

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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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 an Environmental Compliance Approval (ECA) from the MECP will be required, as the system will treat over 10,000 L/d of sanitary sewage.

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

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

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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 watermain.

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 (cBOD₅) 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 cBOD₅, 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:

- 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".
- 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 frequent 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.

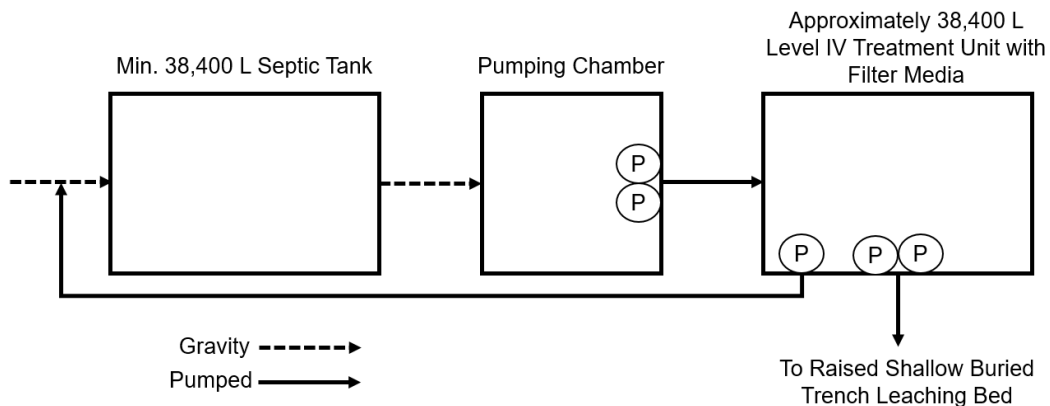


Figure 2-1: Septic System Process Flow Schematic

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% of 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 radius 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 (m²)

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 m². The total mantle surface area provided (extended and beneath the SBT) has an approximate contact surface area of 660 m² 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 radius 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 m 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 water mains. 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 m³, 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 m³ and 987.9 m³ 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 824m³. In the pond dimensioning, at least 677 m³ will be provided in the permanent pool and at least 146m³ 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 m³** 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 m³** is proposed in the SWM pond and a storage volume of **115 m³** is proposed on roofs for a total of **396 m³** (**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 m³/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.

$$t = \frac{2 A_p}{C A_o (2g)^{0.5}} \left(h_1^{0.5} - h_2^{0.5} \right) \quad \text{Equation 4.10: Drawdown Time}$$

Where:

t = drawdown time in seconds

A_p = surface area of pond (m²)

C = discharge coefficient

A_o = cross-sectional area of the orifice (m²)

g = gravitational acceleration constant

h_1 = starting water elevation above the orifice (m)

h_2 = ending water elevation above the orifice (m)

$$t = \frac{2A_p}{CA_o(2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$$
$$t = \frac{2(876.75)}{(0.63)(0.005)(2 * 9.81)^{0.5}} (0.2^{0.5} - 0^{0.5})$$
$$t = 55906 \text{ s} = 15.53 \text{ hours}$$

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."

A

Appendix A - Legal Survey – Fastfrate Warehouse Development

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

PLAN 4R-33406
 RECEIVED AND DEPOSITED

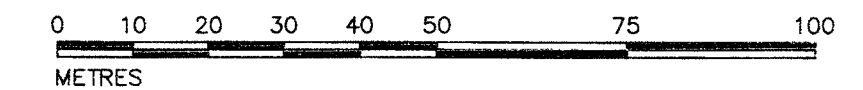
DATE SEPTEMBER 16, 2020

DATE Dec. 22, 2020

J.P. SHIPMAN
 J.P. SHIPMAN

Chris O...
 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



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.

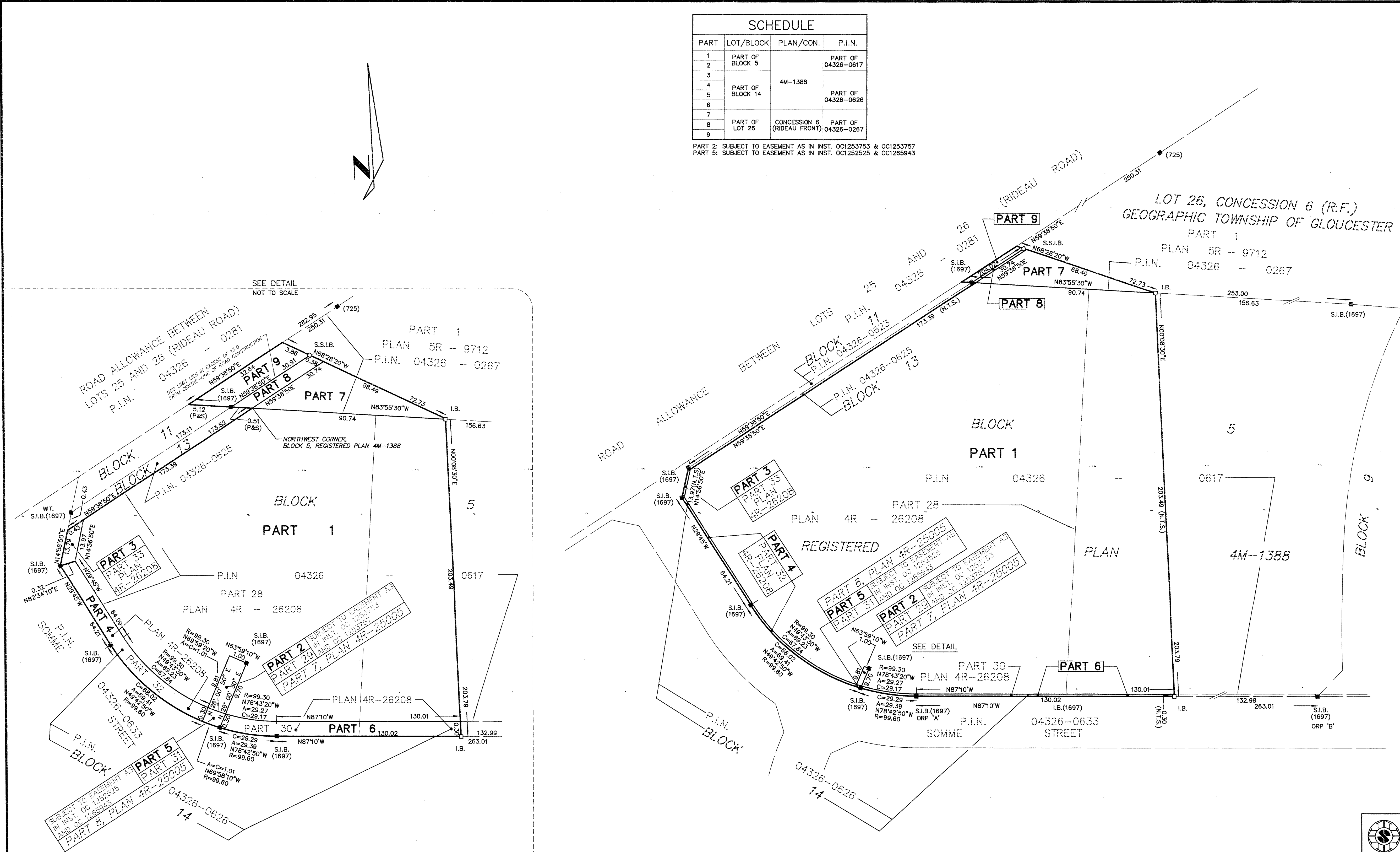
S.I.B. DENOTES 0.025 SQ., 1.2 LONG, STANDARD IRON BAR
 S.S.I.B. DENOTES 0.025 SQ., 0.6 LONG, SHORT STANDARD IRON BAR
 I.B. DENOTES 0.016 SQ., 0.6 LONG, IRON BAR
 □ DENOTES SURVEY MONUMENT FOUND
 □ DENOTES SURVEY MONUMENT PLANTED
 WT. DENOTES WITNESS
 1697 DENOTES J.P. SHIPMAN, O.L.S.
 725 DENOTES R.W. 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
 J.P. SHIPMAN
 ONTARIO LAND SURVEYOR



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:

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STORMWATER MANAGEMENT REPORT
HAWTHORNE INDUSTRIAL PARK

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STORMWATER MANAGEMENT REPORT

HAWTHORNE INDUSTRIAL PARK

1.0 INTRODUCTION

1.1 Background

In 1999, J.L. Richards & Associates Limited (JLR) completed a Stormwater Management Study, on behalf of Beaver Road Builders Ltd., for the development of a proposed area previously referred to as the Hawthorne Road Industrial Subdivision. The main objective of the 1999 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).

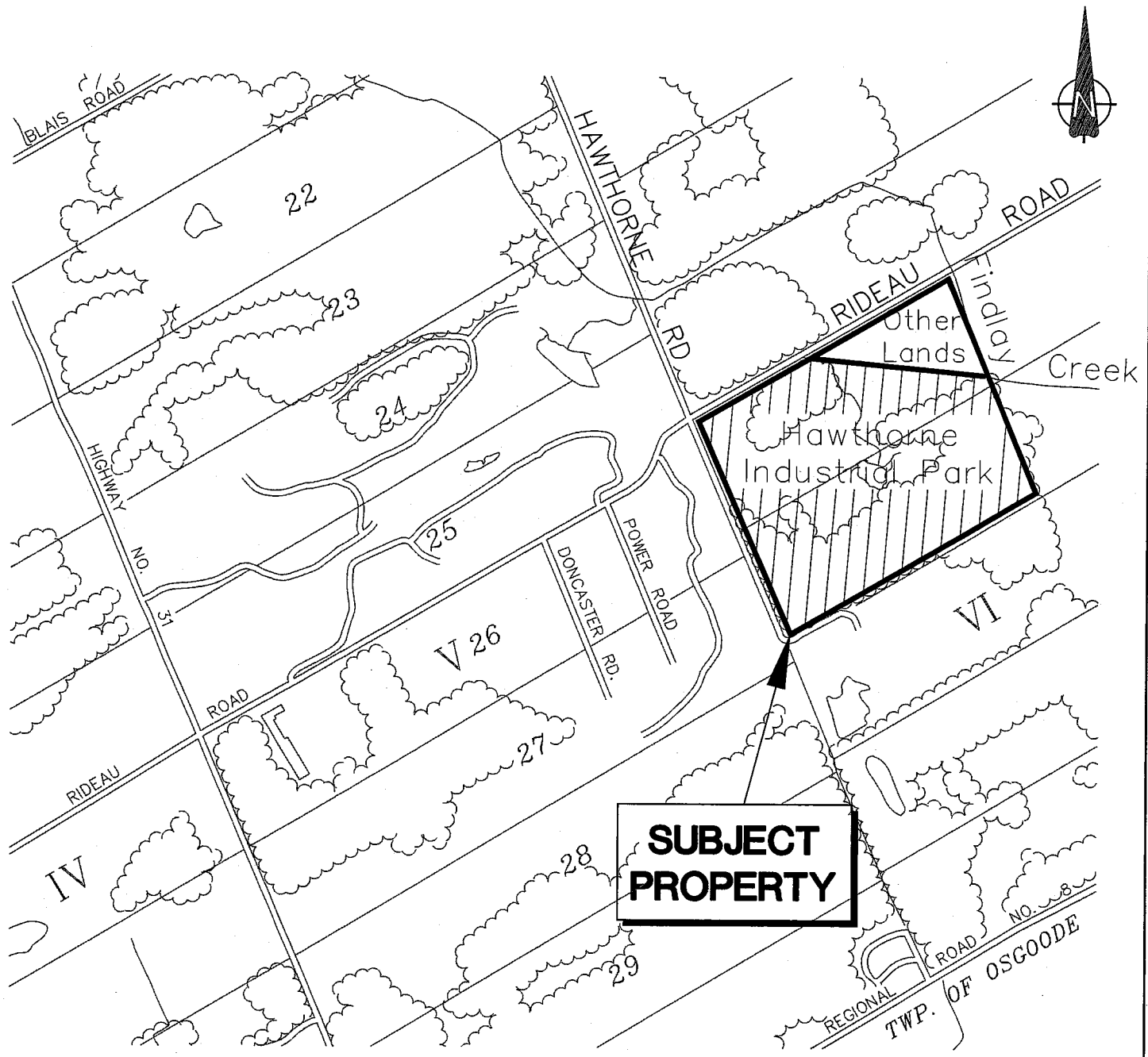
The current landowner, R.W. Tomlinson Limited (Tomlinson), now wishes to complete the development of the subject land, herein referred to as the Hawthorne Industrial Park (HIP).

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 m³ 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




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NOT TO SCALE

PROJECT: HAWTHORNE INDUSTRIAL PARK	DRAWING: KEY PLAN
--	-----------------------------

1.dwg

 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.	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 Management 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 m³/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 m³) exceeds that obtained from Table 3.2 (62.5 m³) 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

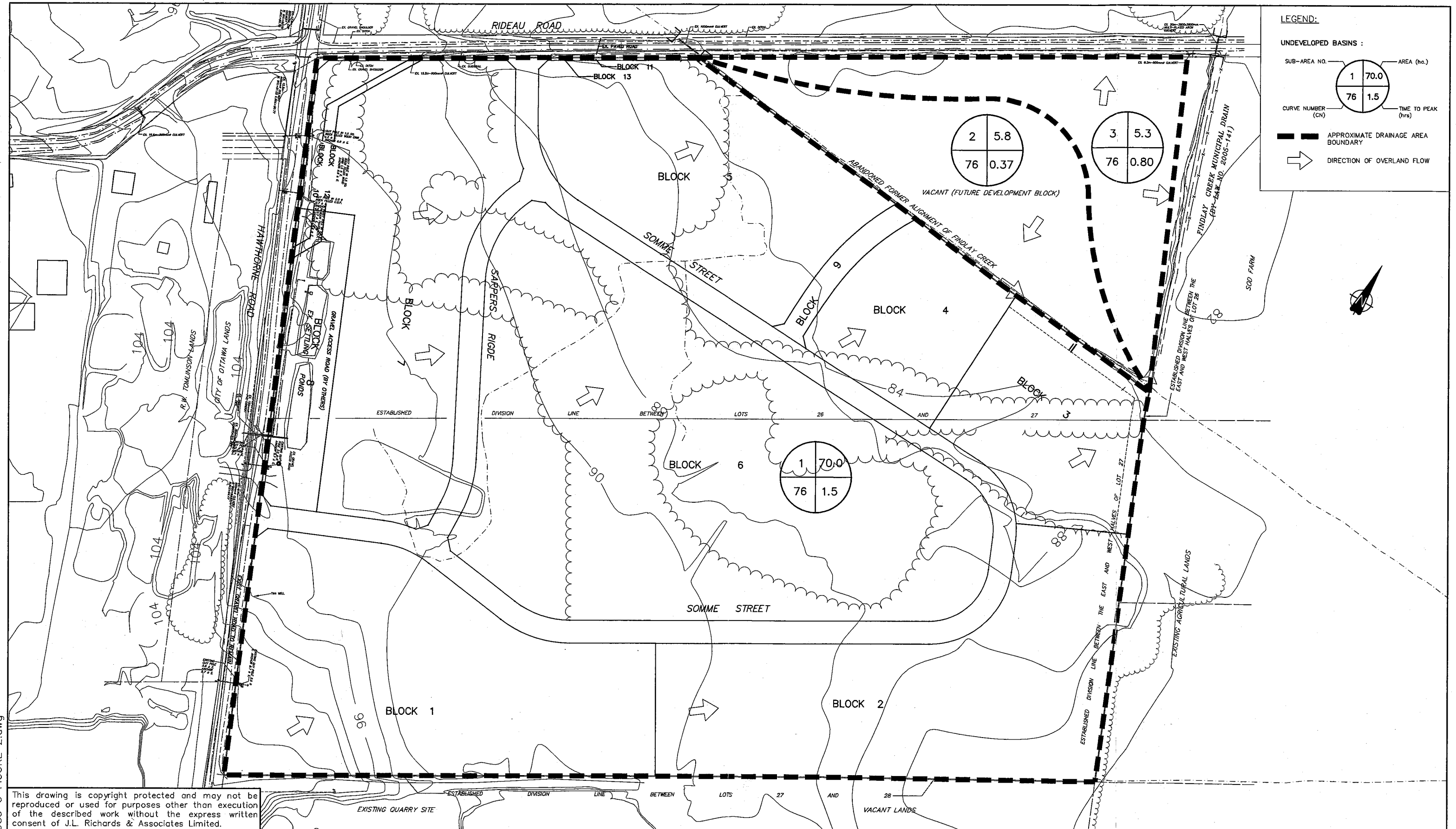
Peak runoff rates were calculated for both pre- and post-development conditions using synthetic design storm event modelling. Peak flow rates were estimated using the 3-hour Chicago Design Storm Event, as this synthetic storm event has been recognized as the most critical event for urban runoff applications (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

120983.dwg 20983



LEGEND:

UNDEVELOPED BASINS :

SUB-AREA NO.	AREA (ha.)
1	70.0
76	1.5

CURVE NUMBER (CN)	TIME TO PEAK (hrs)
76	0.37
76	0.80

— — — — — APPROXIMATE DRAINAGE AREA BOUNDARY

➔ DIRECTION OF OVERLAND FLOW

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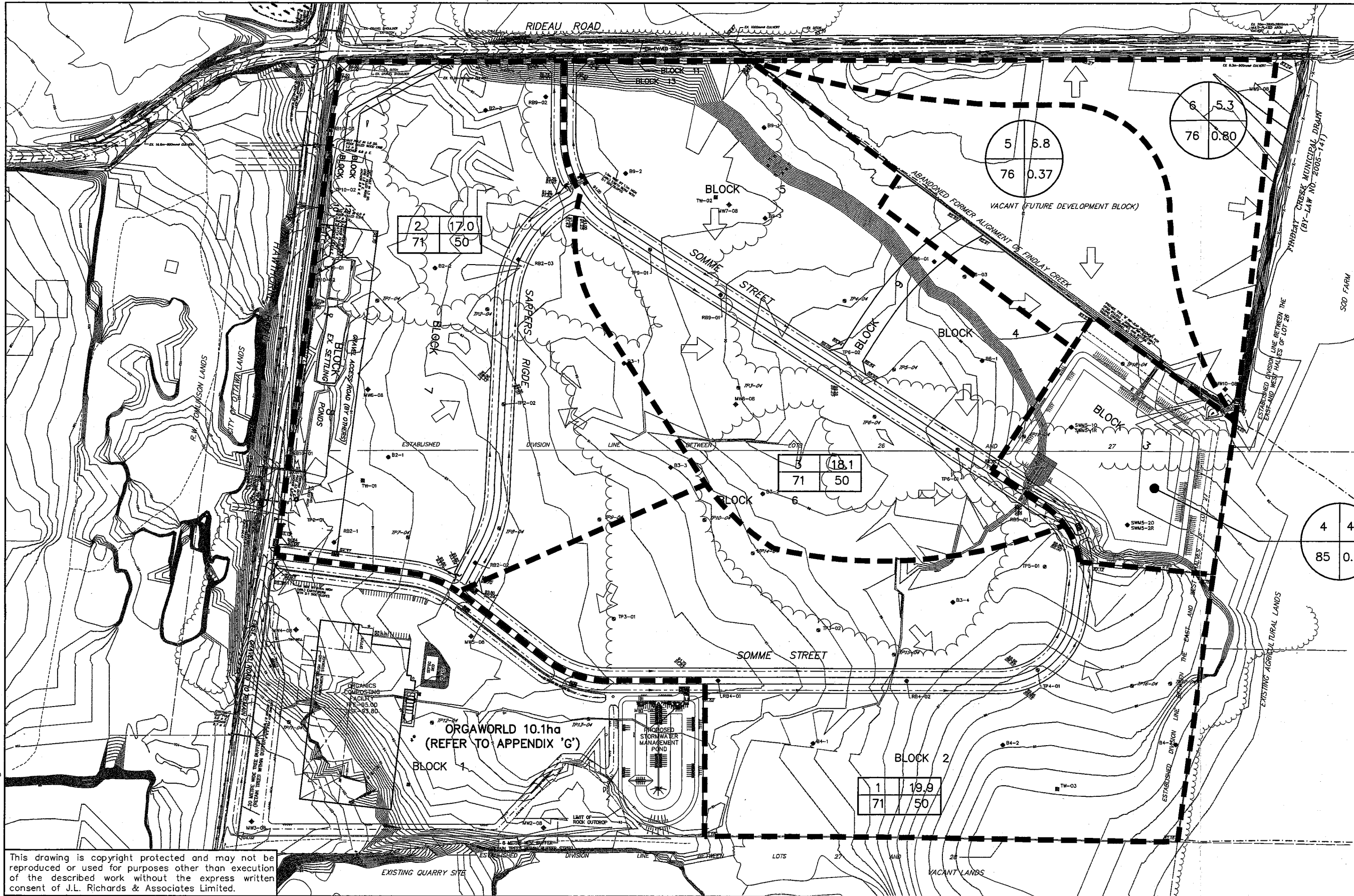
PROJECT: **HAWTHORNE INDUSTRIAL PARK**

DRAWING: **PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN**

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

DESIGN: M.B.
 DRAWN: ARM
 CHECKED: G.F.
 PLOTTED: Apr 30, 2009

DRAWING NO.: **FIGURE 2**
 JLR NO.: 20983



LEGEND:

UNDEVELOPED BASINS :

SUB-AREA NO.	AREA (ha.)
1	70.0
76	1.5

CURVE NUMBER (CN) TIME TO PEAK (hrs)

URBANIZED BASINS :

SUB-AREA NO.	AREA (ha.)
5	2.66
97	97

TOTAL IMPERVIOUSNESS (%) DIRECTLY CONNECTED IMPERVIOUSNESS (%)

— — — — — APPROXIMATE DRAINAGE AREA BOUNDARY

→ DIRECTION OF OVERLAND FLOW



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PROJECT: **HAWTHORNE INDUSTRIAL PARK**

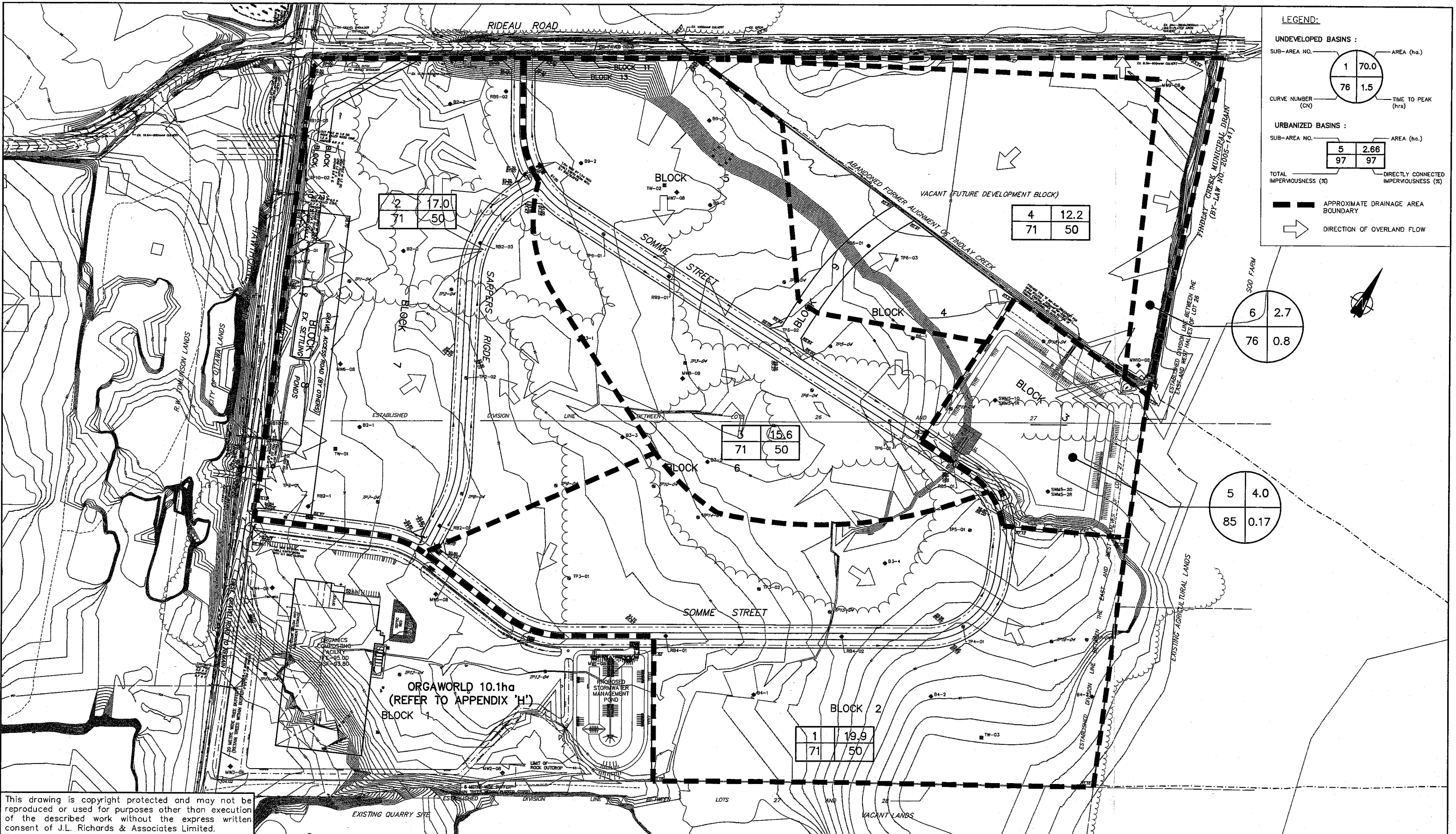
DRAWING: **POST DEVELOPMENT – PHASE 1 STORM DRAINAGE AREA PLAN**

J.L. Richards & Associates Limited
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 K1Z 5M2
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 Fax: 613 728 6012

