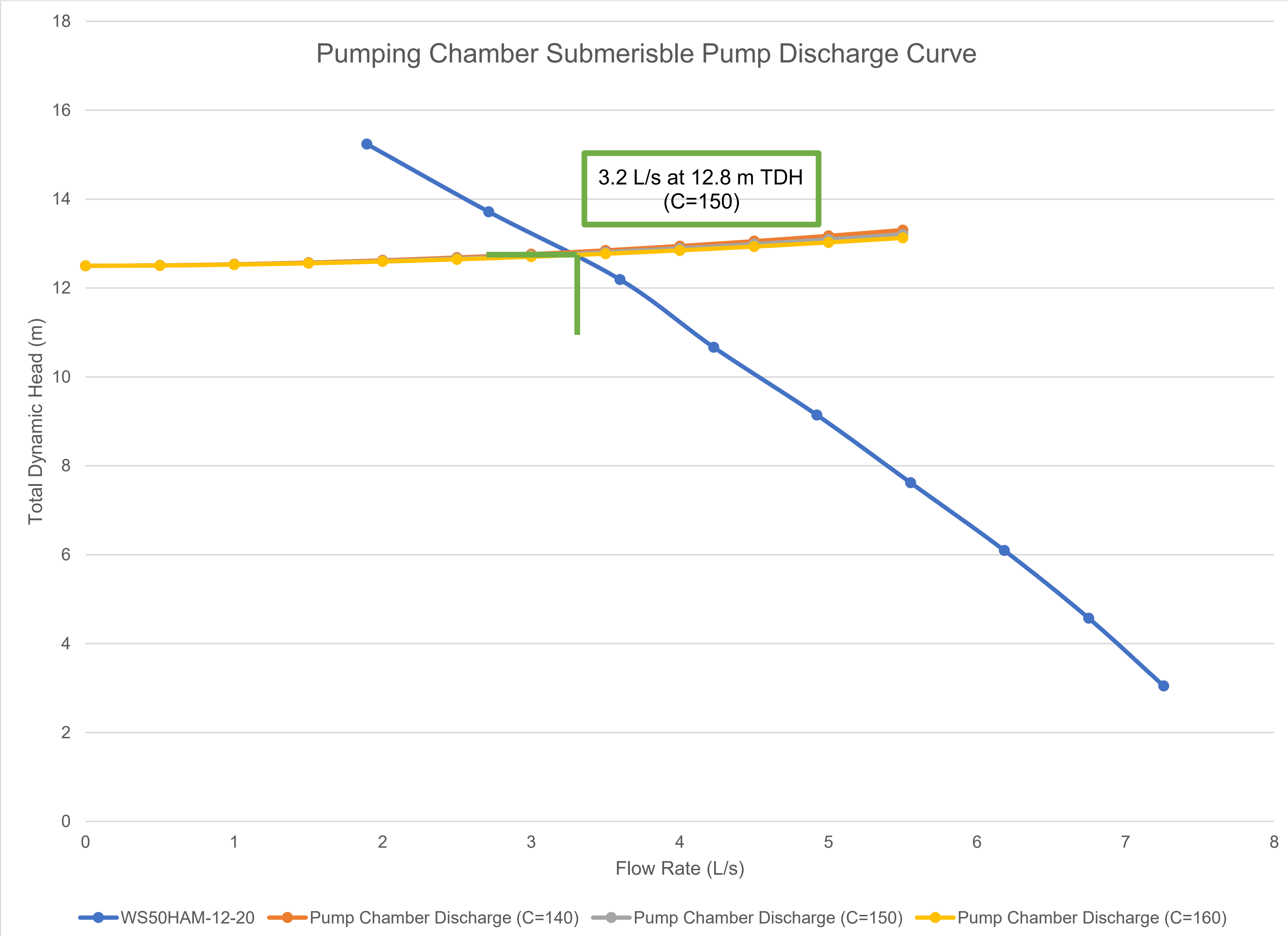
Flow		Velocity	Fitting Loss (K*V^2/2*g)	Pipe Friction Losses Friction Coefficient (C) in m 50 mm Forcemain & Manifold			Pipe Friction Losses Friction Coefficient (C) in m 25 mm Forcemain & Manifold			Static Head	Pressure to be dosed	Total Dynamic Head Loss (m)		
L/s	m3/s	m/s	m	140	150	160	140	150	160	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