DESIGN: M.B.
 DRAWN: ARM
 CHECKED: G.F.
 PLOTTED: Apr 30, 2009

DRAWING NO.: **FIGURE 3**
 JLR NO.: 20983

v:\20983\20983.dwg



LEGEND:

UNDEVELOPED BASINS :

SUB-AREA NO.	1	70.0
CURVE NUMBER (CN)	76	1.5
TIME TO PEAK (hrs)		

URBANIZED BASINS :

SUB-AREA NO.	5	2.66
CURVE NUMBER (CN)	97	97
TIME TO PEAK (hrs)		

TOTAL IMPERVIOUSNESS (%) DIRECTLY CONNECTED IMPERVIOUSNESS (%)

— — — — — APPROXIMATE DRAINAGE AREA BOUNDARY

➔ DIRECTION OF OVERLAND FLOW

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PROJECT: **HAWTHORNE INDUSTRIAL PARK**

DRAWING: **POST DEVELOPMENT – PHASE 2 STORM DRAINAGE AREA PLAN**

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DESIGN: M.B.
 DRAWN: ARM
 CHECKED: G.F.
 PLOTTED: Apr 30, 2009

DRAWING NO.: **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 m³ (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 laden 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

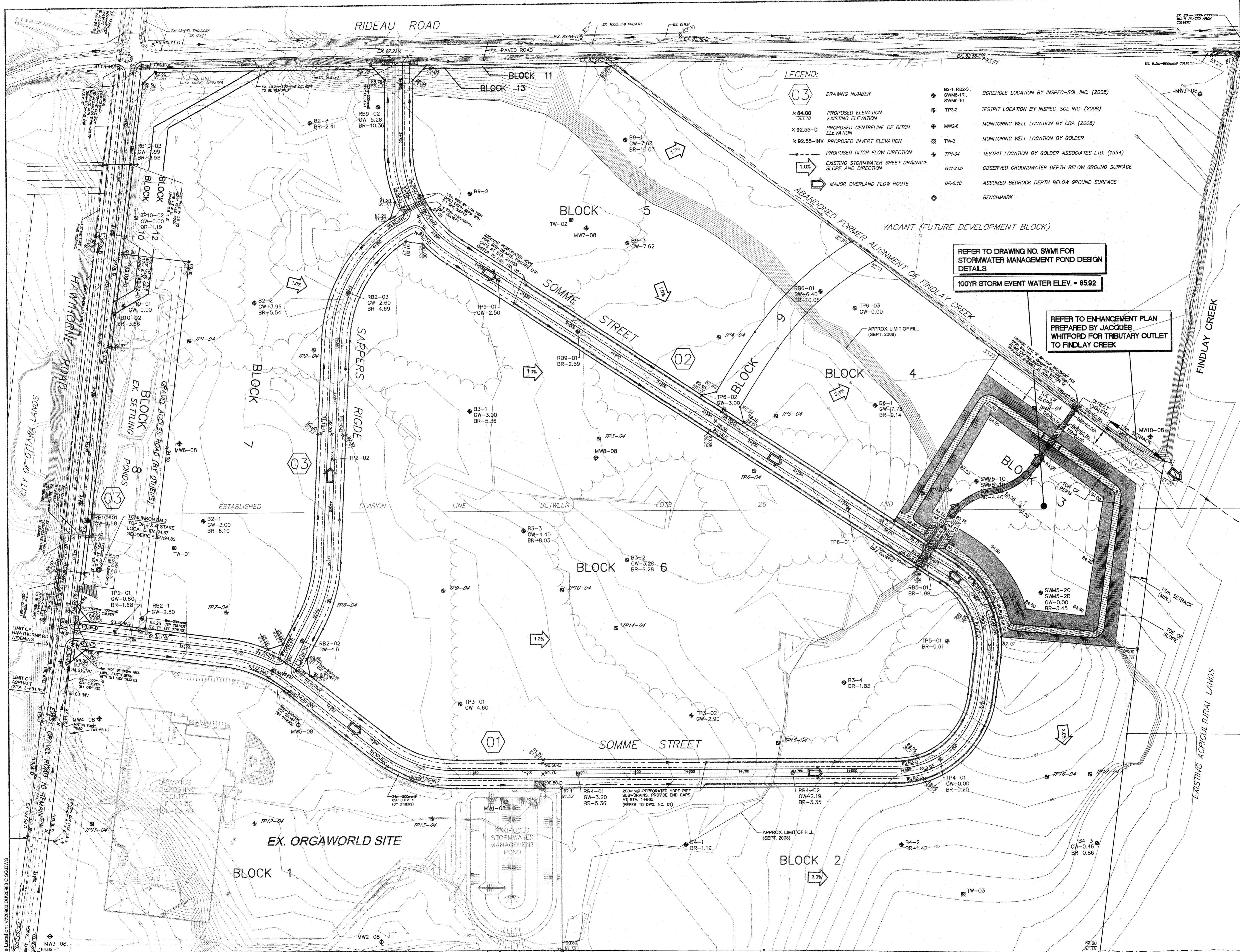
1. This Stormwater Management Report has been prepared to present a complete approach in achieving the stormwater criteria developed as part of the approved document entitled "Shields Creek Subwatershed Study."
2. Stormwater servicing for the proposed HIP has been designed using the dual drainage concept. 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 m³ 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.

Reviewed by: J.S. Guy Forget

J.S. Guy Forget, P.Eng.

Reviewed by: Derrick Upton

Derrick Upton, P.Eng.

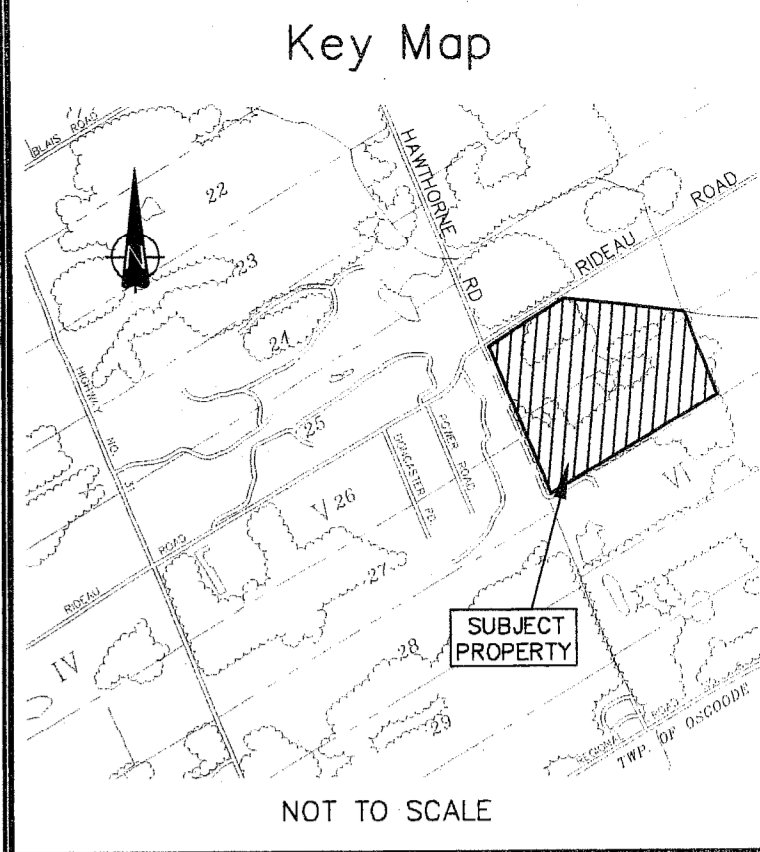


- LEGEND:**
- DRAWING NUMBER
 - $\times 84.00$ PROPOSED ELEVATION
 - $\times 92.55-D$ PROPOSED CENTRELINE OF DITCH ELEVATION
 - $\times 92.55-INV$ PROPOSED INVERT ELEVATION
 - \rightarrow PROPOSED DITCH FLOW DIRECTION
 - \rightarrow EXISTING STORMWATER SHEET DRAINAGE SLOPE AND DIRECTION
 - \rightarrow MAJOR OVERLAND FLOW ROUTE
 - BOREHOLE LOCATION BY INSPEC-SOL INC. (2008)
 - TESTPIT LOCATION BY INSPEC-SOL INC. (2008)
 - MONITORING WELL LOCATION BY CRA (2008)
 - MONITORING WELL LOCATION BY GOLDER
 - TESTPIT LOCATION BY GOLDER ASSOCIATES LTD. (1994)
 - OBSERVED GROUNDWATER DEPTH BELOW GROUND SURFACE
 - ASSUMED BEDROCK DEPTH BELOW GROUND SURFACE
 - BENCHMARK

REFER TO DRAWING NO. SWM1 FOR
STORMWATER MANAGEMENT POND DESIGN
DETAILS

100YR STORM EVENT WATER ELEV. = 85.92

REFER TO ENHANCEMENT PLAN
PREPARED BY JACQUES
WHITFORD FOR TRIBUTARY OUTLET
TO FINDLAY CREEK



GENERAL NOTES:

- 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.
- A GEOTECHNICAL ENGINEER LICENSED IN THE PROVINCE OF ONTARIO IS TO INSPECT ALL SUBGRADE SURFACES FOR FOOTINGS AND PAVEMENT STRUCTURES PRIOR TO CONSTRUCTION.
- ALL MATERIAL AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS) AND CITY OF OTTAWA GUIDELINES.

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

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D. P. UPTON
PROVINCE OF ONTARIO

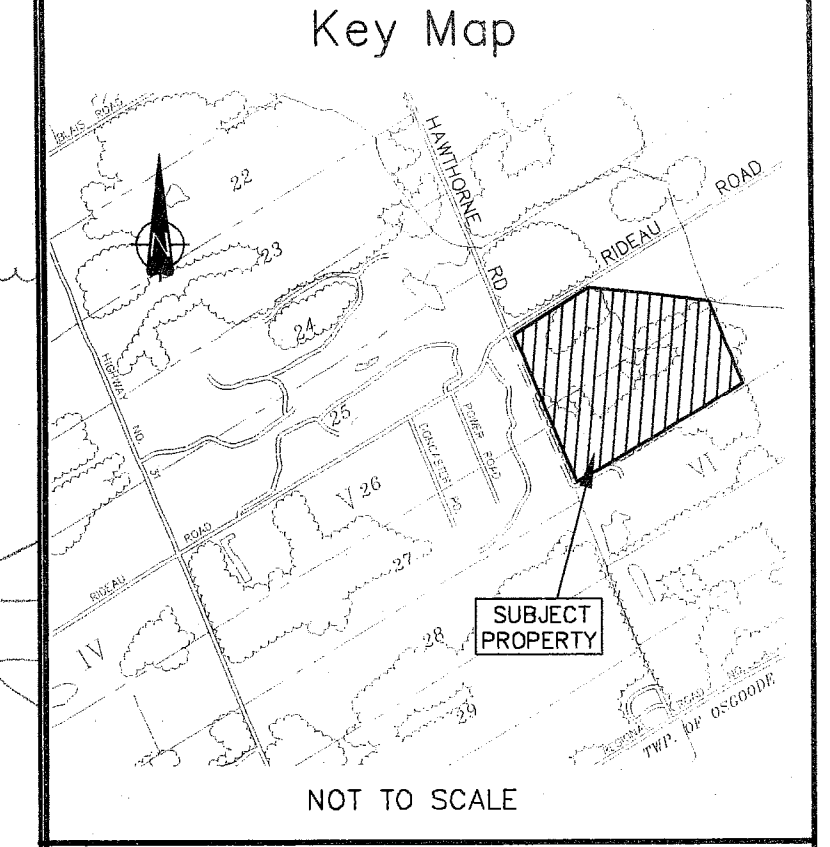
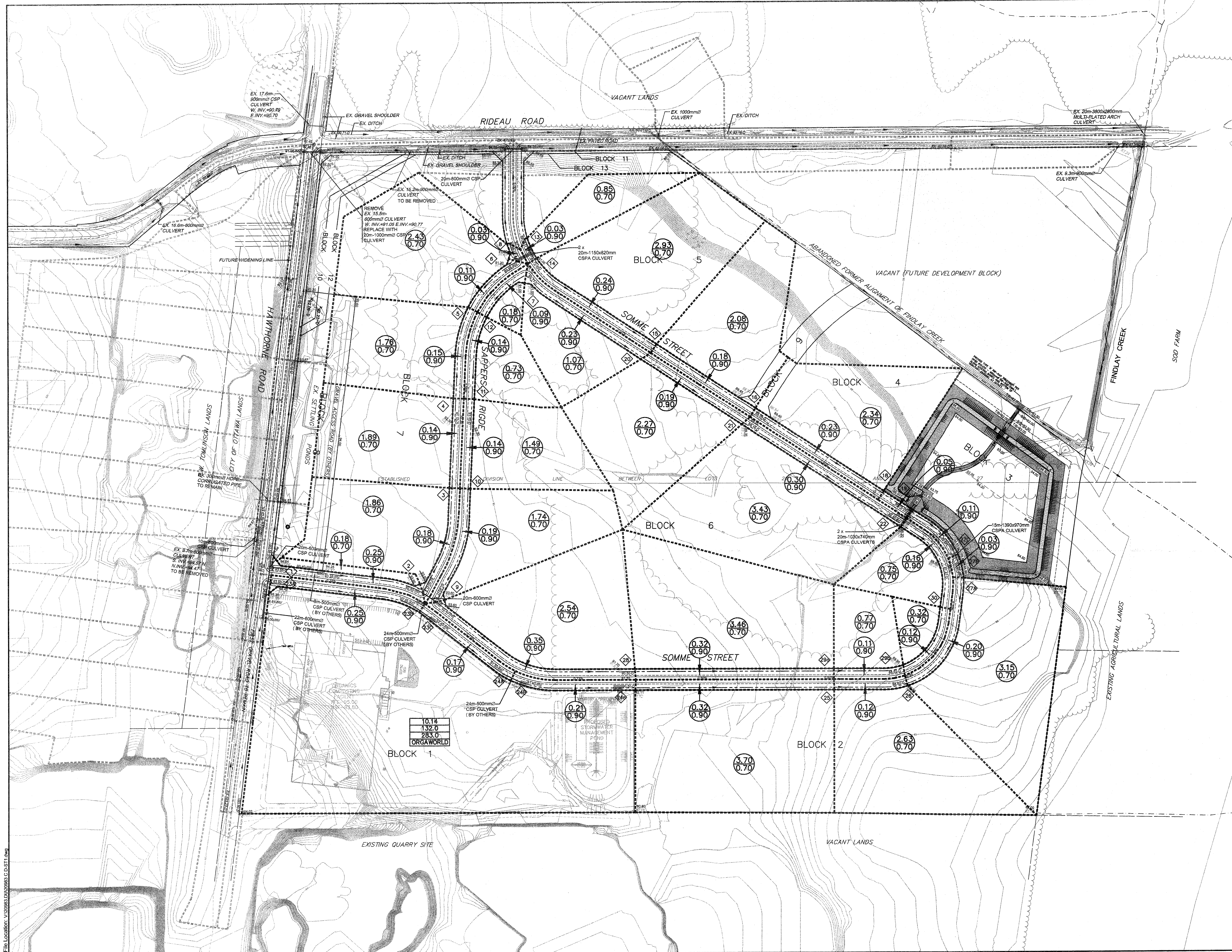
PROJECT NORTH

PROJECT: HAWTHORNE INDUSTRIAL PARK

DRAWING: SITE SERVING AND GRADING

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

File Location: V:\2008\3-DWG\20983.CSG.DWG



LEGEND

- DRAINAGE BOUNDARY
- (2.91 / 0.70) AREA IN HECTARES
* RUNOFF COEFFICIENT (C)
- 10.14 DRAINAGE AREA (ha)
- 132.0 10 YEAR PEAK FLOW (l/s)
- 283.0 100 YEAR PEAK FLOW (l/s)
- ORGAWORLD 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

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SCALE: 1:2000

03 283.0 100 YEAR PEAK FLOW (l/s)

02 132.0 10 YEAR PEAK FLOW (l/s)

01 10.14 DRAINAGE AREA (ha)

ORGAWORLD ORGAWORLD SITE

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 203-863 Princess Street
 Kingston, ON Canada
 K7L 5N4
 Tel: 613 544 1424
 Fax: 613 544 5679

PROFESSIONAL STAMP

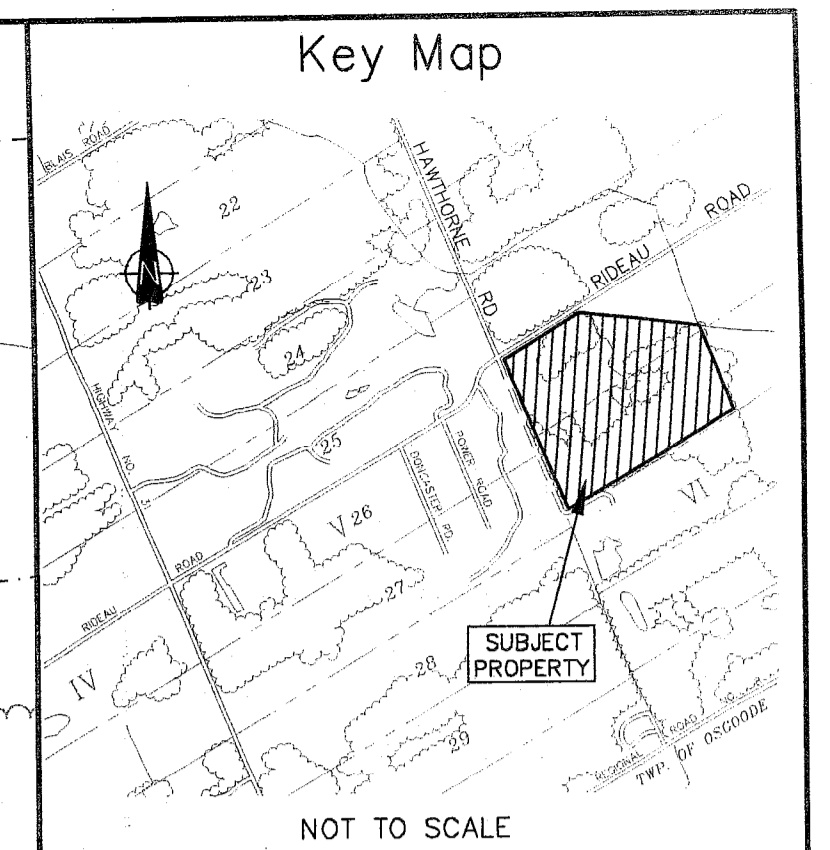
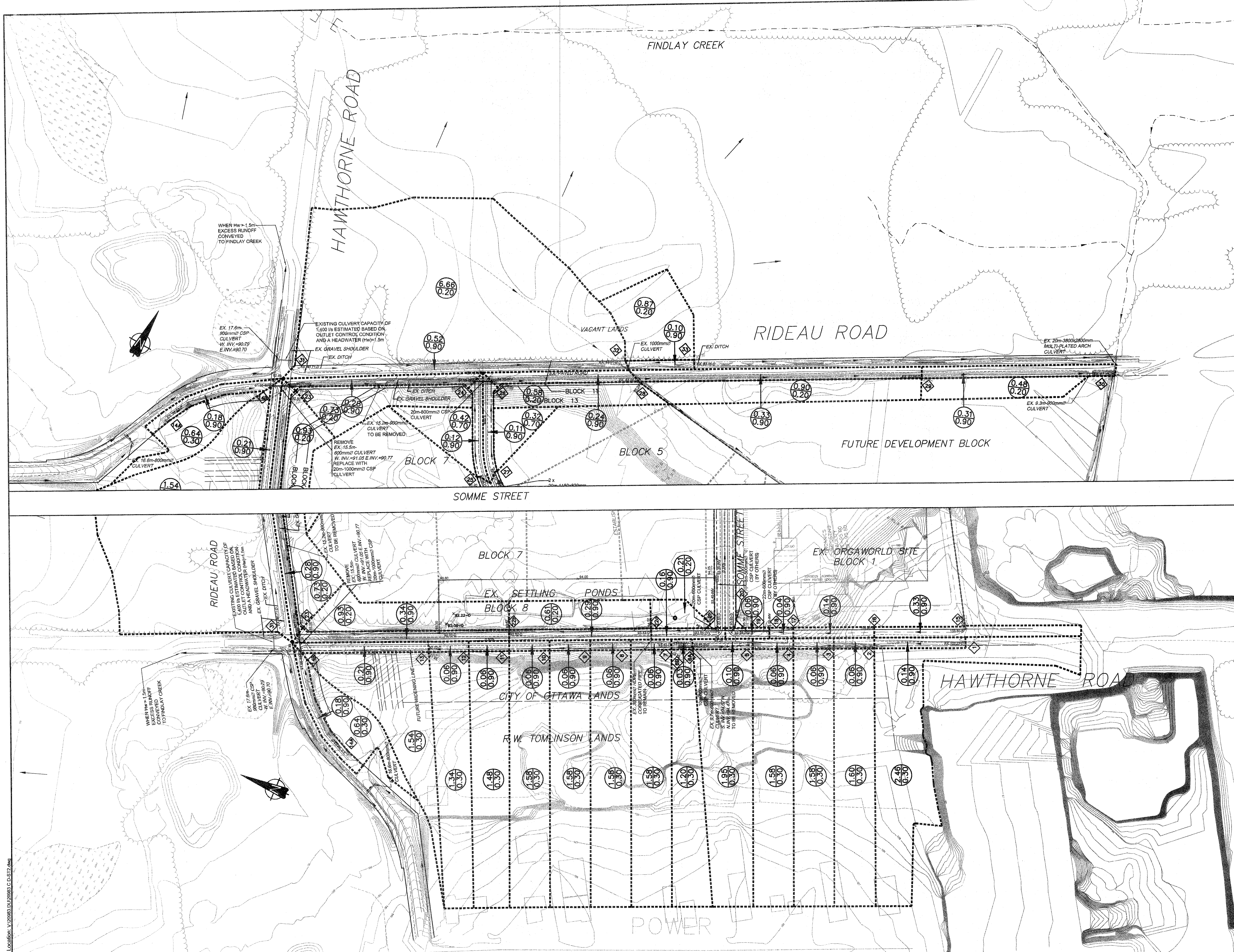
 D. P. UPTON
 PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
STORM DRAINAGE AREA PLAN

DESIGN: M.B.	DRAWING NO.: D-ST1
DRAWN: T.S.	JLR NO:
CHECKED: D.U.	20983
PLOTTED: May 28, 2009	



LEGEND

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

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

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

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J.L. Richards
 ENGINEERS ARCHITECTS-PLANNERS

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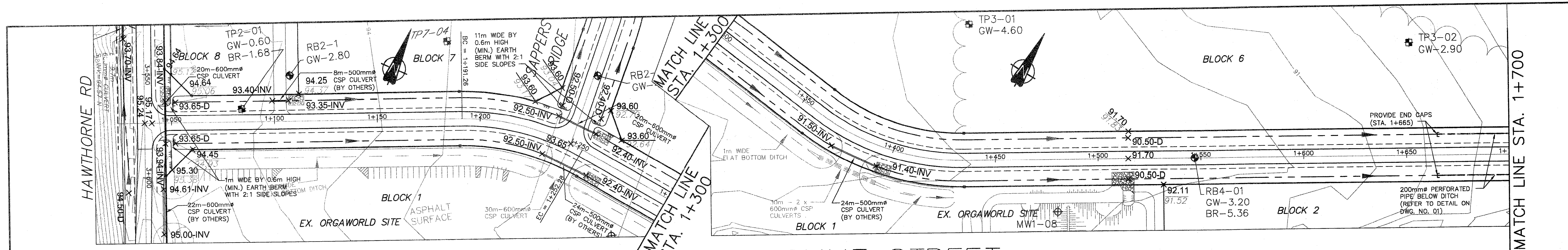
 PROJECT NORTH

PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
STORM DRAINAGE AREA PLAN

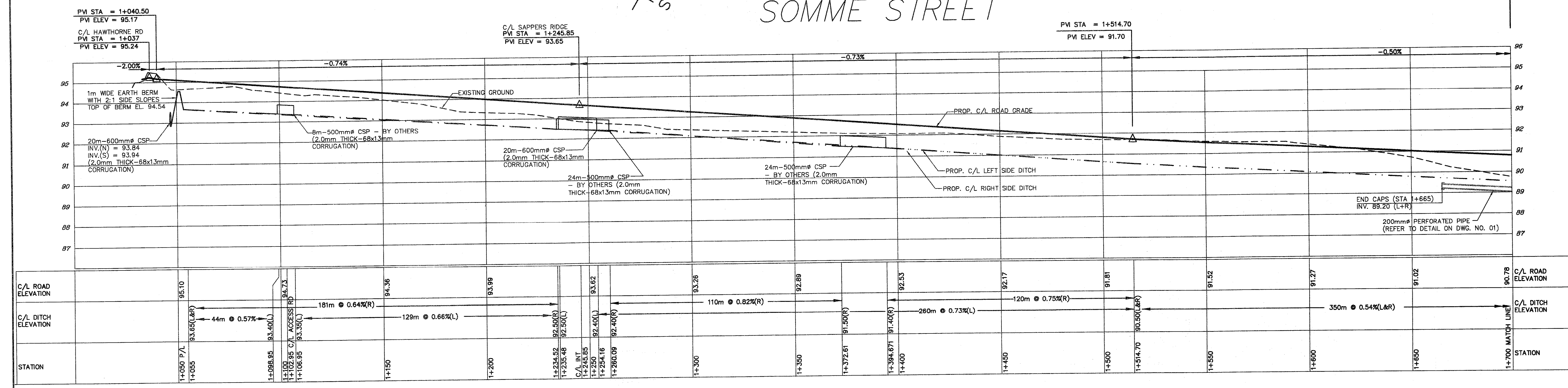
DESIGN: M.B.	DRAWING NO.: D-ST2
DRAWN: T.S.	JLR NO:
CHECKED: D.U.	20983
PLOTTED: May 28, 2009	

File Location: V:\09083\01\09083_C-D-ST2.dwg



LEGEND:

- PROPOSED DITCH AND FLOW DIRECTION
- PROPOSED CULVERT
- PROPOSED RIP-RAP
- PROPOSED C/L ELEVATION
- PROPOSED DITCH ELEVATION
- PROPOSED INVERT
- PROPOSED ELEVATION
- EXISTING ELEVATION
- BOREHOLE LOCATION BY INSPEC-SOL INC. (2008)
- TEST PIT LOCATION BY INSPEC-SOL INC. (2008)
- MONITORING WELL LOCATION BY CRA (2008)
- MONITORING WELL LOCATION BY GOLDER ASSOCIATES LTD. TEST PIT LOCATION BY GOLDER ASSOCIATES LTD. (1994)
- OBSERVED GROUNDWATER DEPTH BELOW GROUND SURFACE
- ASSUMED BEDROCK DEPTH BELOW GROUND SURFACE



NO.	ISSUE	DATE
3	ISSUED FOR M.O.E. APPROVAL	28/05/09
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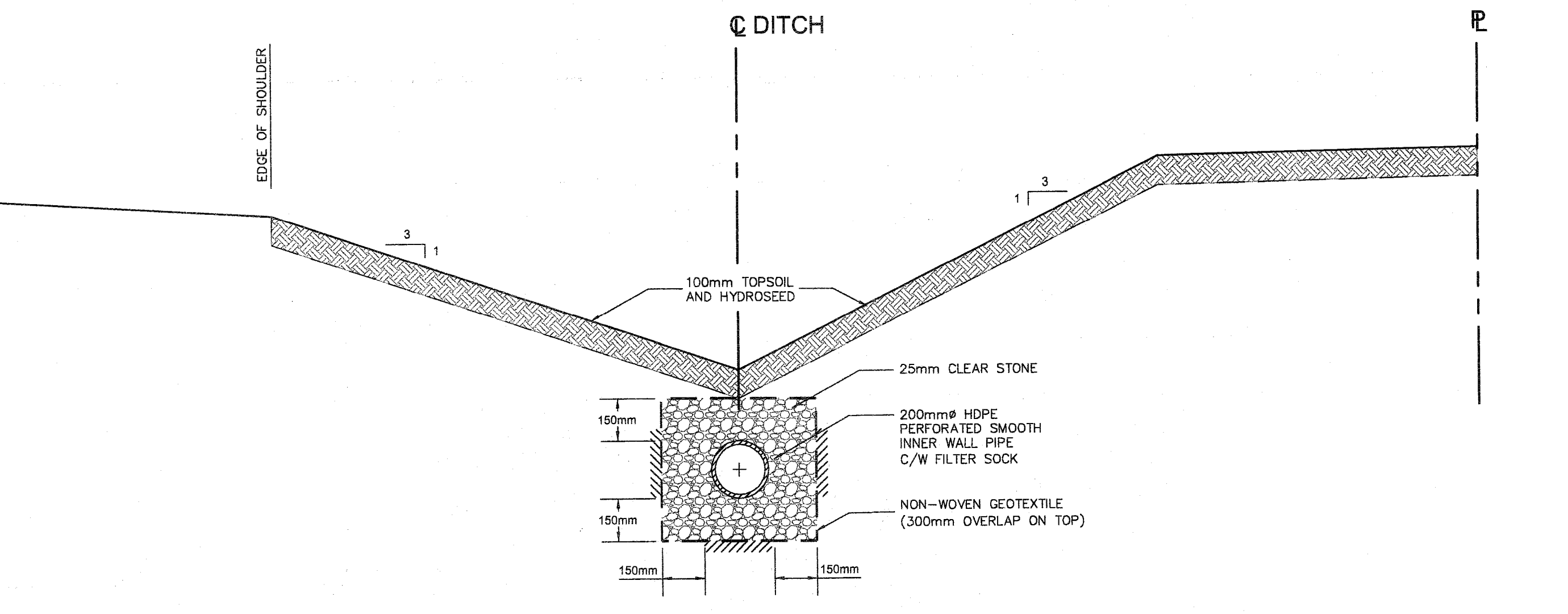
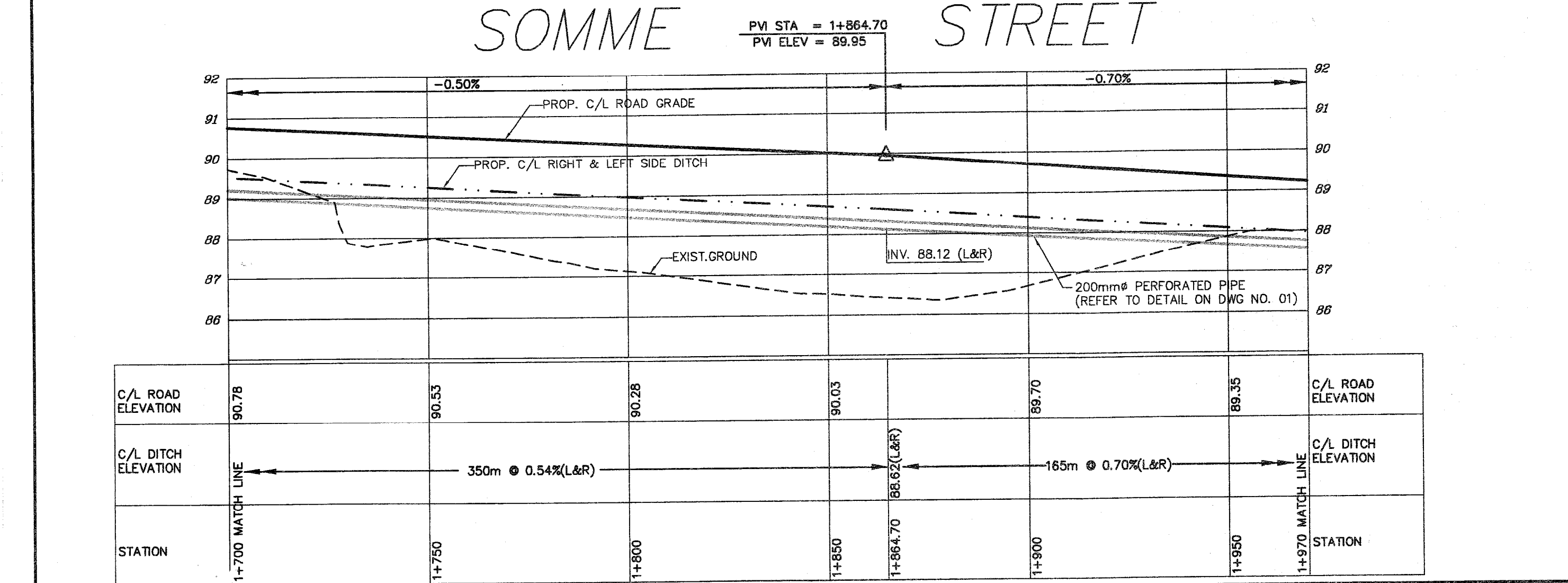
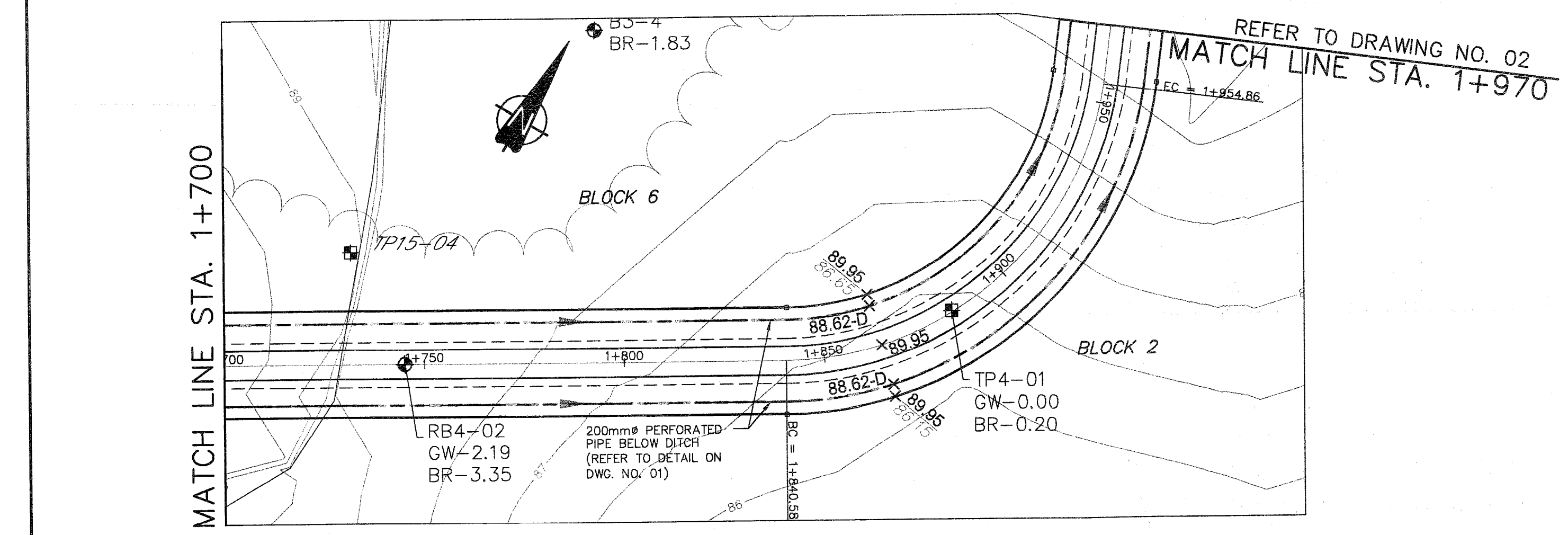
PROFESSIONAL STAMP
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 D. P. UPTON
 PROVINCE OF ONTARIO

PROJECT:
HAWTHORNE INDUSTRIAL PARK

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

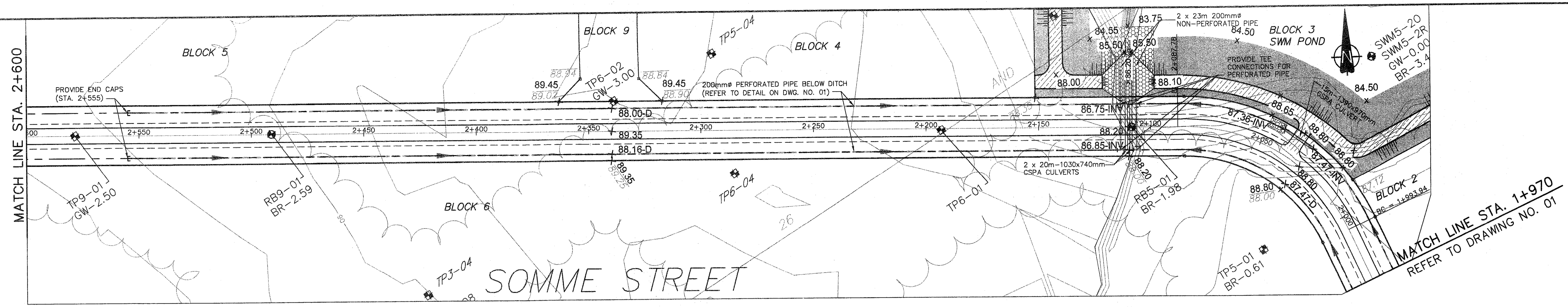
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 CHECKED: D.U.
 PLOTTED: May 28, 2009

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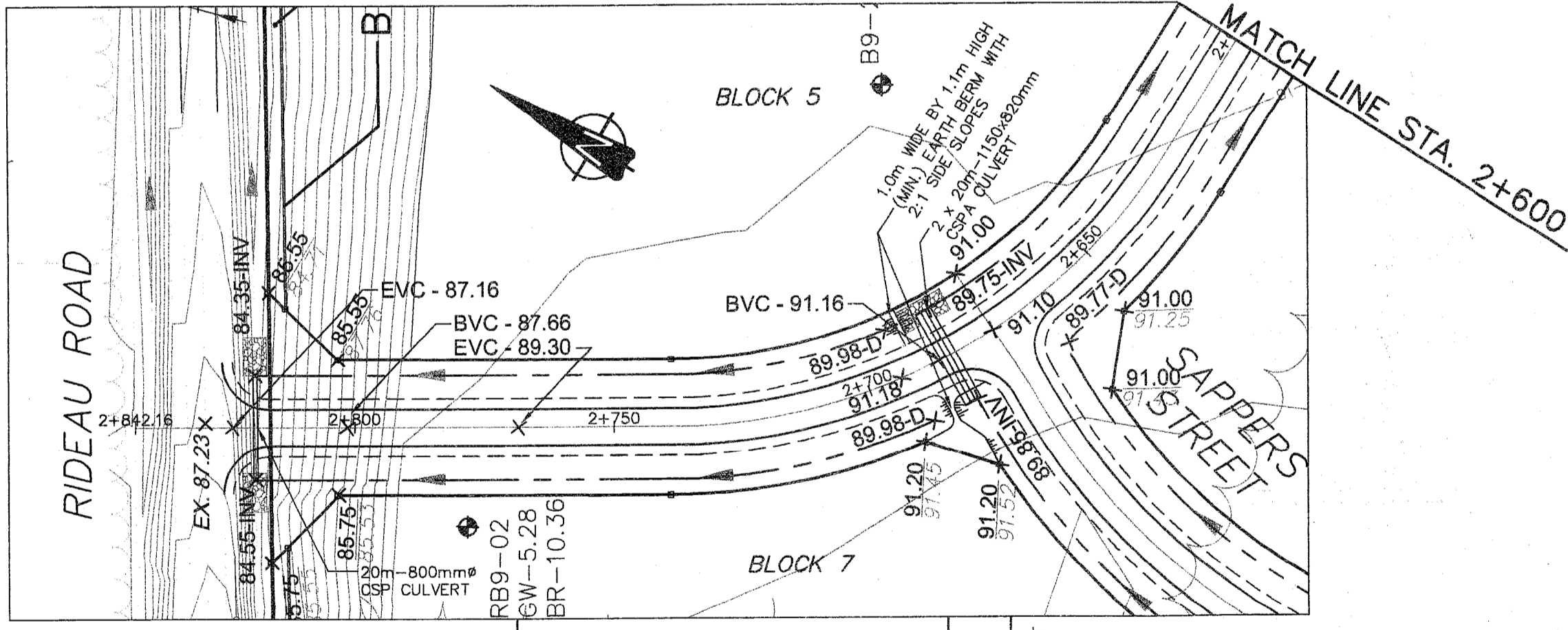
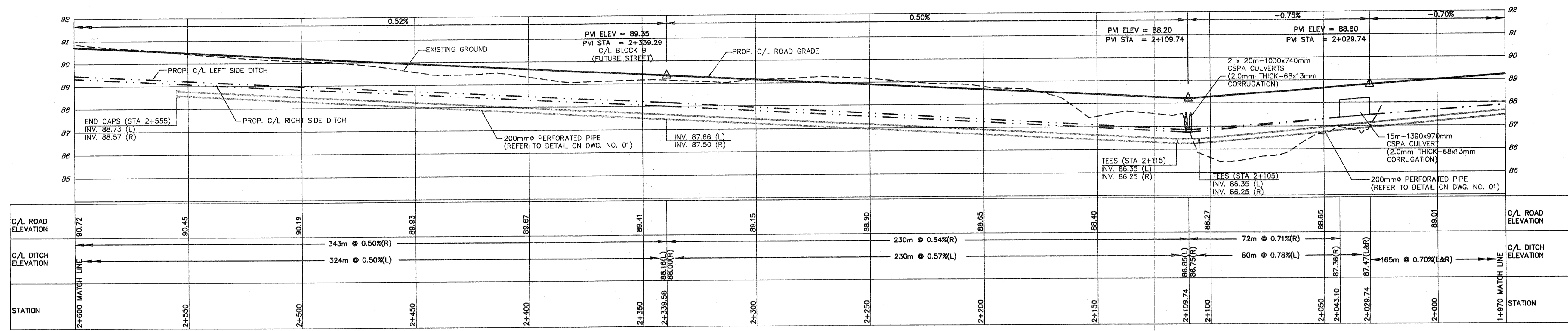
DRAWING NO.:
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 JLR NO.:
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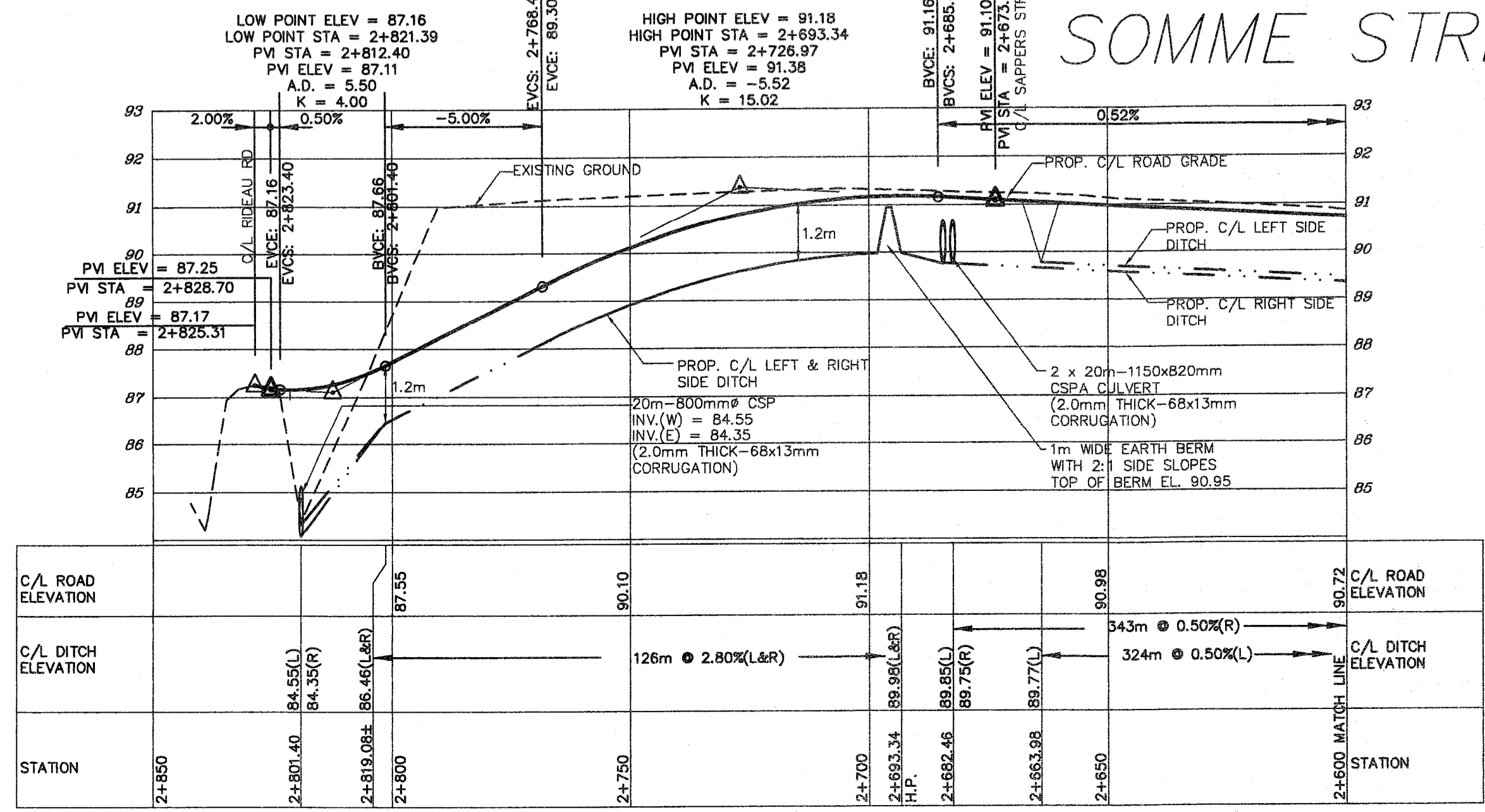
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- PROPOSED DITCH AND FLOW DIRECTION
- PROPOSED CULVERT
- PROPOSED RIP-RAP
- x 93.50 PROPOSED C/L ELEVATION
- x 92.55-D PROPOSED DITCH ELEVATION
- x 92.55-INV PROPOSED INVERT
- + 89.45 PROPOSED ELEVATION
- 88.90 EXISTING ELEVATION
- B2-1, RB2-3, SWM5-1R, SWM5-10 BOREHOLE LOCATION BY INSPEC-SOL INC. (2008)
- TP3-2 TEST PIT LOCATION BY INSPEC-SOL INC. (2008)
- MW2-8 MONITORING WELL LOCATION BY CRA (2008)
- TW-3 MONITORING WELL LOCATION BY GOLDER ASSOCIATES LTD. TEST PIT LOCATION BY GOLDER ASSOCIATES LTD. (1994)
- TP1-04 TEST PIT LOCATION BY GOLDER ASSOCIATES LTD. (1994)
- GW-3.00 OBSERVED GROUNDWATER DEPTH BELOW GROUND SURFACE
- BR-6.10 ASSUMED BEDROCK DEPTH BELOW GROUND SURFACE