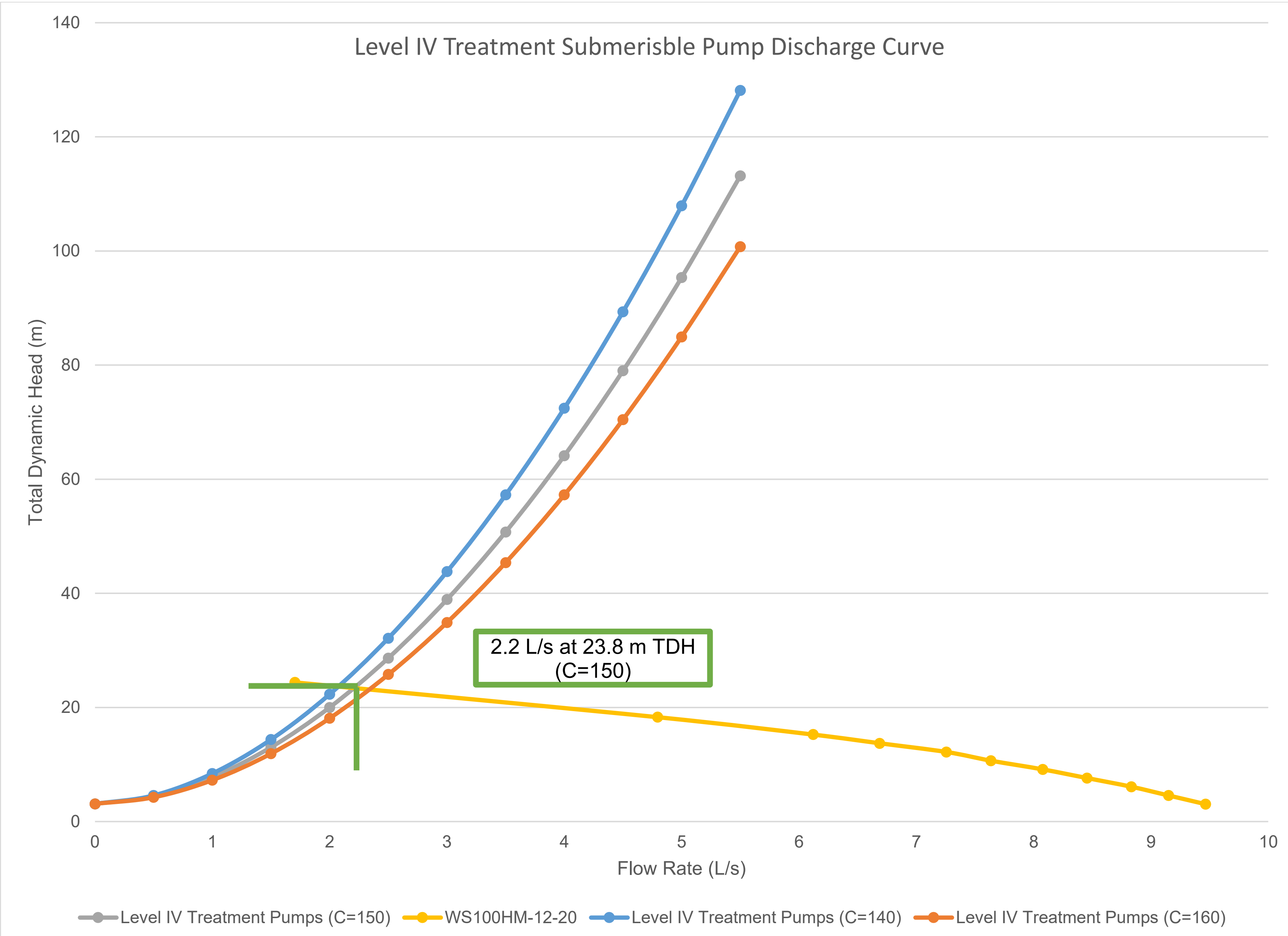
Recycle Line Pump (from Level IV Treatment to Upstream of the Septic System)