MATCH LINE STA. 1+970
REFER TO DRAWING NO. 01

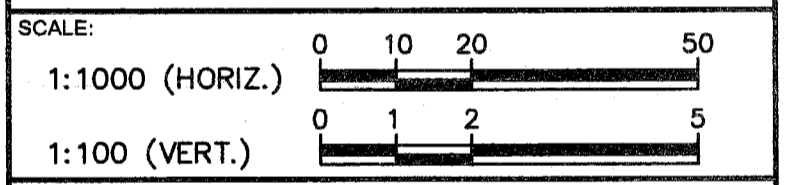


REFER TO DRAWING NO. 03



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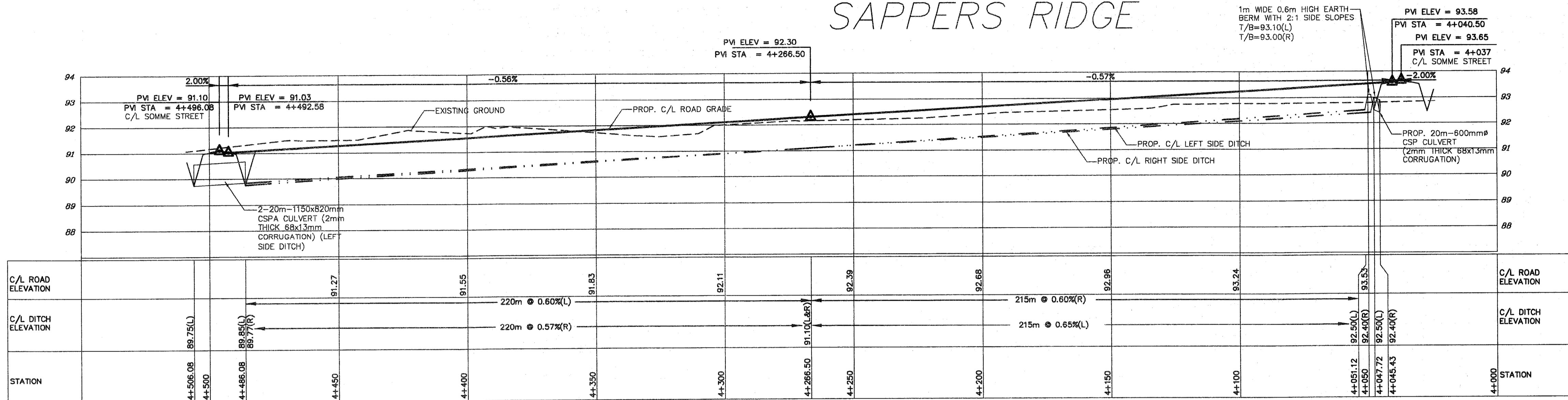
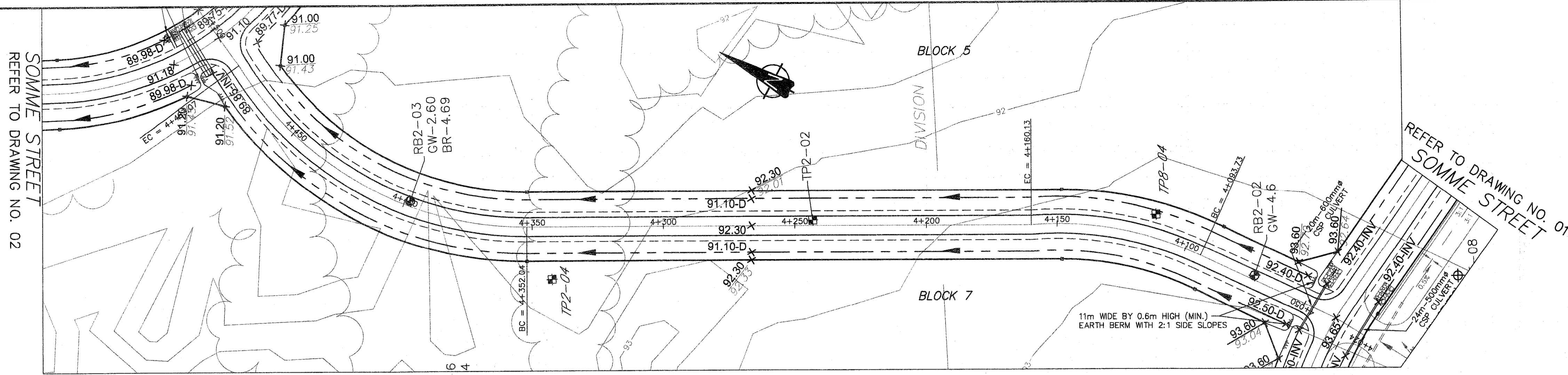
PROFESSIONAL STAMP
D. P. UPTON
PROVINCE OF ONTARIO

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.	JLR NO:
CHECKED: D.U.	20983
PLOTTED: May 28, 2009	



- LEGEND:**
- PROPOSED DITCH AND FLOW DIRECTION
 - PROPOSED CULVERT
 - PROPOSED RIP-RAP
 - PROPOSED C/L ELEVATION
 - PROPOSED DITCH ELEVATION
 - PROPOSED INVERT
 - PROPOSED ELEVATION
 - EXISTING ELEVATION
 - B2-1, RB2-3, SWMS-1R, SWMS-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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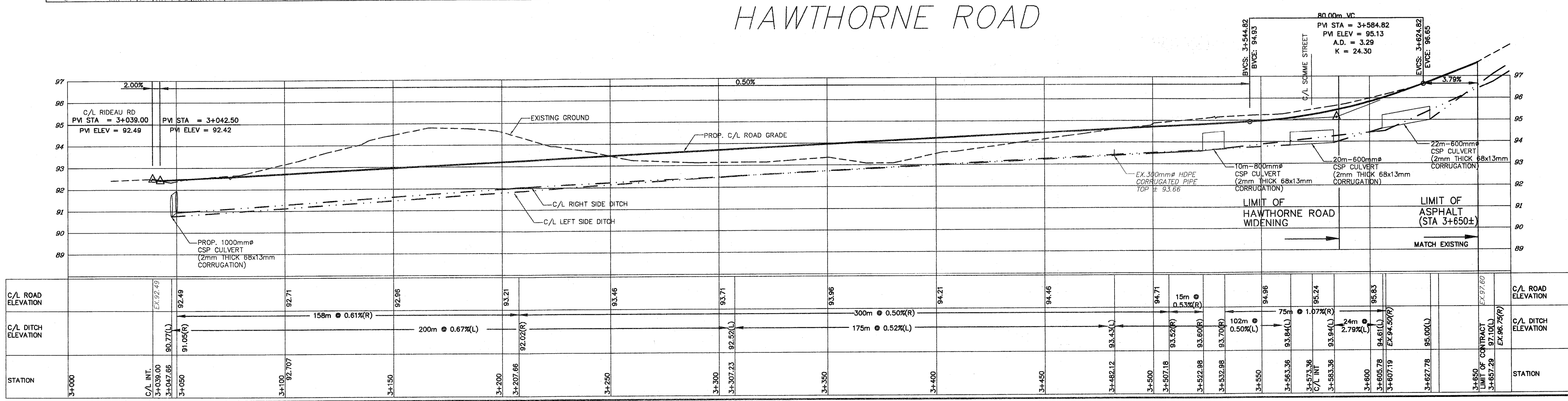
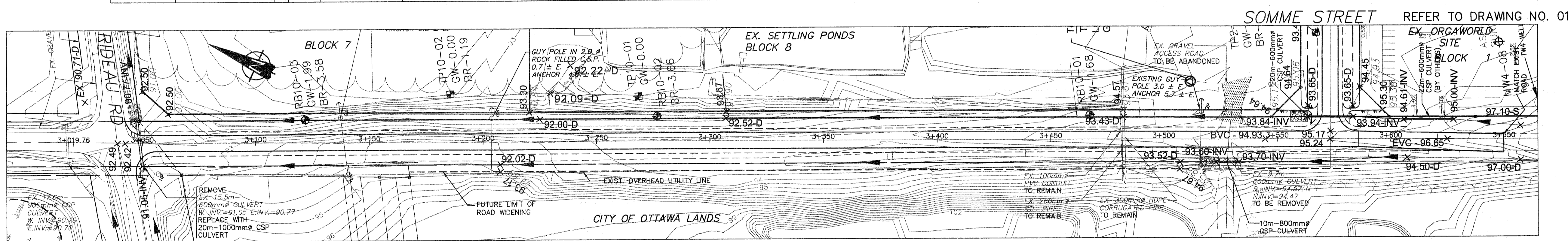
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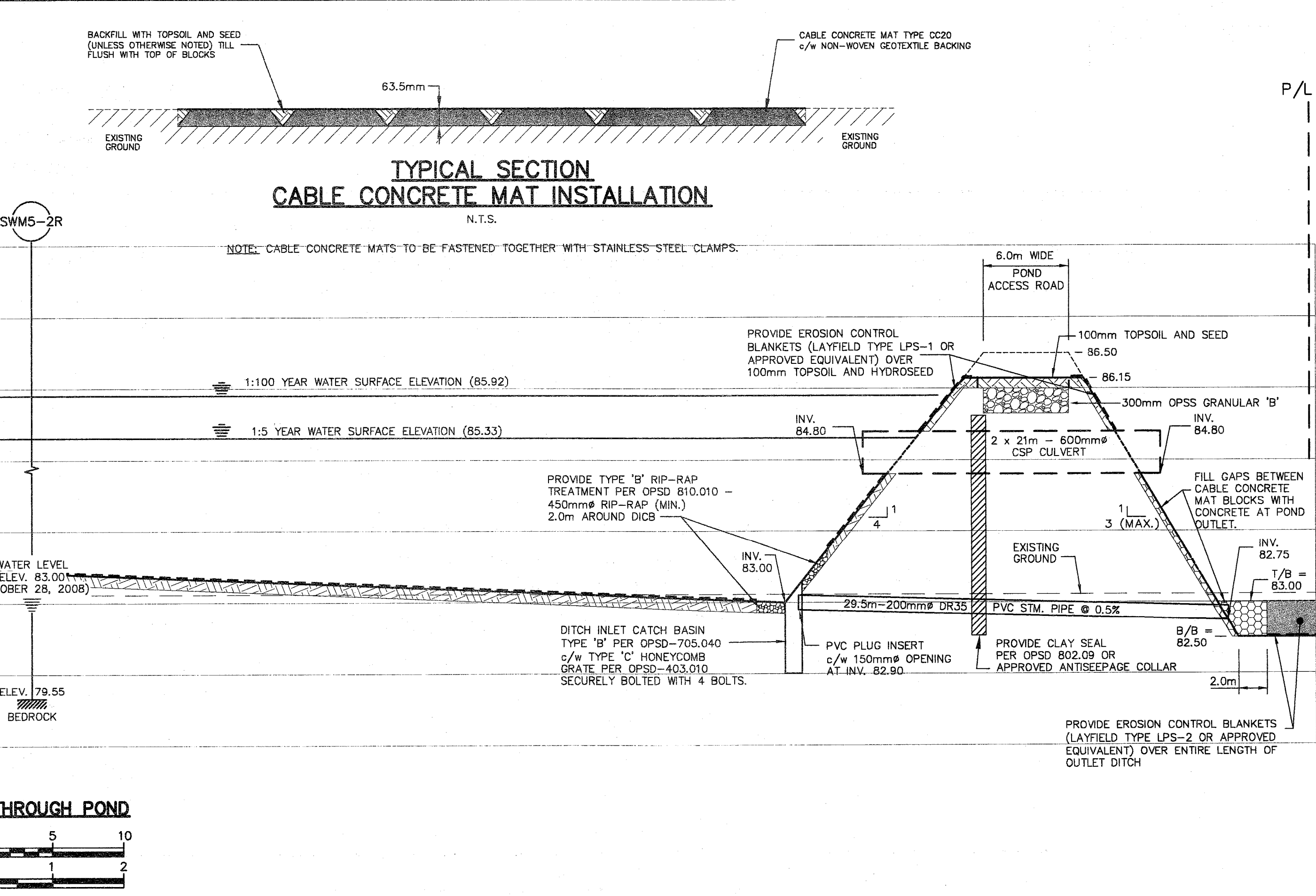
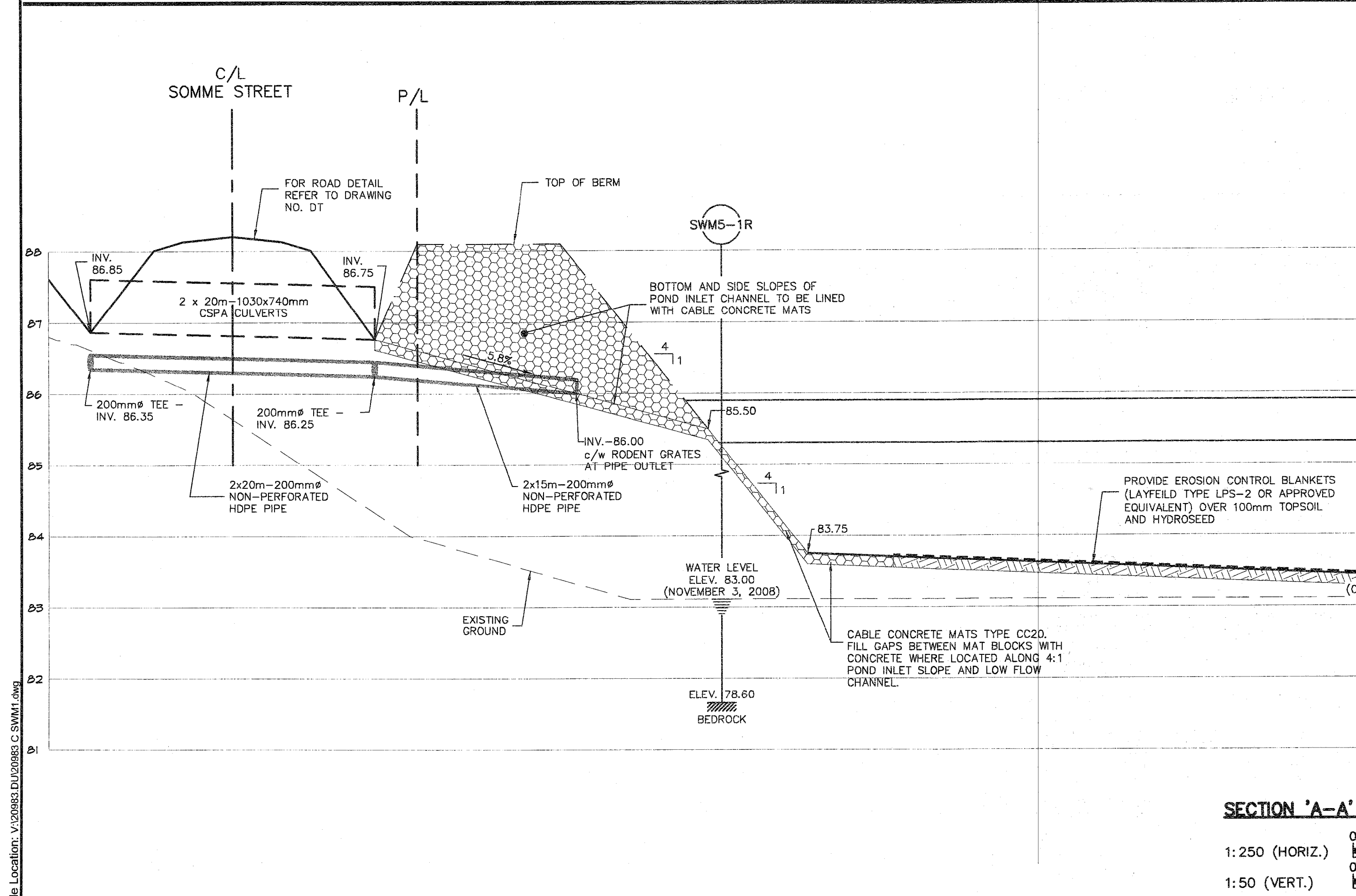
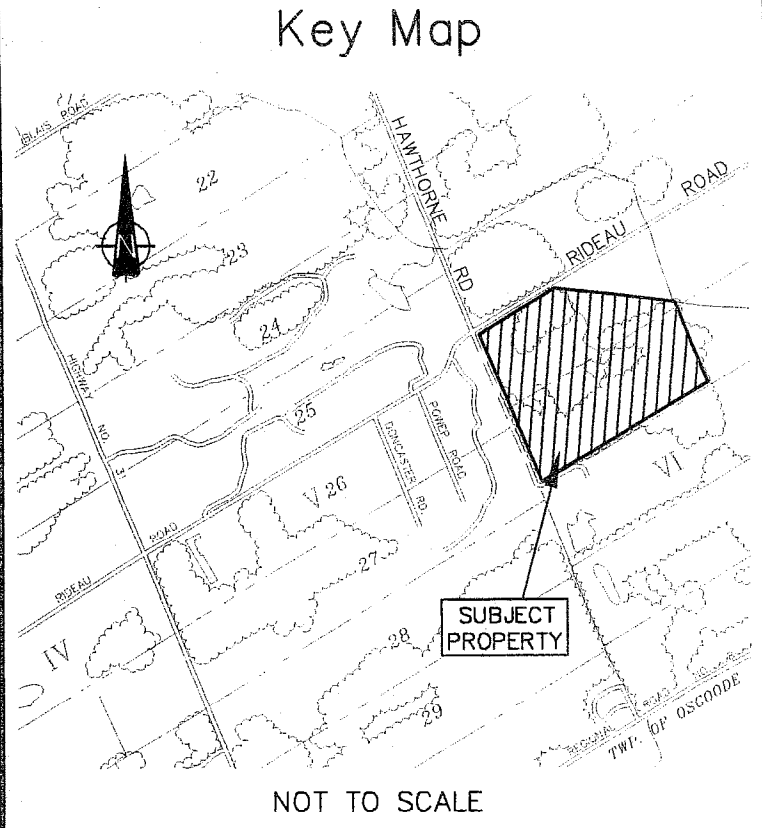
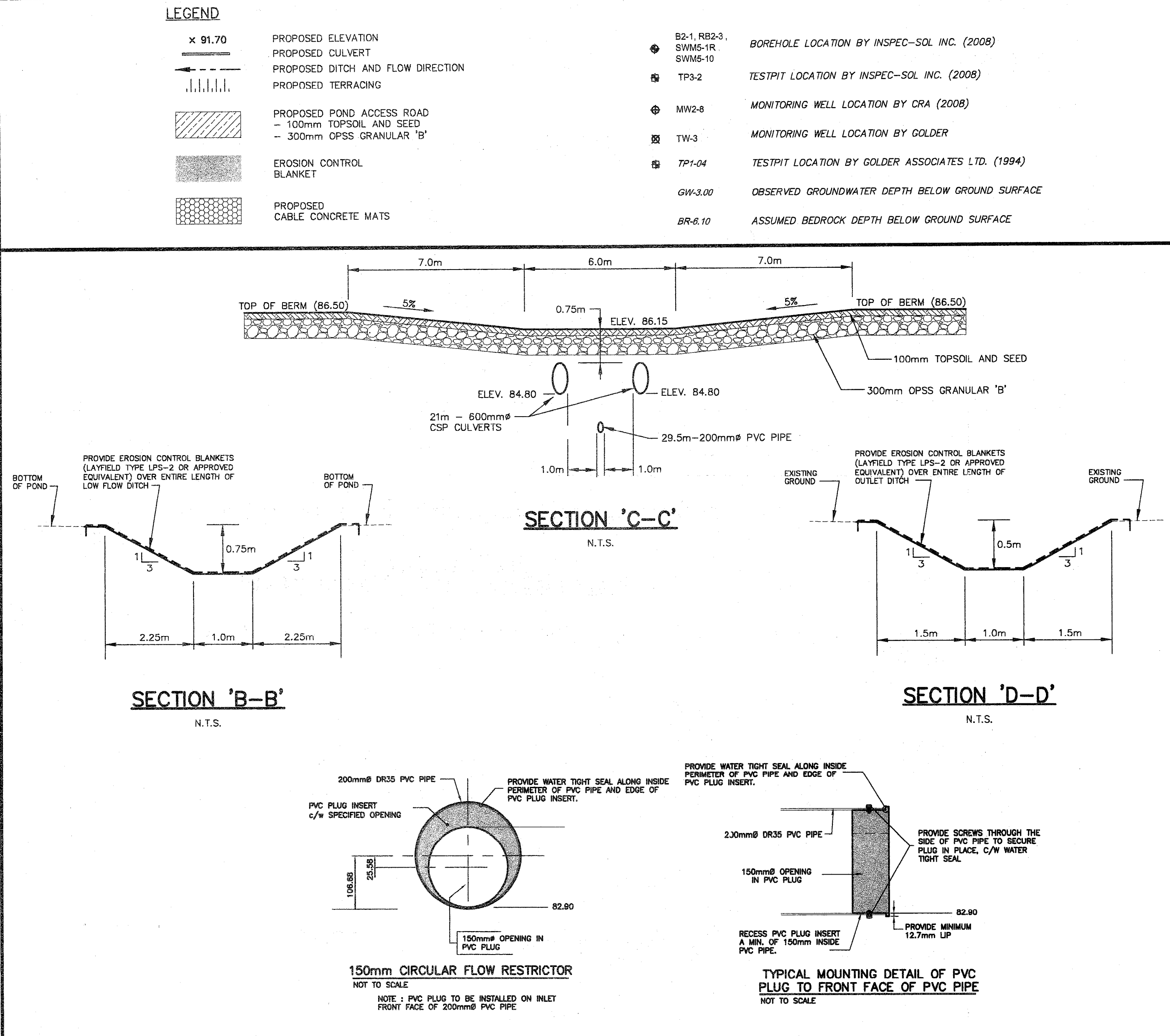
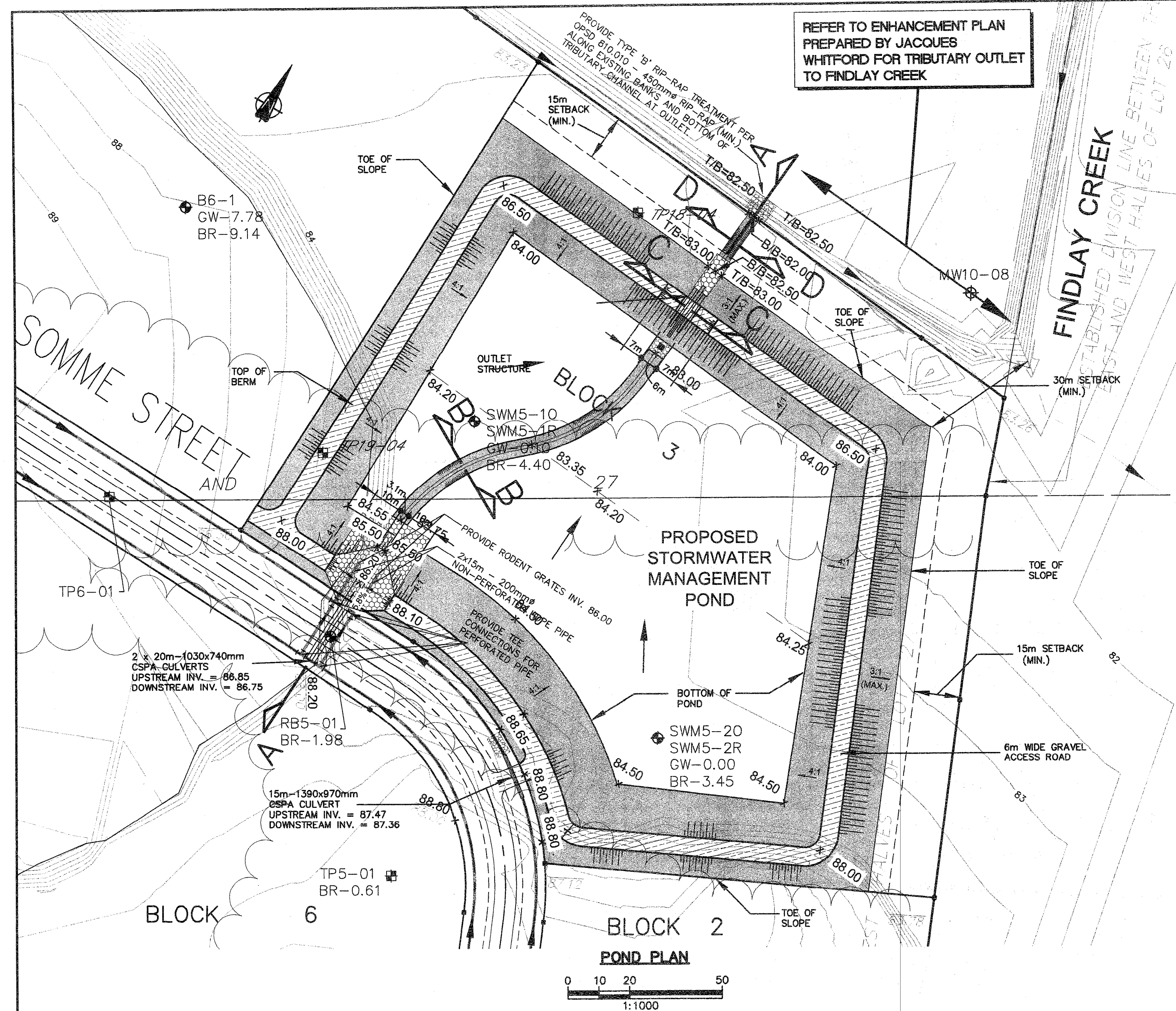
PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
PLAN & PROFILE SAPPERS RIDGE AND HAWTHORNE ROAD EXTENSION

DESIGN: M.B.
 DRAWN: T.S.
 CHECKED: D.U.
 PLOTTED: May 28, 2009

DRAWING NO.:
03
 JLR NO.:
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J.L. Richards
ENGINEERS ARCHITECTS PLANNERS

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

PROJECT: NORTH

HAWTHORNE INDUSTRIAL PARK

DRAWING: **STORMWATER MANAGEMENT POND PLAN AND SECTIONS**

DESIGN: M.B. DRAWING NO: **SWM1**

DRAWN: T.S. CHECKED: D.U. PLOTTED: May 28, 2009

JLR NO: 20983

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 dewatering bags prior to its release to the receiving stream.

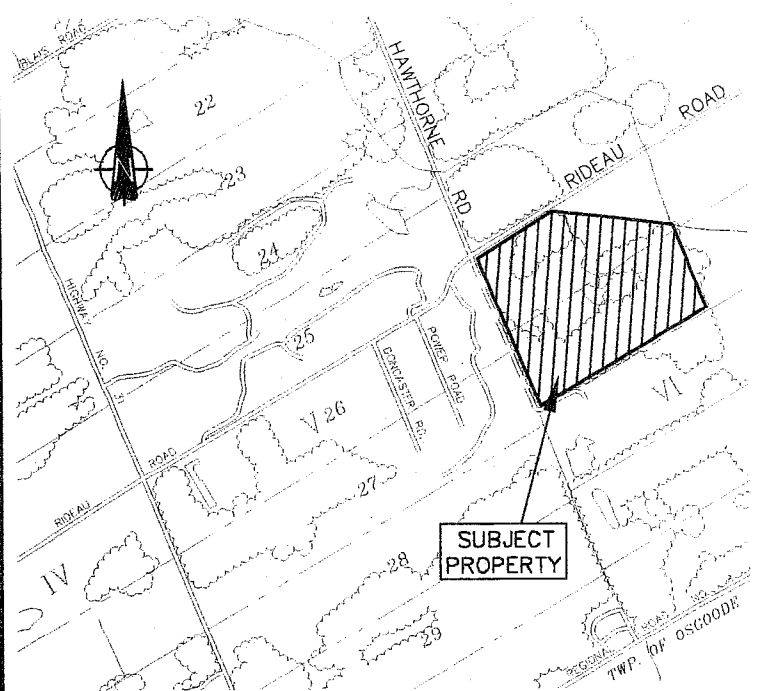
Sediment and Erosion control measures shall be implemented prior to work and maintained during the work phase by the general contractor to prevent entry of sediment into the receiving stream. All sediment and erosion control measures shall be inspected daily by the general contractor to ensure that they 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, oil, etc.) from entering the receiving stream. Vehicle and equipment re-fueling 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



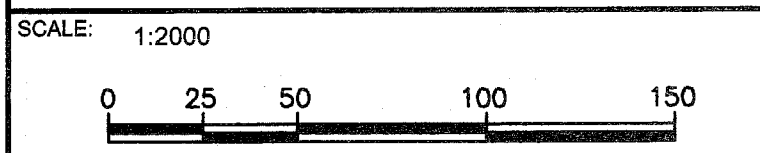
NOT TO SCALE

LEGEND

- x 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

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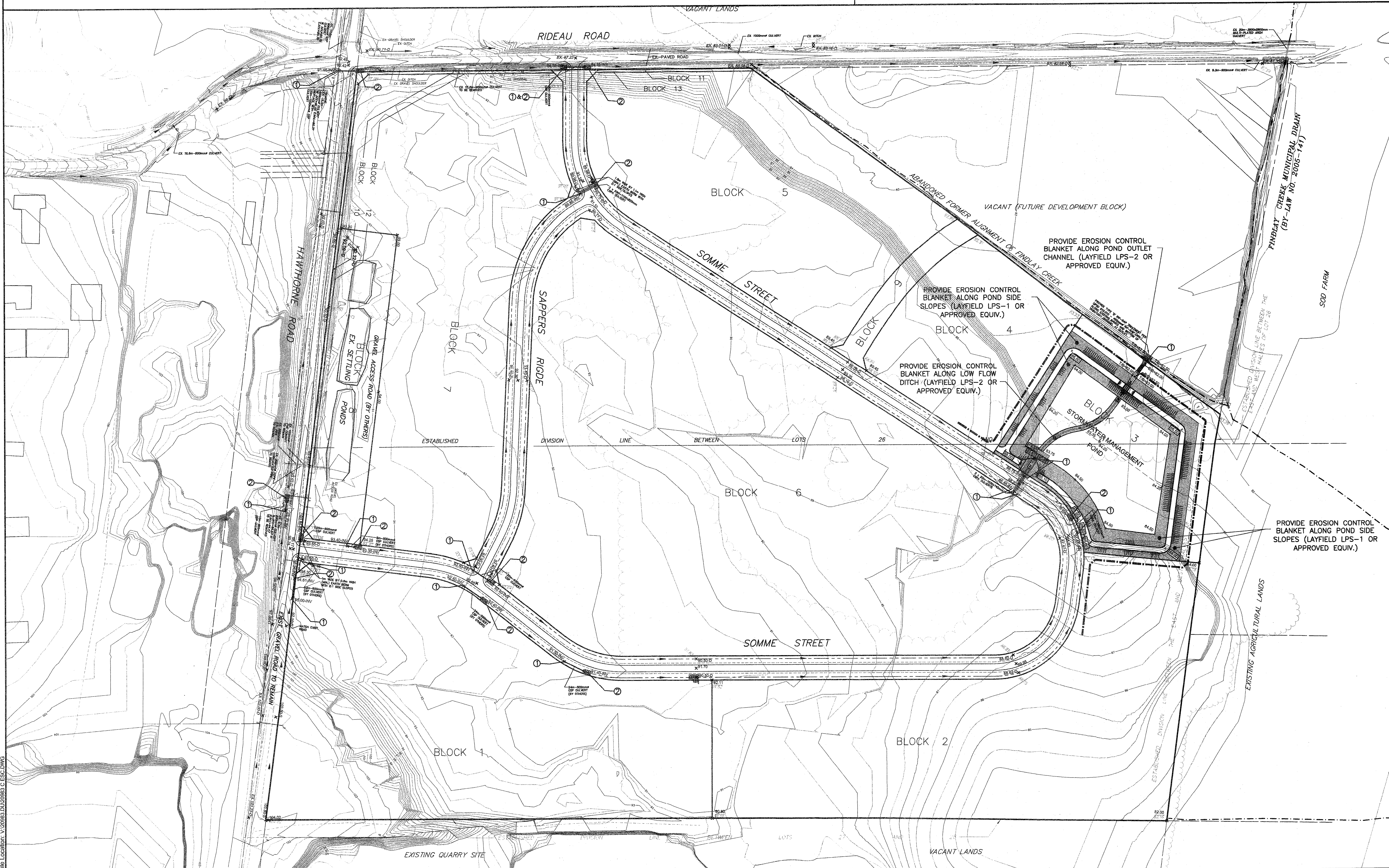
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PROJECT NORTH: [North Arrow]

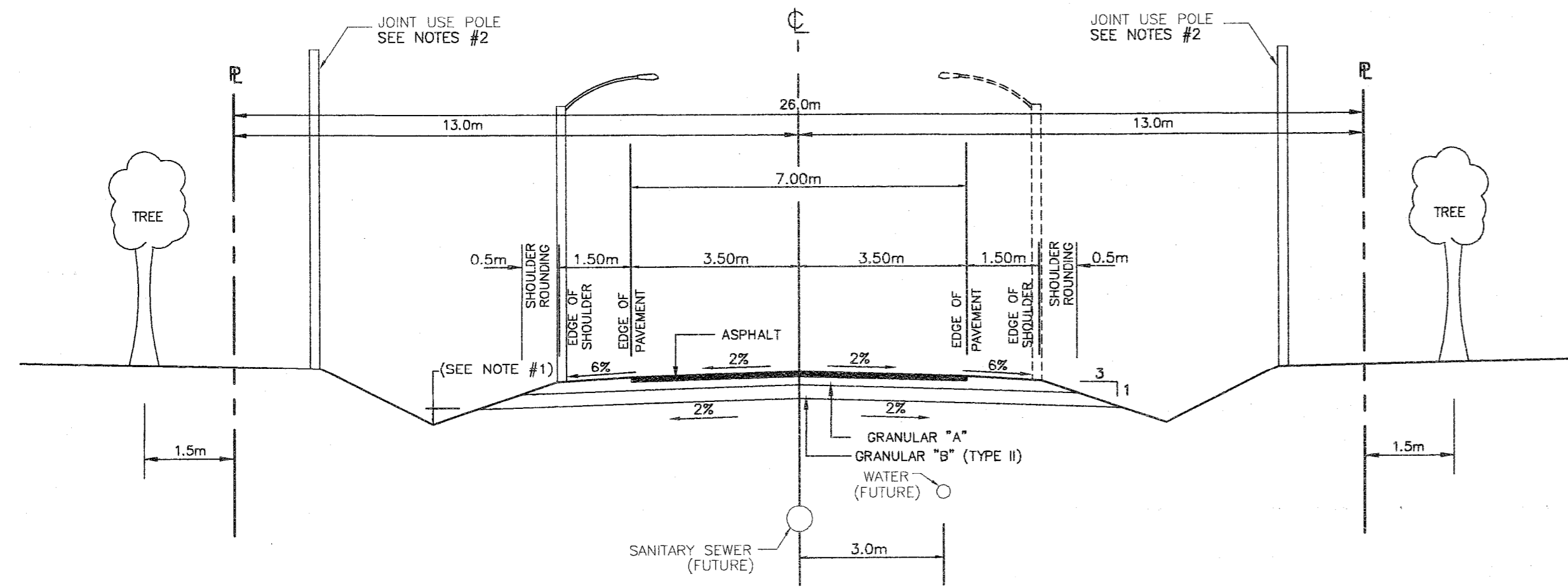
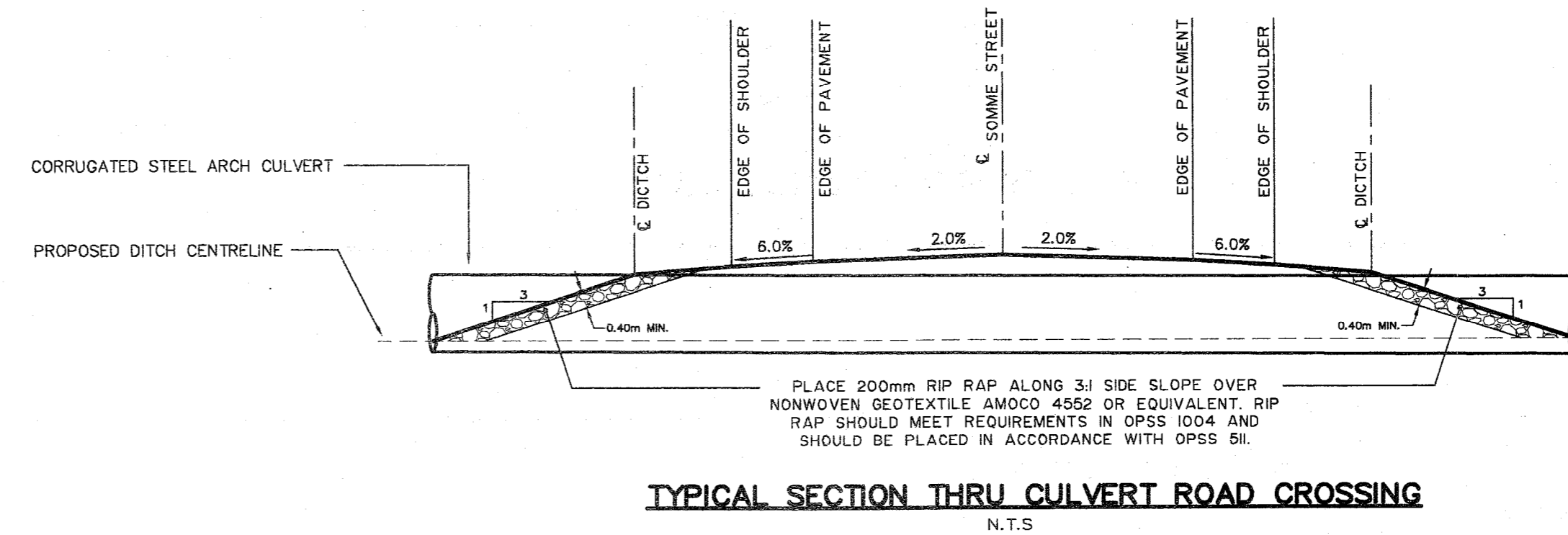
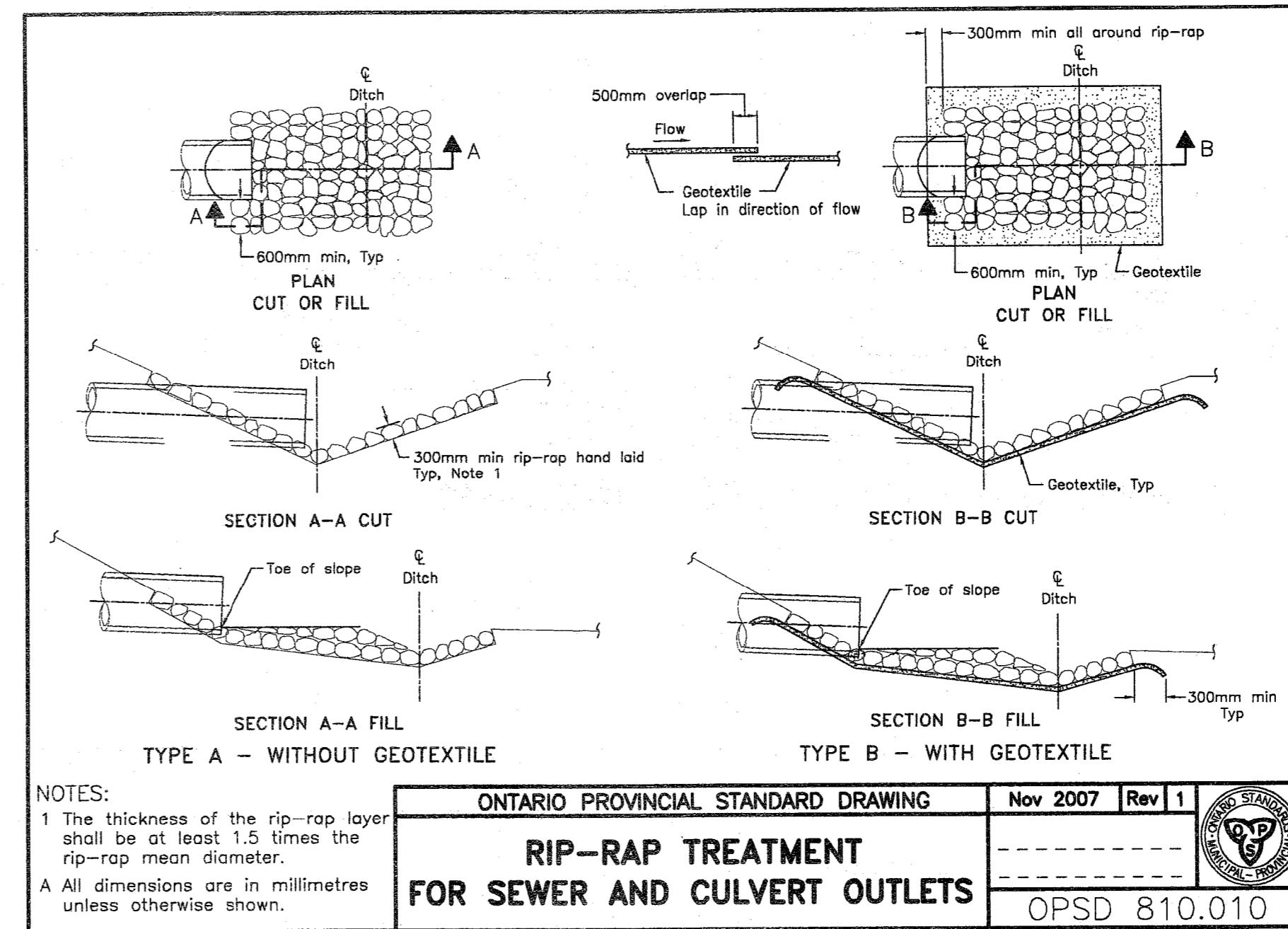
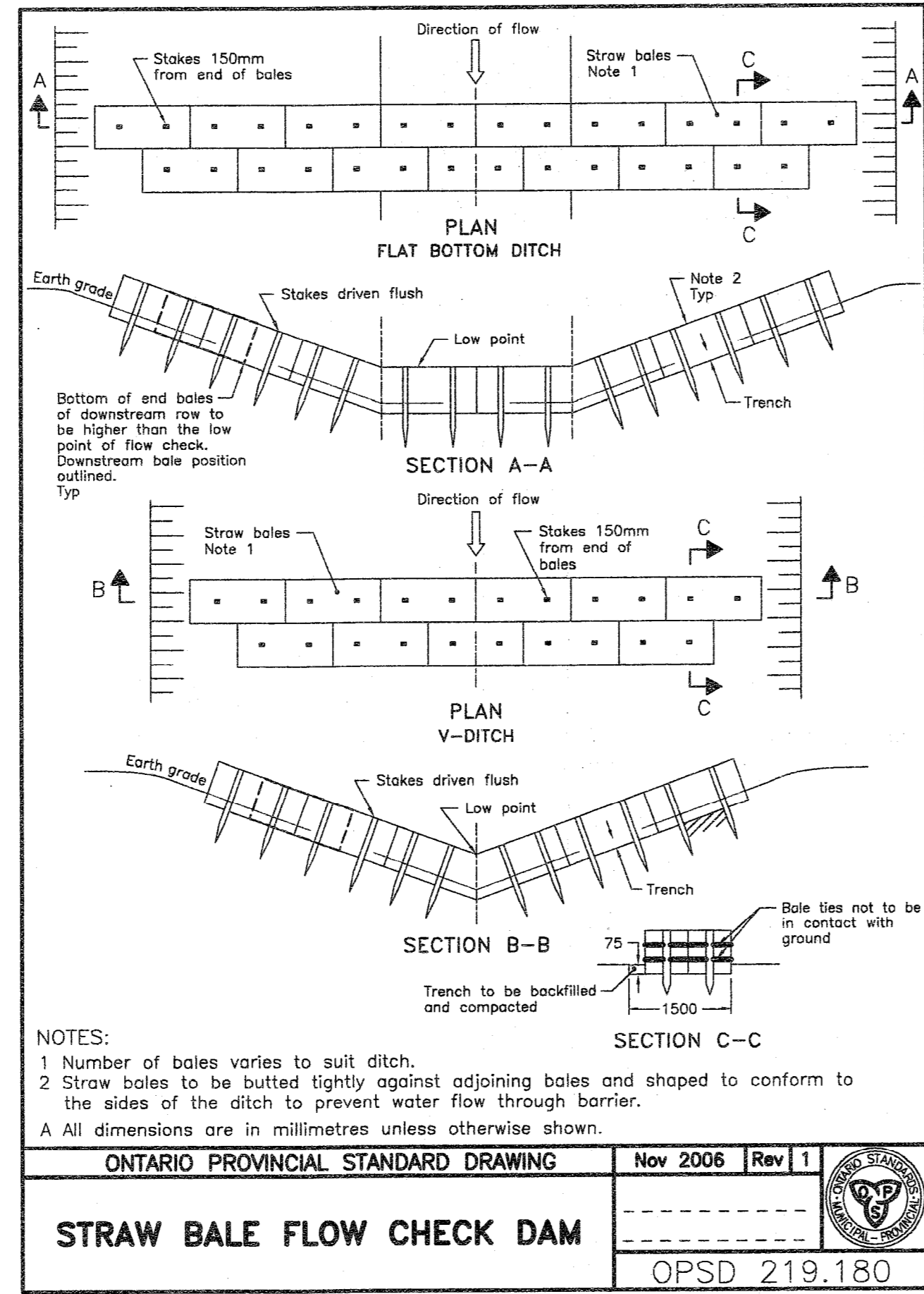
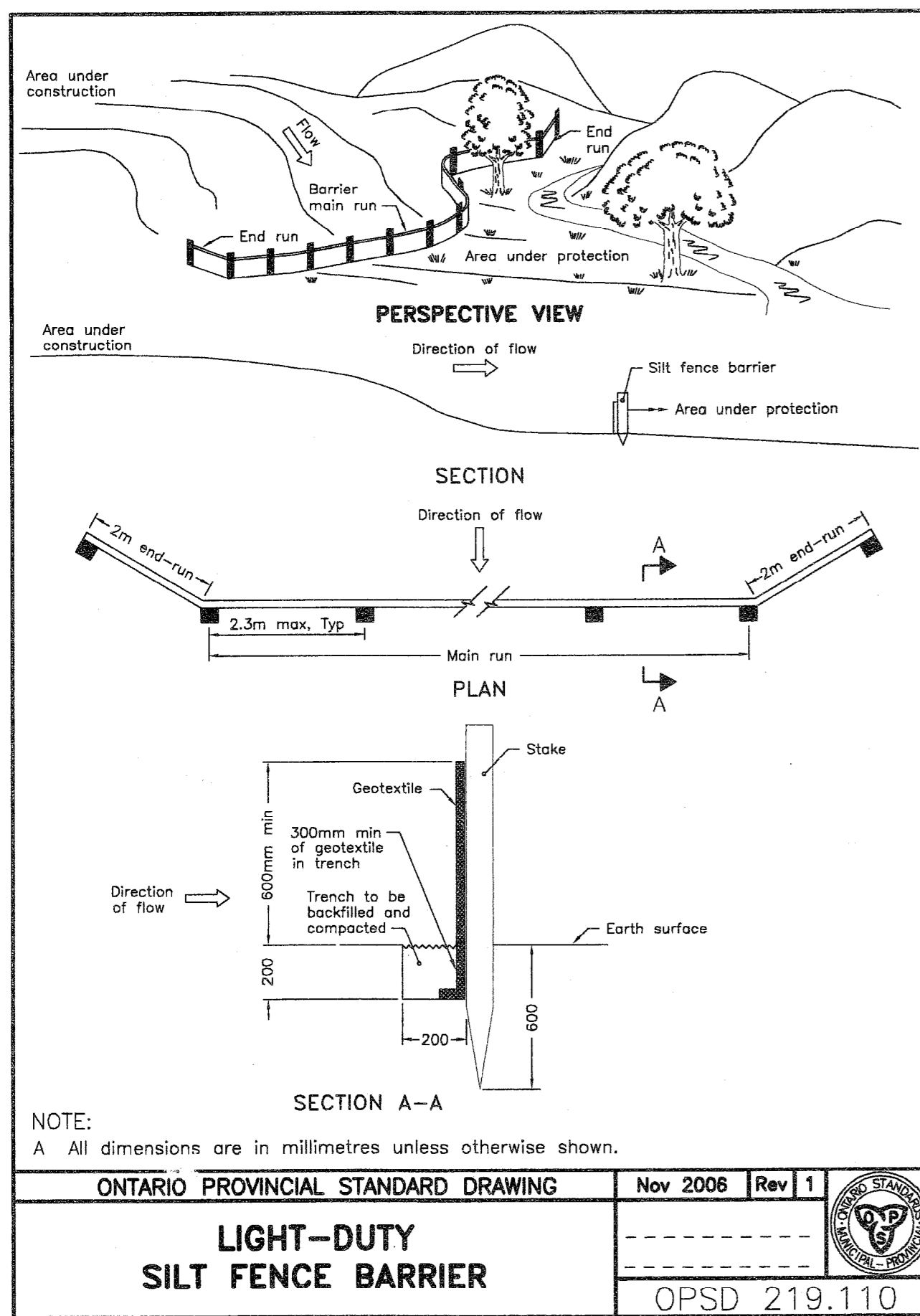
PROJECT: HAWTHORNE INDUSTRIAL PARK

DRAWING: EROSION AND SEDIMENT CONTROL PLAN

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



File Location: V:\2008\DL20983.C ESC.DWG



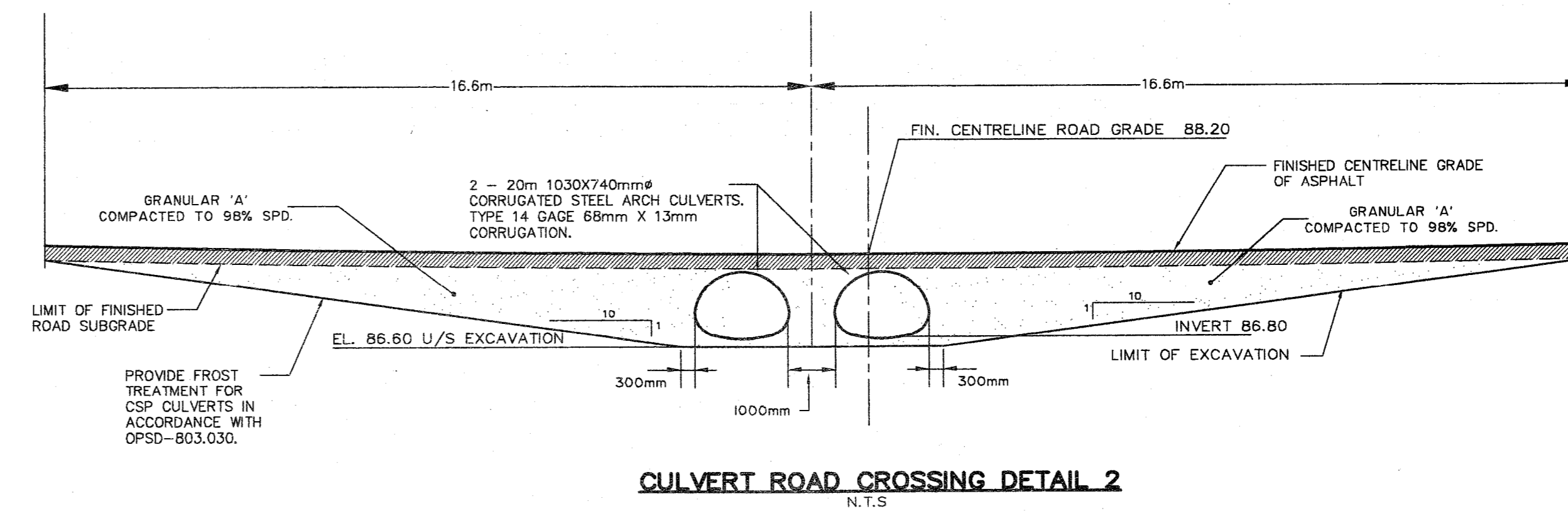
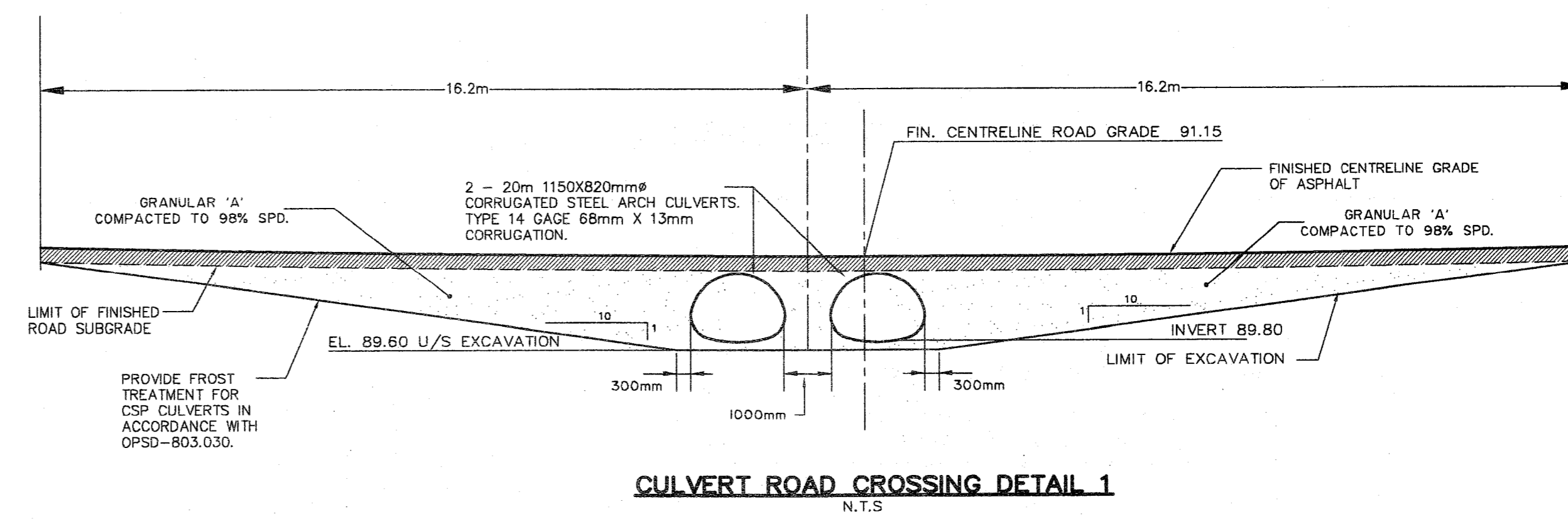
26.0 METER ROAD ALLOWANCE RURAL SECTION

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:

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



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PROJECT NORTH
LICENSED PROFESSIONAL ENGINEER
D. P. UPTON
PROVINCE OF ONTARIO

PROJECT: **HAWTHORNE INDUSTRIAL PARK**

DRAWING: **DETAILS**

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

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)

Checked by: G. Forget, P.Eng.