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	

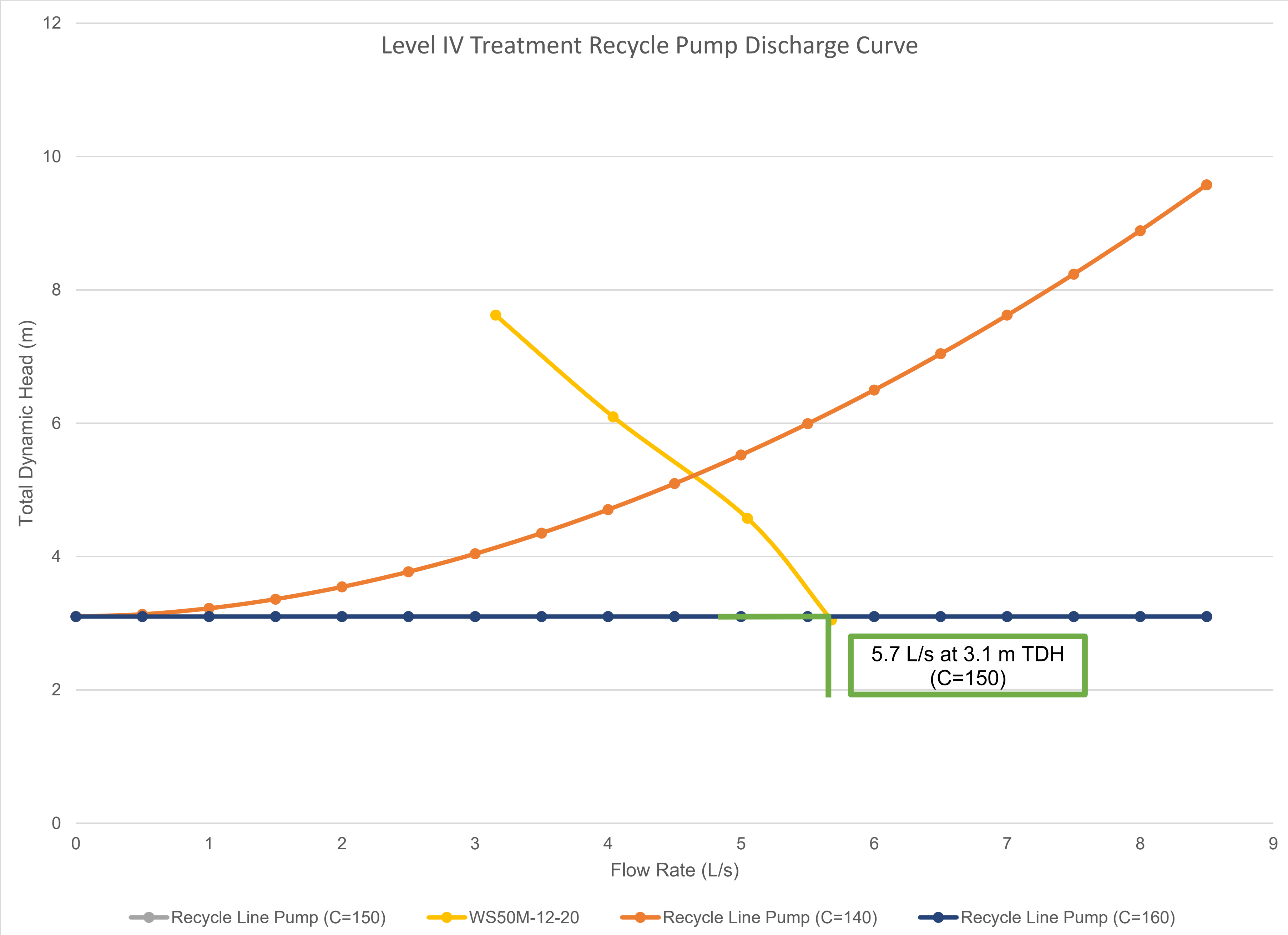
Fittings	K Value	Qty	Total
90 degree elbows	0.81	3	2.43
Check Valve	10.8	1	10.8
Ball Valve	0.08	1	0.08
		Subtotal	13.31
		Safety Factor	1.2
		Total	**14.51**

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)
140
120
100
80
60
40
20
0
0
1
2
3
4
5
6
7
8
9
10
Flow Rate (L/s)
2.2 L/s at 23.8 m TDH
(C=150)
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
Total Dynamic Head (m)
Flow Rate (L/s)
0
2
4
6
8
10
12
0
1
2
3
4
5
6
7
8
9
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)

K

Appendix K - 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

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) (m^3/s)	Velocity (full) (m/s)	Flow (m^3/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
PEO No.: 100530467
Date: 2021-07-20

Verified by: Christian Lavoie-Lebel, P.Eng.
PEO No.: 100067842
Date: 2021-07-20

L

Appendix L - Correspondence

Ottawa

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.

- o Right-of-way protection on Rideau is 26 metres and the sight triangle at Somme/Rideau: 5 metre x 5 metres
- o 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)

- o 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.
- o 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.
- o 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)

- o 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*).
- o 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.
- o 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.
- o 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

T 613-860-2462 ext. 6623 **M** 613-668-1298 **F** 613-860-1870
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

T 613-860-2462 ext. 6623 **M** 613-668-1298 **F** 613-860-1870
110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

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

T 613-860-2462 ext. 6667 **C** 613 868-5747 **F** 613-860-1870
110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

Avis pour nos clients sur la COVID-19

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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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.	Appendix B
☑	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	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.	Appendix F
☐	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.	Appendix C, D
☐	Proposed phasing of the development, if applicable.	N/A
☐	Reference to geotechnical studies and recommendations concerning servicing.	Appendices B, C, D & E
☐	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.	Complete drawings provided in Appendix F

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	Appendix C
☑	Identify boundary conditions	Appendix C
☑	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	Appendix F
☐	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, Appendix C
☐	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

Servicing Study Guidelines for Development Applications

☐	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 I
☐	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 K
☑	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 B, G
☑	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 H
☐	Set-back from private sewage disposal systems.	Appendix F
☐	Watercourse and hazard lands setbacks.	Appendix F
☑	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 L
☐	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 & Appendix F
☐	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

Servicing Study Guidelines for Development Applications		
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	Section 4.2, Appendix G
☐	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Appendix F
☐	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.	Appendix F
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	Appendix H
☐	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	