1:10 year Ottawa International Airport IDF Curve

Increase Runoff Coefficient by 0.0%

DETAILS	NODES		DRAINAGE AREA					PEAK FLOW GENERATION					OPEN DITCH/SWALE DATA						CULVERTS SIZED UNDER 1:10 YEAR STORM EVENT					FLOW TIME (min)	U/S Inv (m)	D/S Inv (m)								
	FROM	TO	Area at C of		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)				
			0.70 (ha)	0.90 (ha)																														
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	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	2	9		0.00	0.00	0.00	0.35	0.00	0.97	19.28	84.12	81.3					0.50				20.00	1	600	---		NO	YES	0.52	1.16	92.50	92.40			
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	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	28	29A	3.46	0.32	3.78	2.71	5.15	7.53	14.33	24.77	71.65	1026.7	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	29A	29B	0.77	0.11	0.88	0.64	5.79	1.78	16.11	28.58	65.15	1049.5	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	29B	30	0.32	0.12	0.44	0.33	6.13	0.92	17.03	29.92	63.16	1075.8	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	30	22	0.75	0.16	0.91	0.67	6.80	1.86	18.89	31.25	61.31	1158.5	0.00	0.58	1.20	3.00	0.97	1402.6	9748.4	1.39	124.55									1.49	87.96	86.75		
										32.74																								
CULVERT CROSSING	22	19		0.00	0.00	0.00	15.59	0.00	43.33	32.74	59.38	2573.1					0.50				20.00	2	---	1.03 X 0.74	YES	NO	1.30	0.08	86.85	86.75				
										32.82																								
POND INLET	19	POND		0.00	0.00	0.00	35.97	0.00	100.06	38.67	52.87	5422.6	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	POND	DITCH	1:10 year controlled post development peak flow = 696 l/s, see SWMHYMO output of this Report																													0.26	82.50	82.00

Note: Conveyance Capacities 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)

Checked by: G. Forget, P.Eng.

1:100 year Ottawa International Airport IDF Curve

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		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		
			0.70 (ha)	0.90 (ha)																									
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 Capacities 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

Checked by: G. Forget, P.Eng.

10 year Ottawa International Airport IDF Curve

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				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)	
			0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)																											
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	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	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

Checked by: G. Forget, P.Eng.

10 year Ottawa International Airport IDF Curve

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				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)	
			0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)																											
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		0.00	0.58	1.50	3.00	1.93	1974.3	24880.1	1.96	400.00								3.41	90.71	83.01
												23.41																					
EXISTING CULVERT CROSSING	32	28				0.00	0.00	0.00	2.06	0.00	5.74	23.41	87.93																				
												23.55																					
SOUTH CATCHMENT AREA																																	
SOUTH SIDE RIDEAU ROAD	28	29	0.90			0.33	1.23	0.48	13.16	1.33	36.58	37.84	53.68	3363.5	0.00	1.17	2.20	3.00	0.14	3437.1	18513.7	0.84	347.24								6.91	83.04	82.56
SOUTH SIDE RIDEAU ROAD	29	30	0.48			0.31	0.79	0.38	13.53	1.04	37.62	44.76	47.64	3192.1	0.00	0.90	2.20	3.00	0.51	3287.0	35640.2	1.35	236.20								2.91	82.56	81.35

Note: Conveyance Capacities 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

Checked by: G. Forget, P.Eng.

1:100 year Ottawa International Airport IDF Curve

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				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		
			0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)																									
NORTH CATCHMENT AREA																															
Existing 900 mm dia. Culvert Capacity before ditch flows to Findlay Creek																															
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 Capacities for the Open Ditch/Swale were calculated based on a Manning's Roughness Coefficient (n) of 0.030

HAWTHORNE INDUSTRIAL PARK

1:10 YEAR ROADSIDE CULVERT DESIGN

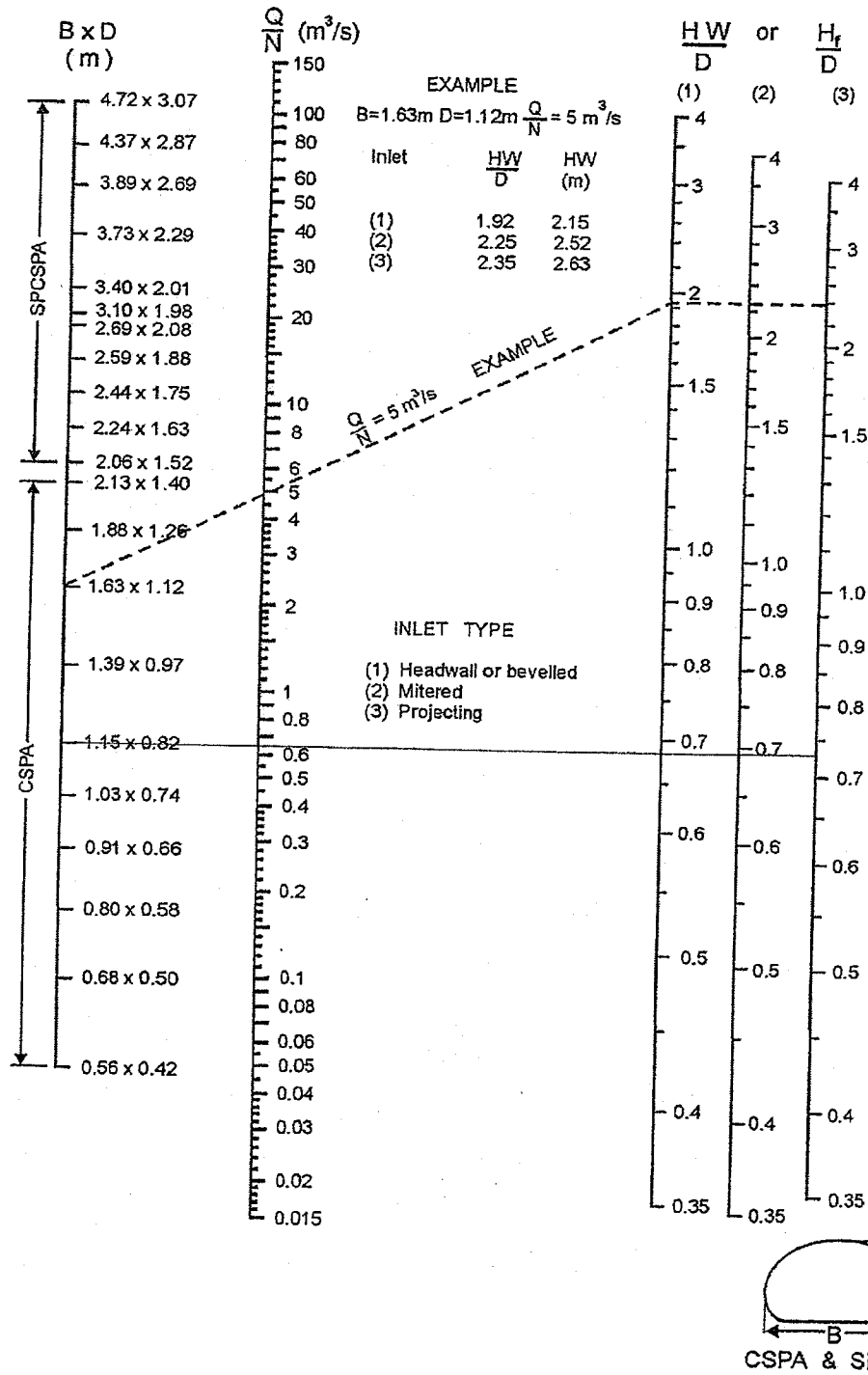
CONVENTIONAL CULVERT DESIGN

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

Station	DESIGN DATA							CULVERT DATA					INLET CONTROL			OUTLET CONTROL					GOVERNING HW	VEL V _o				
	Q (m ³ /s)	d (m)	d _o (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)
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	
<p>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</p> <p>8 Culvert Slope 10a/b D (circular) or B x H (arch) 11 Number of Barrels 13 Area per barrel 14 For box only</p> <p>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)</p> <p>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</p> <p>26 Outlet velocity if required (Subsection 3.2.3)</p>																										

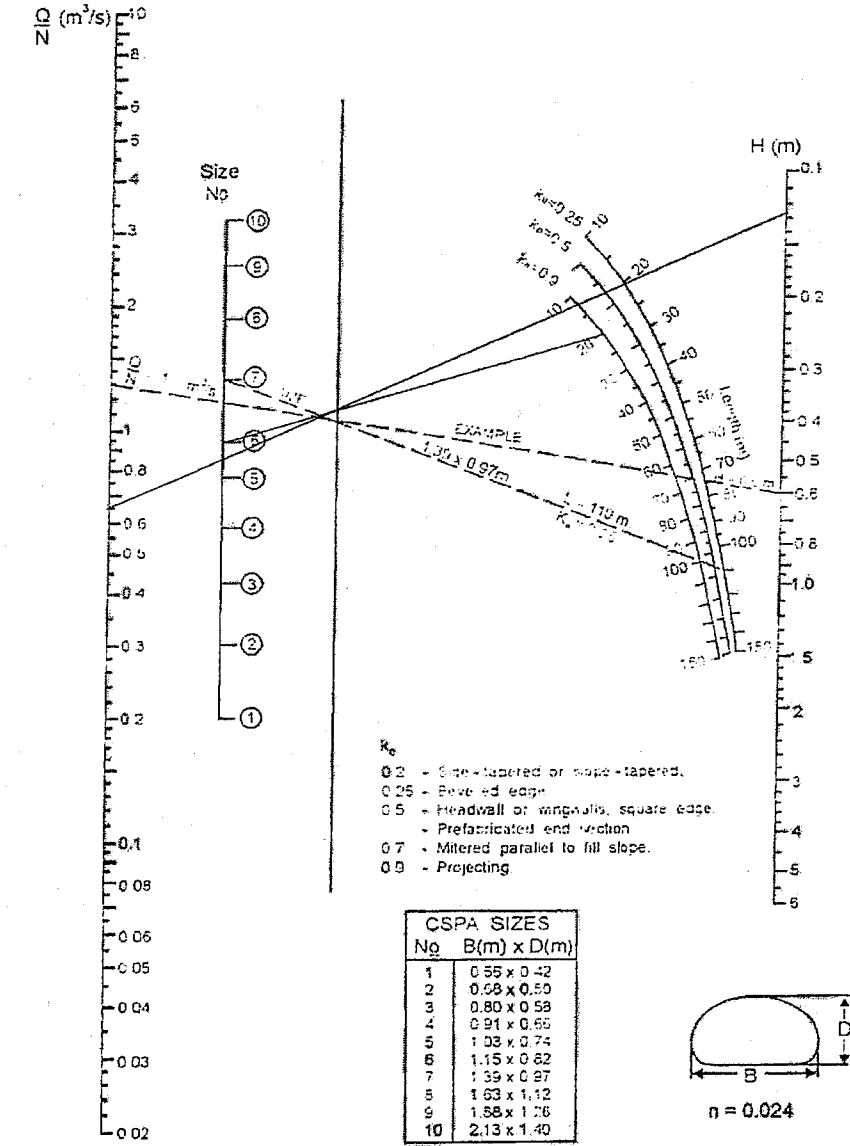
Culvert Crossing $\diamond 6-14$ $2 \times 1.15 \text{ m} \times 0.82 \text{ m}$

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts



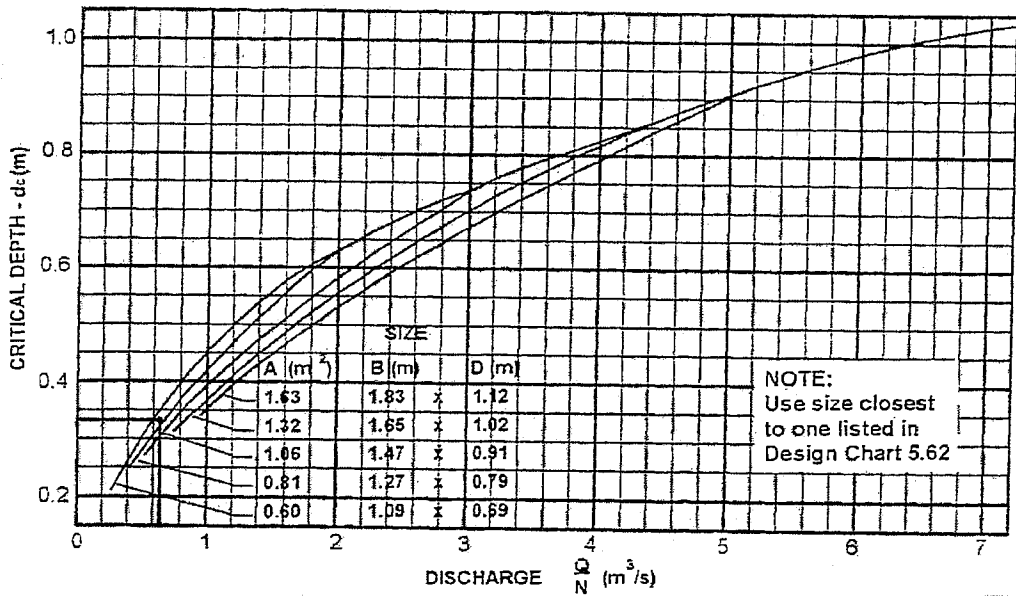
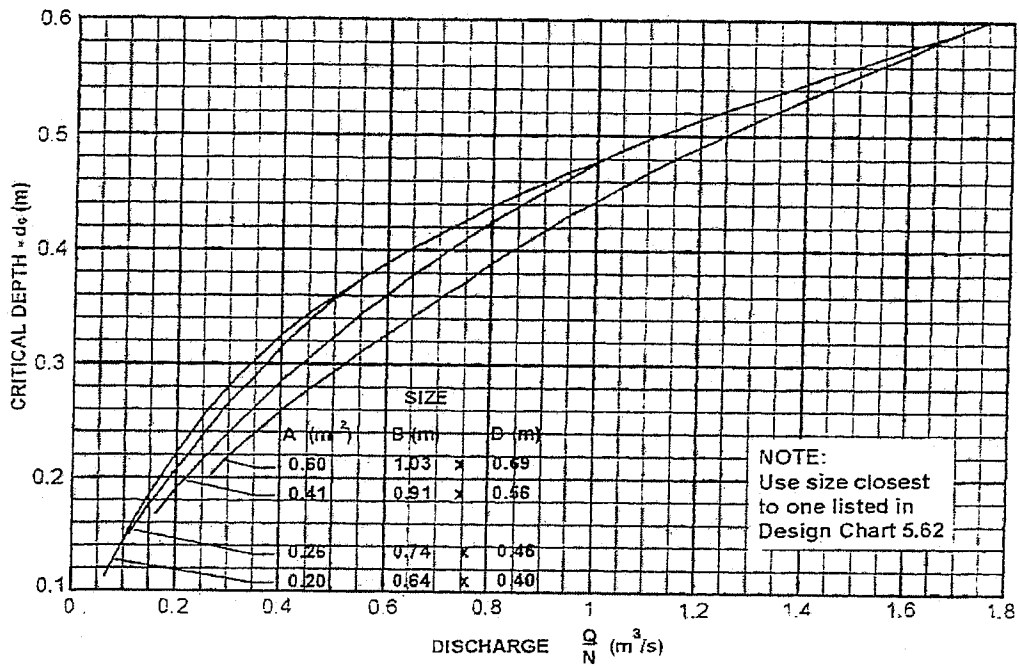
Source: Herr (1977)

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



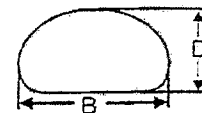
Source: Herr (1977)

Design Chart 5.53: CSP Pipe Arch Culverts



$(d_c \geq D)$

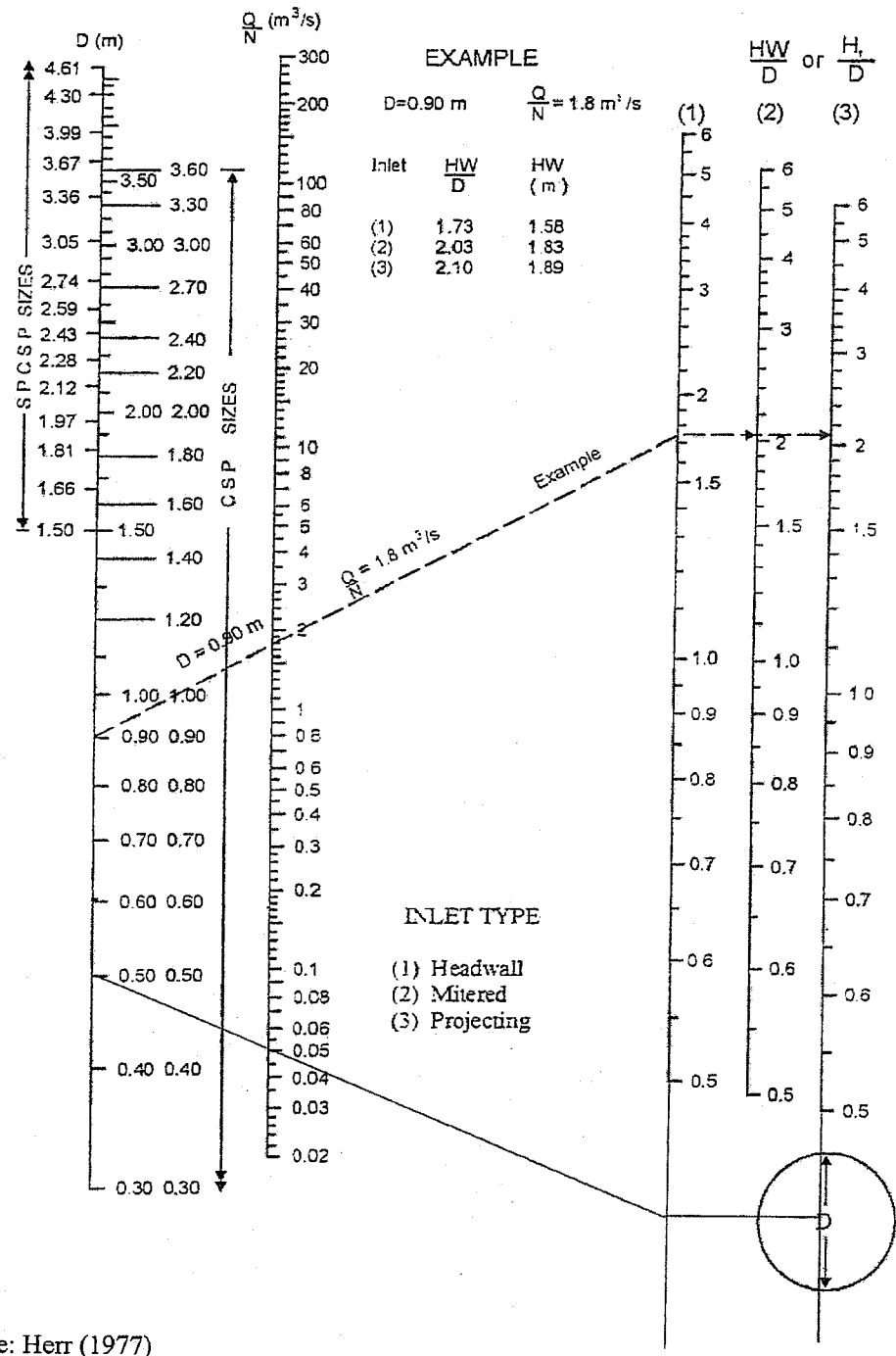
A = Cross-sectional area per barrel interpolated for other sizes



Source: Herr (1977)

Culvert Crossing $\diamond 23b$ to $\diamond 23c$ 500mm \varnothing

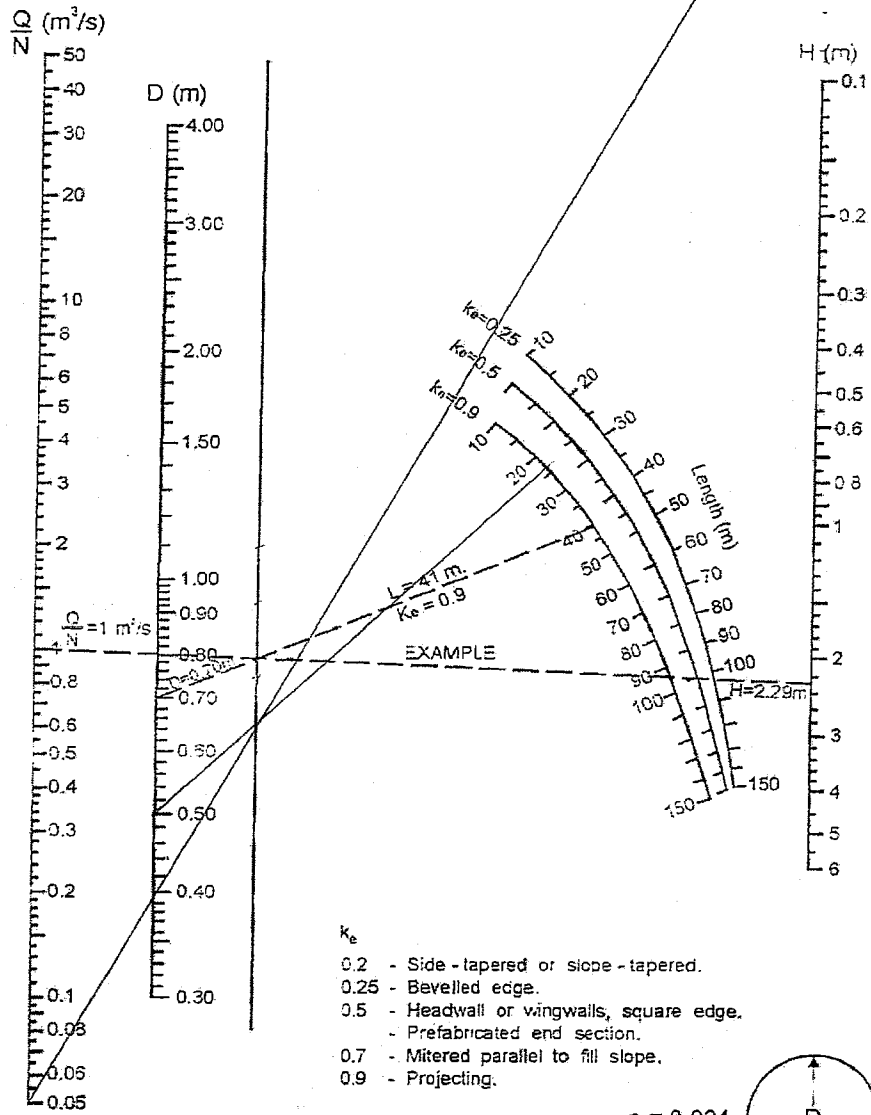
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

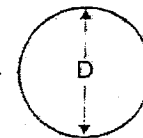
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

$H < 0.1 m$



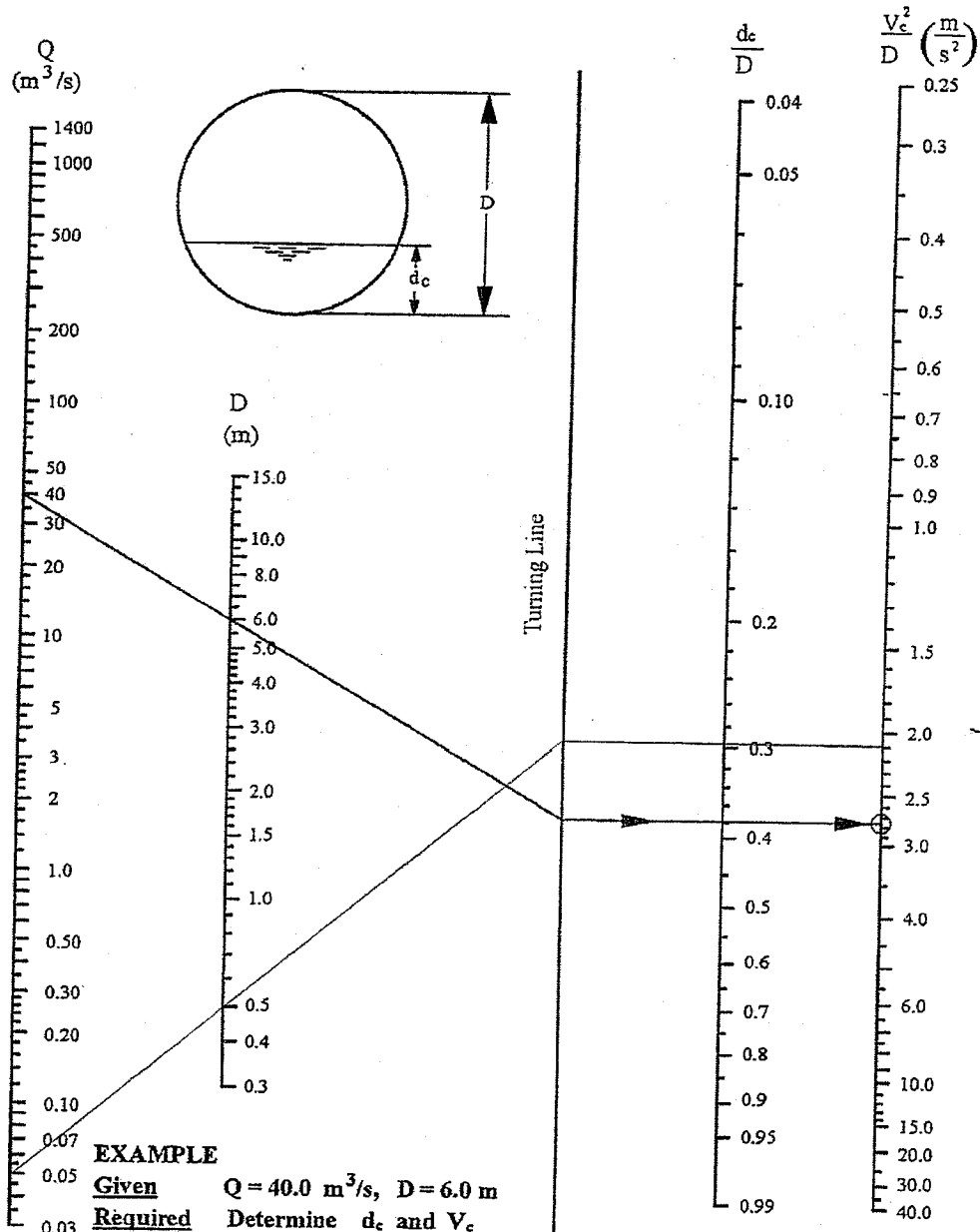
- k_e
- 0.2 - Side-tapered or slope-tapered.
 - 0.25 - Bevelled edge.
 - 0.5 - Headwall or wingwalls, square edge.
 - 0.7 - Prefabricated end section.
 - 0.9 - Mitered parallel to fill slope.
 - 0.9 - Projecting.

$n = 0.024$



Source: Herr (1977)

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



$\frac{d_c}{D} = 0.3$
 $d_c = 0.3 \times 0.5$
 $= 0.15$

EXAMPLE

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

Required Determine d_c and V_c

Solution Join $Q = 40.0 \text{ m}^3/\text{s}$ to $D = 6.0 \text{ m}$ and extend to turning line.

Draw a horizontal line perpendicular to the turning line to intersect

$d_c/D = 0.38$ and $V_c^2/D = 2.76$

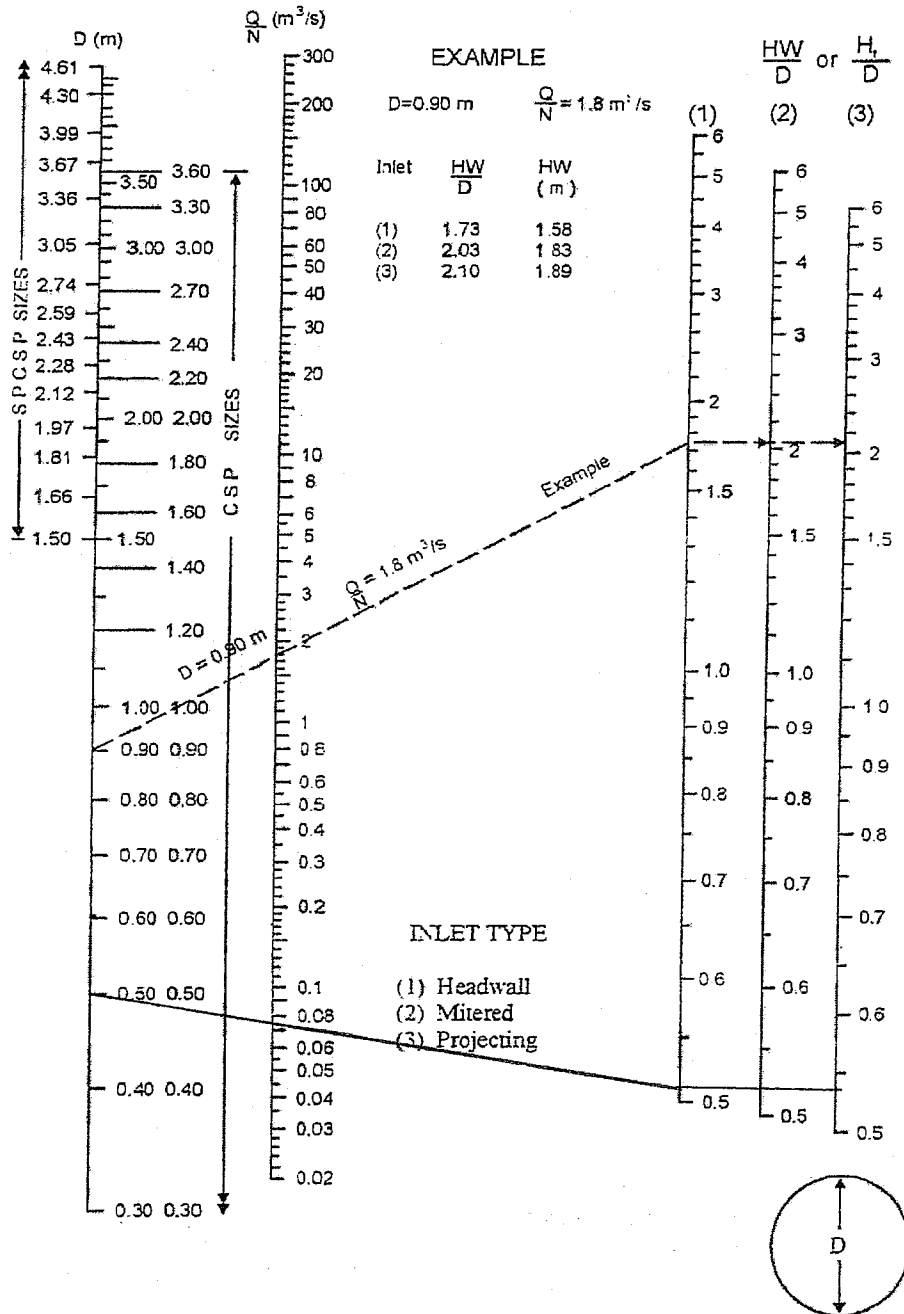
Calculate $d_c = 0.38 \times 6.0 = 2.28 \text{ m}$.

$V_c = (2.76 \times 6.0)^{0.5} = 4.07 \text{ m/s}$

Source: American Iron and Steel Institute

Culvert Crossing $\diamond 24a$ to $\diamond 24b$ 500 mm \emptyset

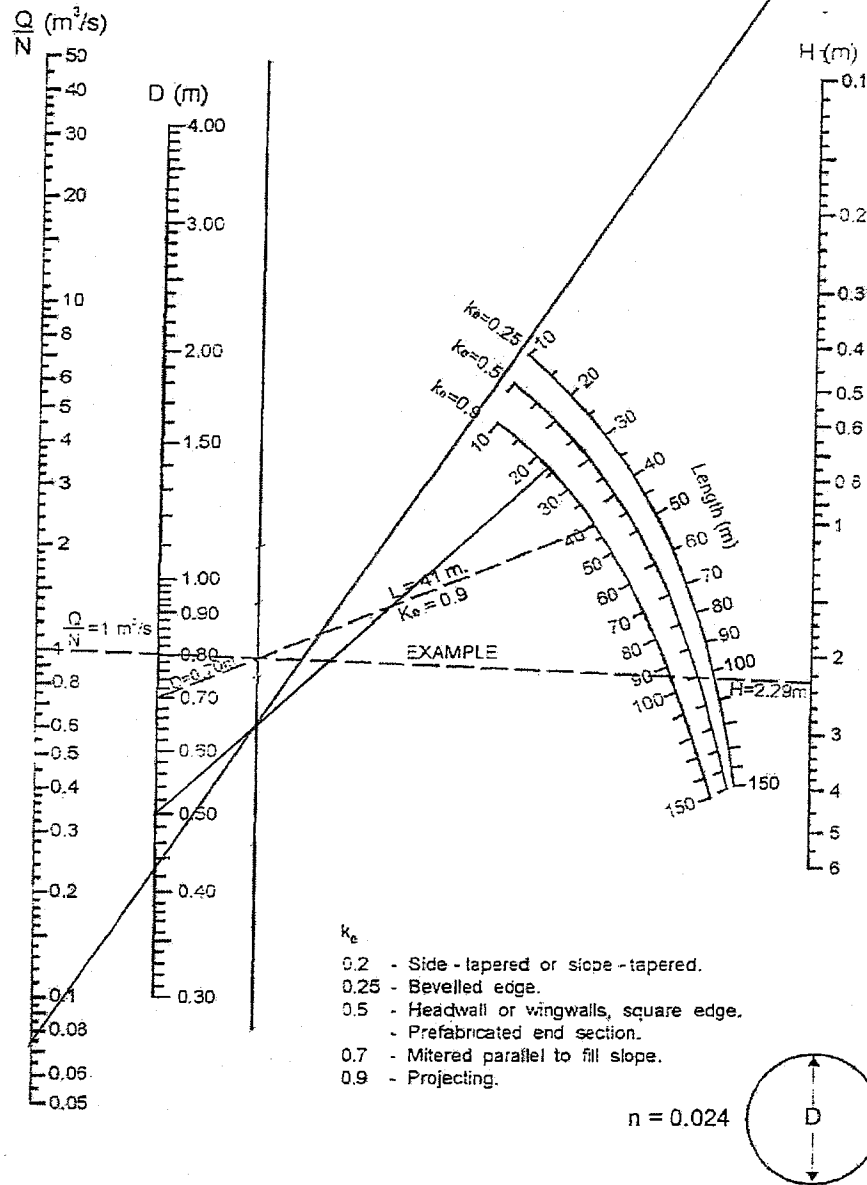
Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)

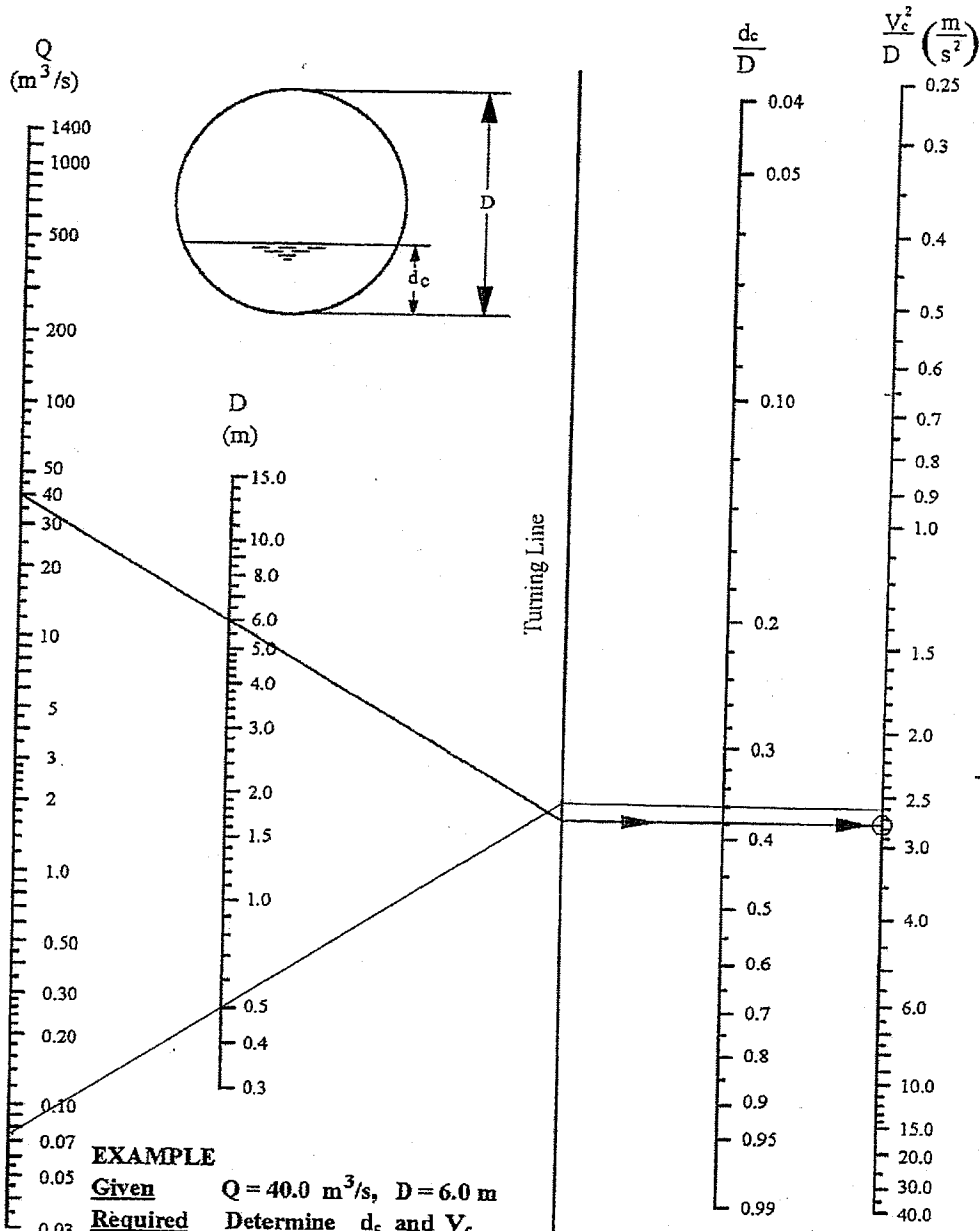
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full

$H < 0.1m$



Source: Herr (1977)

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



EXAMPLE

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

Required Determine d_c and V_c .

Solution Join $Q = 40.0 \text{ m}^3/\text{s}$ to $D = 6.0 \text{ m}$ 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 $d_c = 0.38 \times 6.0 = 2.28 \text{ m}$.

$V_c = (2.76 \times 6.0)^{0.5} = 4.07 \text{ m/s}$

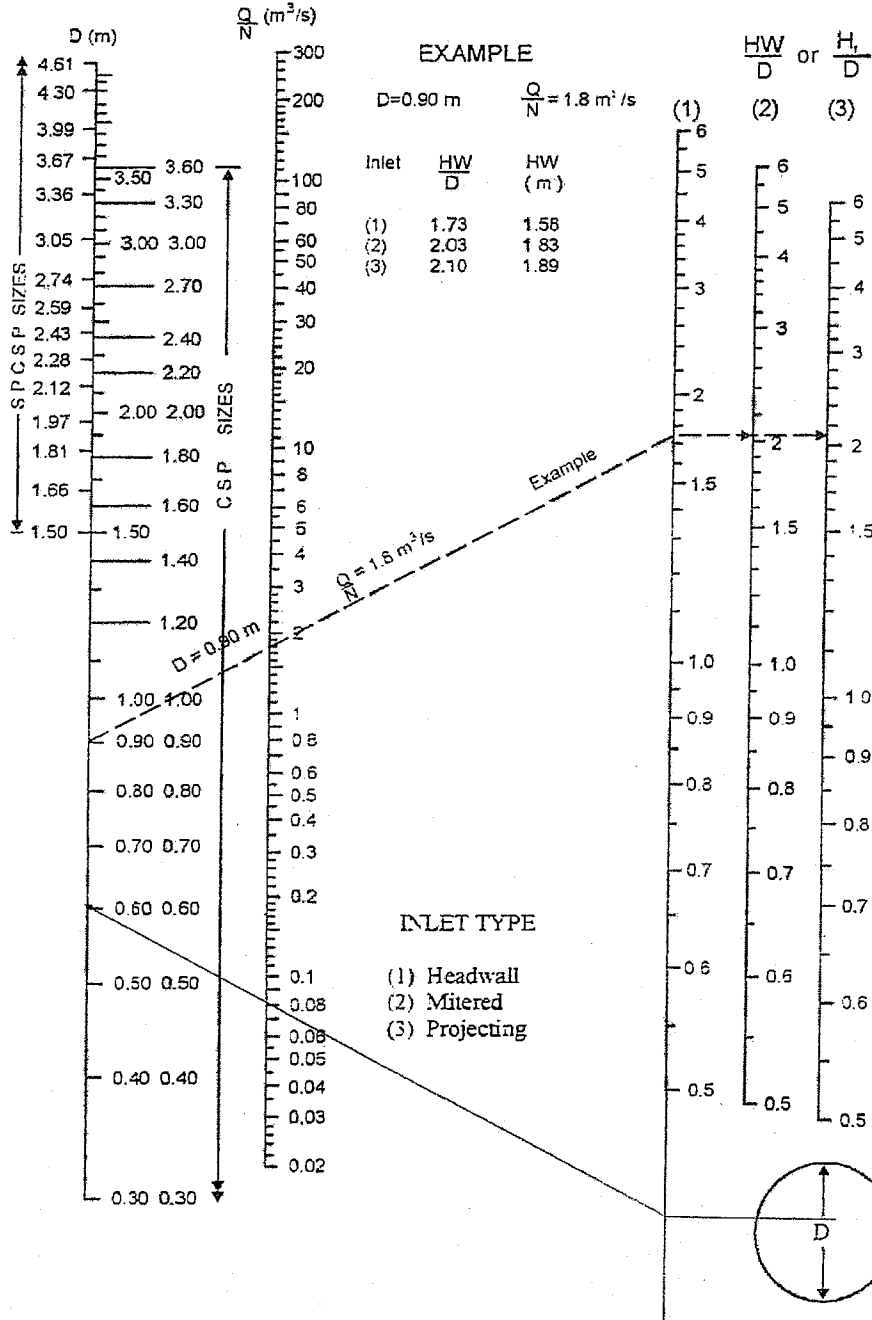
$\frac{d_c}{D} = 0.36$
 $d_c = 0.36 \times 0.5$
 $= 0.18$

Source: American Iron and Steel Institute

Culvert Crossing 2 - 9 600 mm ϕ

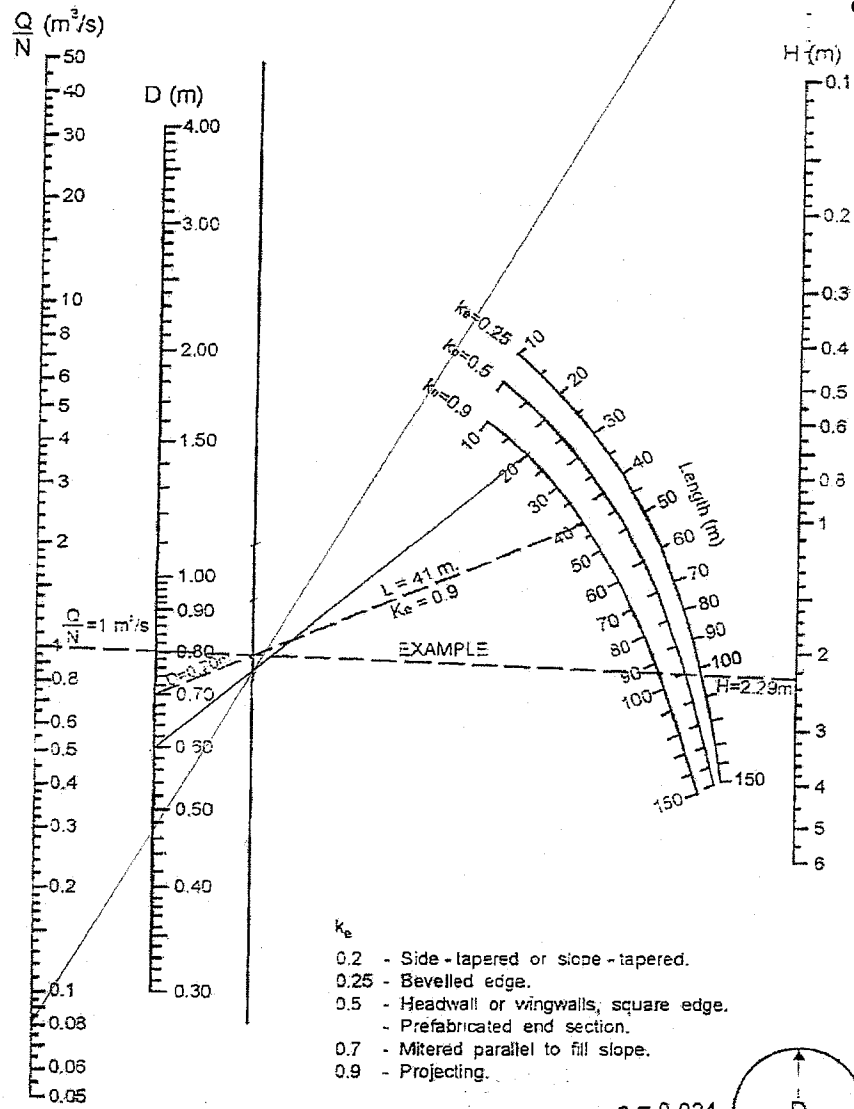
MTO Drainage Management Manual

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



Source: Herr (1977)

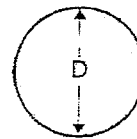
Design Chart 2.35: Outlet Control: CSP Culvert - Flowing Full



$\therefore H < 0.1 m$

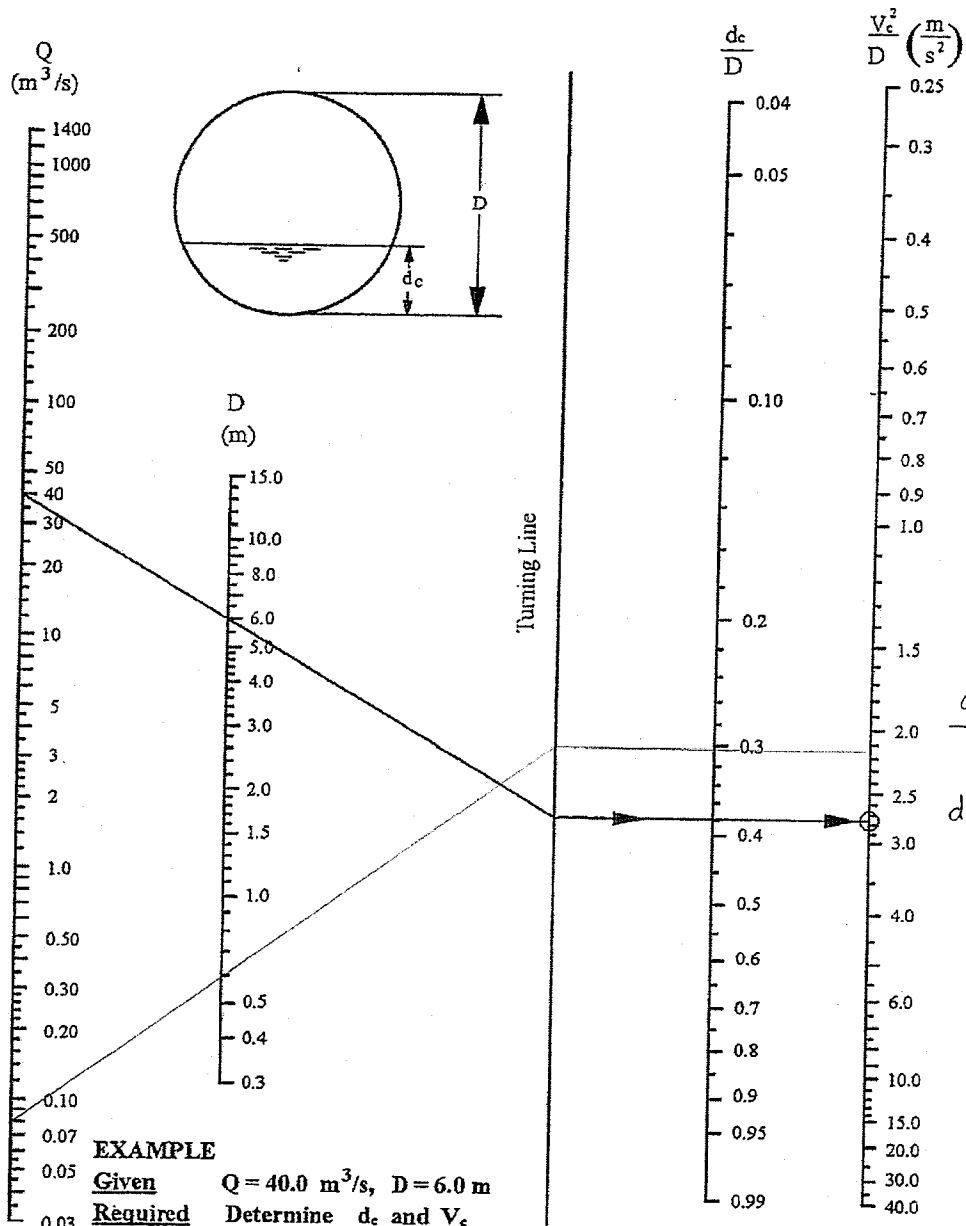
- k_e
- 0.2 - Side-tapered or side-tapered.
 - 0.25 - Bevelled edge.
 - 0.5 - Headwall or wingwalls, square edge.
 - Prefabricated end section.
 - 0.7 - Mitered parallel to fill slope.
 - 0.9 - Projecting.

$n = 0.024$



Source: Herr (1977)

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



EXAMPLE

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

Required Determine d_c and V_c

Solution Join $Q = 40.0 \text{ m}^3/s$ to $D = 6.0 \text{ m}$ and extend to turning line.

Draw a horizontal line perpendicular to the turning line to intersect

$d_c/D = 0.38$ and $V_c^2/D = 2.76$

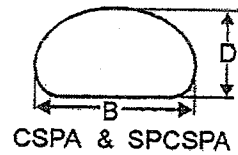
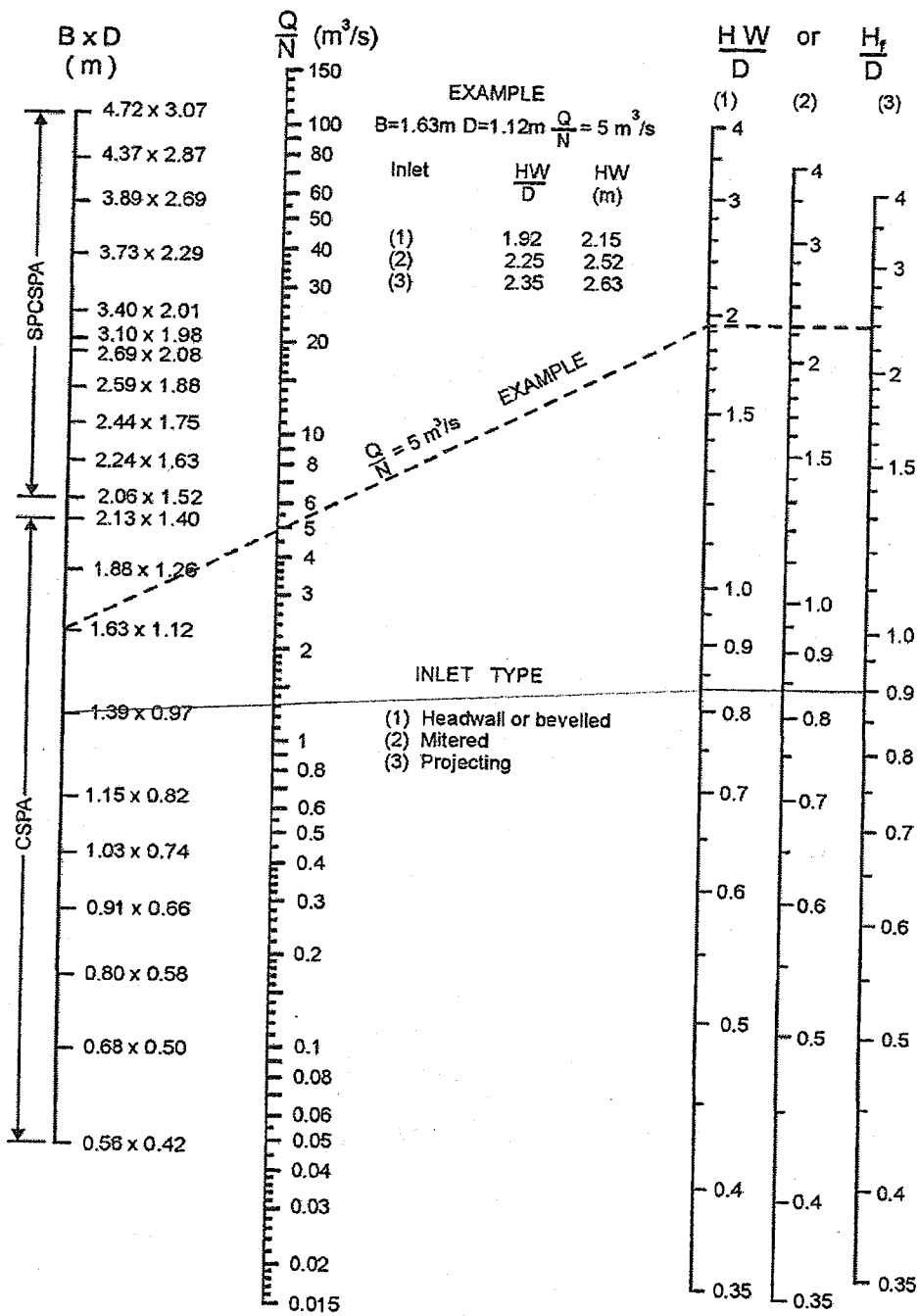
Calculate $d_c = 0.38 \times 6.0 = 2.28 \text{ m}$.

$V_c = (2.76 \times 6.0)^{0.5} = 4.07 \text{ m/s}$

Source: American Iron and Steel Institute

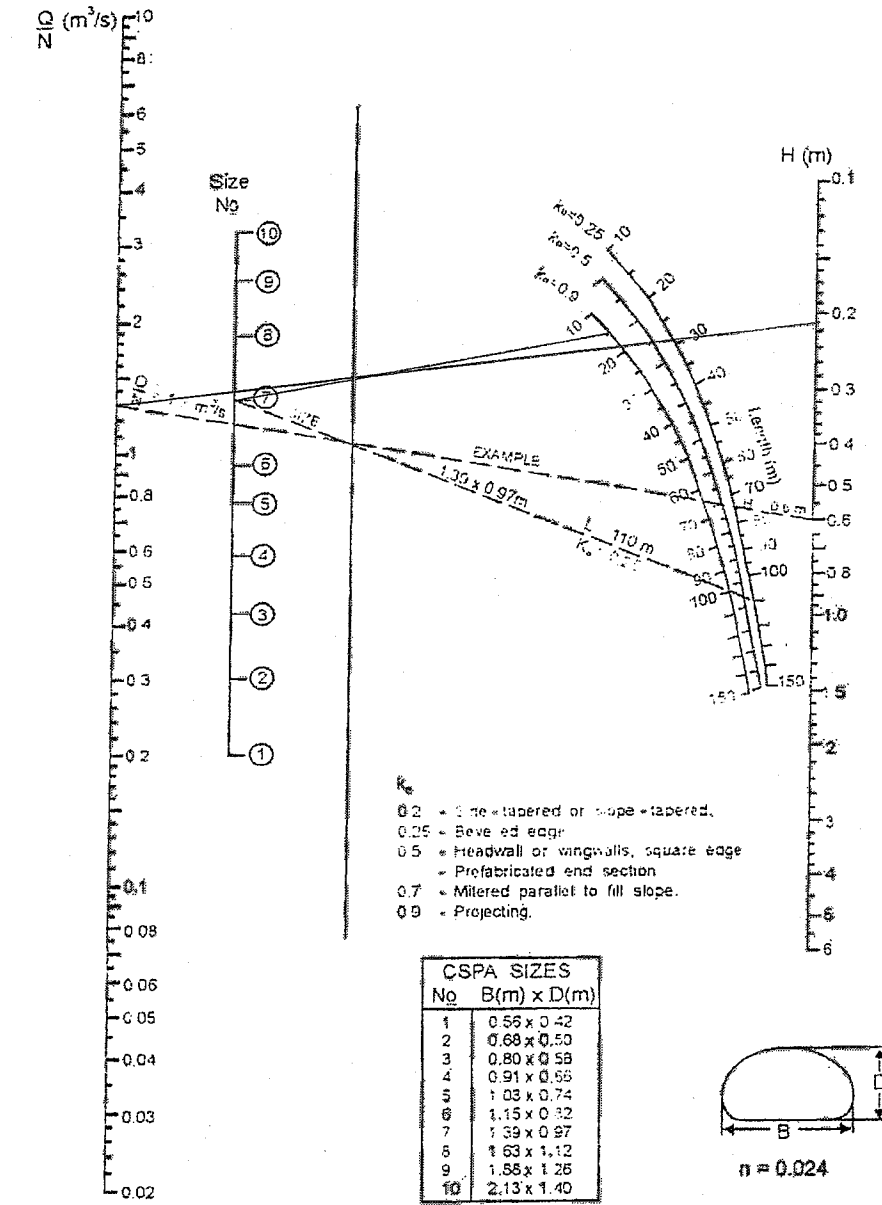
Culvert Crossing 27b to 27c 1.39 x 0.97 m

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts



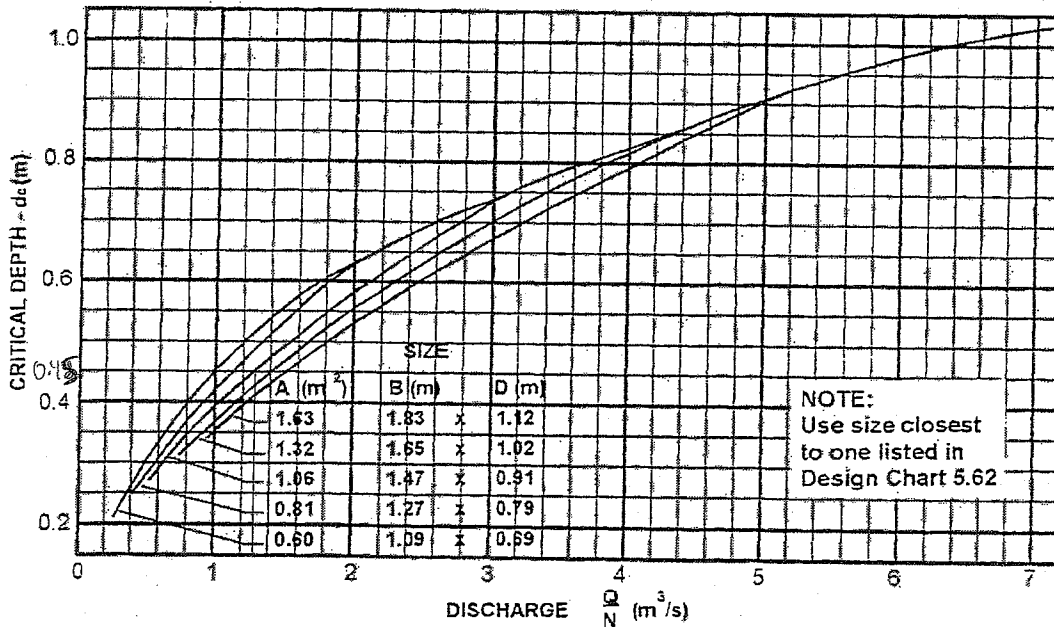
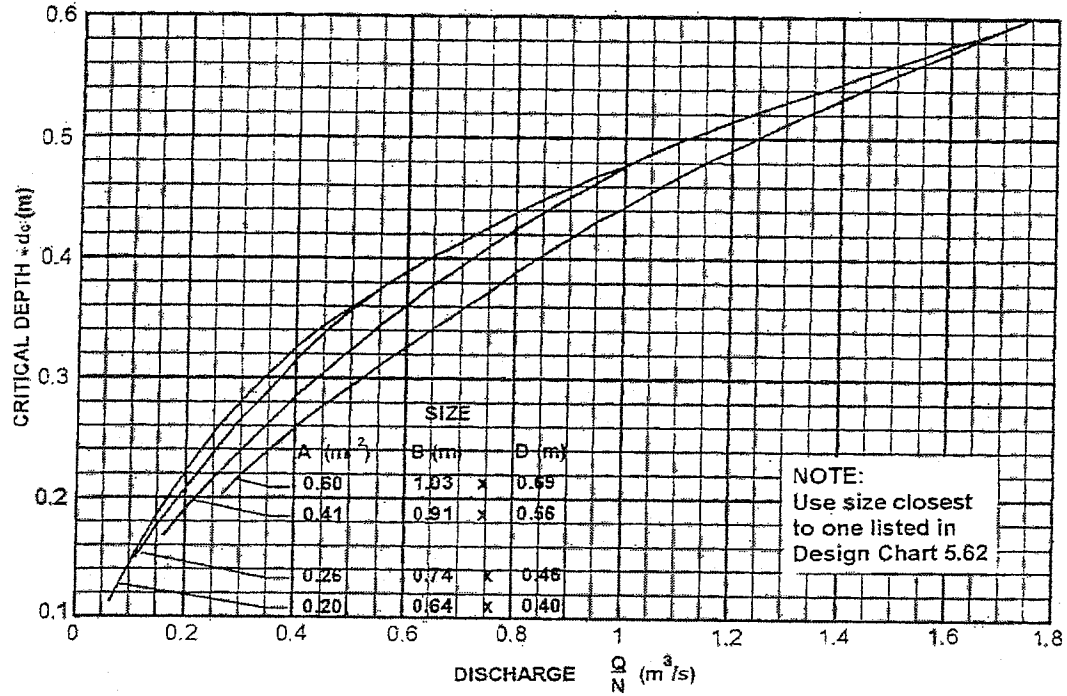
Source: Herr (1977)

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

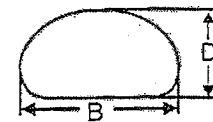


Source: Herr (1977)

Design Chart 5.53: CSP Pipe Arch Culverts



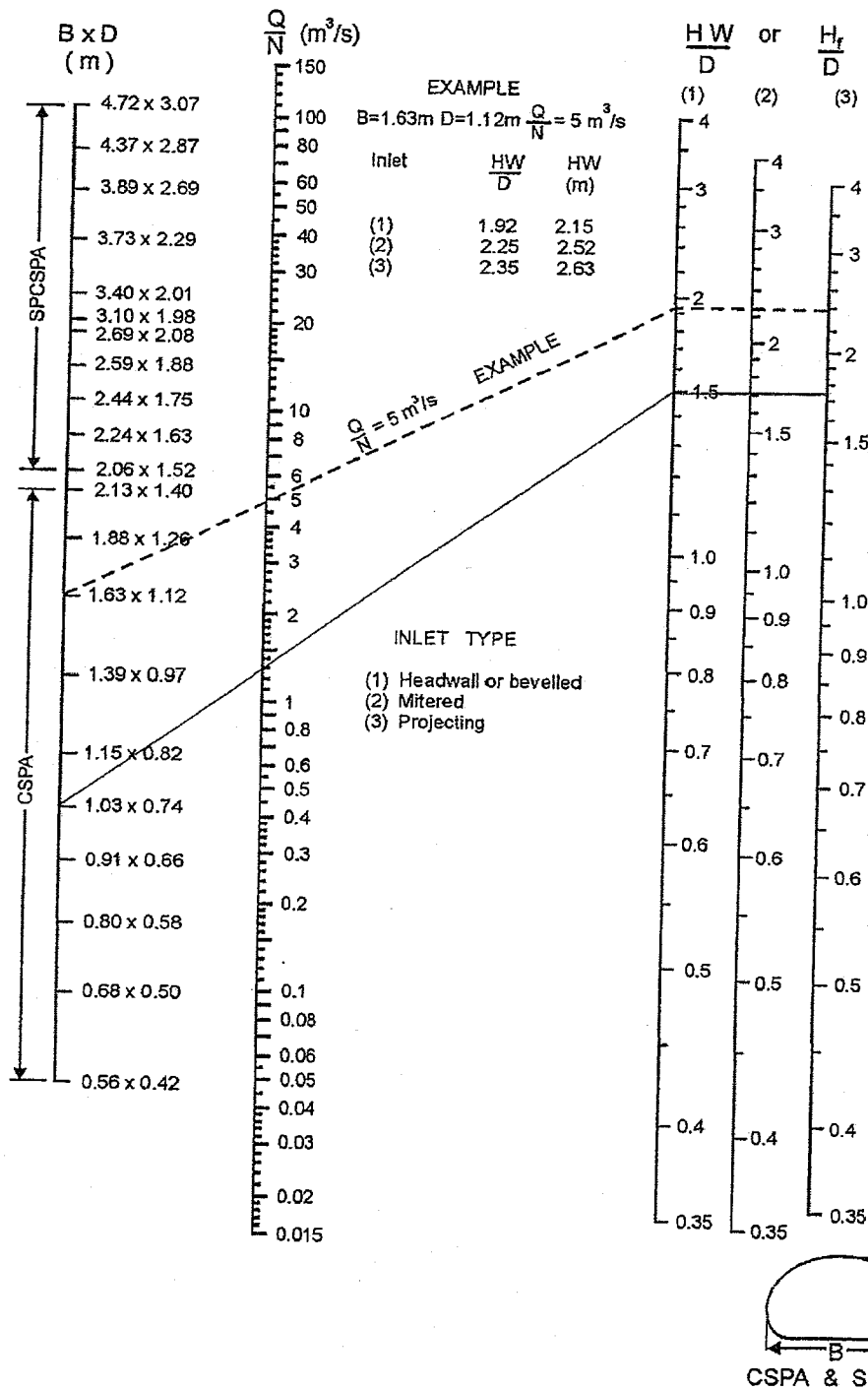
$(d_c \leq D)$
 A = Cross-sectional area per barrel interpolated for other sizes



Source: Herr (1977)

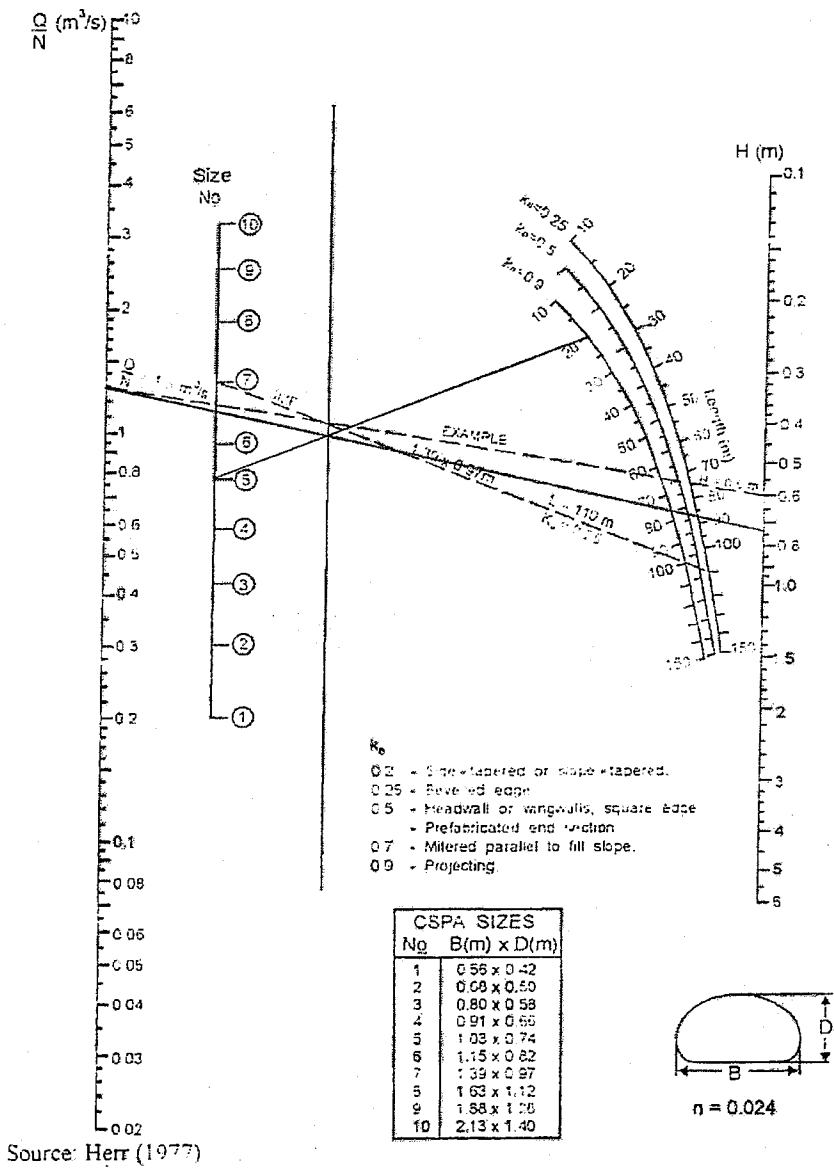
Culvert Crossing 22 - 79 $2 \times 1.03\text{m} \times 0.74\text{m}$

Design Chart 5.43: Inlet Control: Steel Pipe Arch Culverts

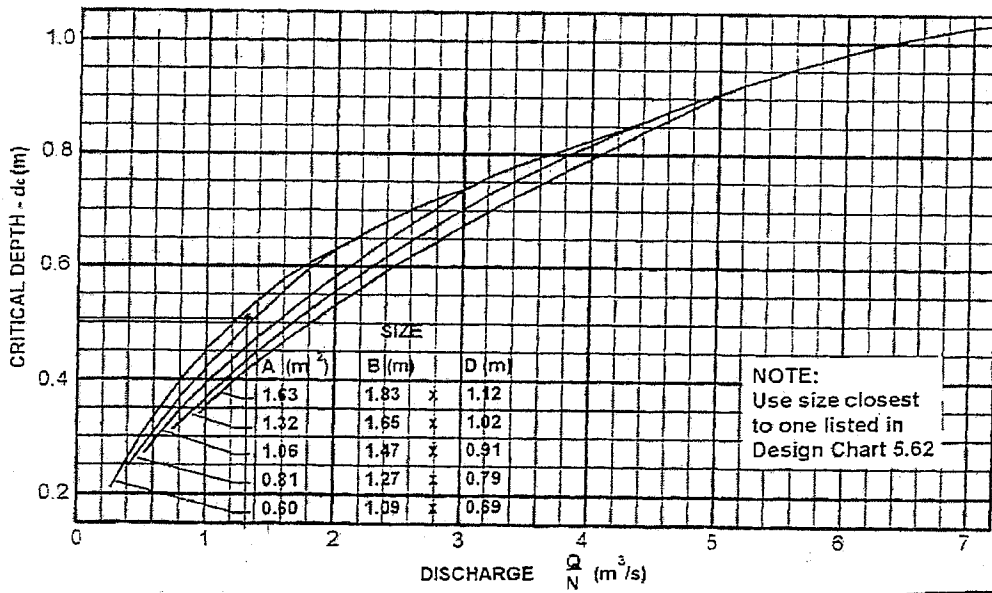
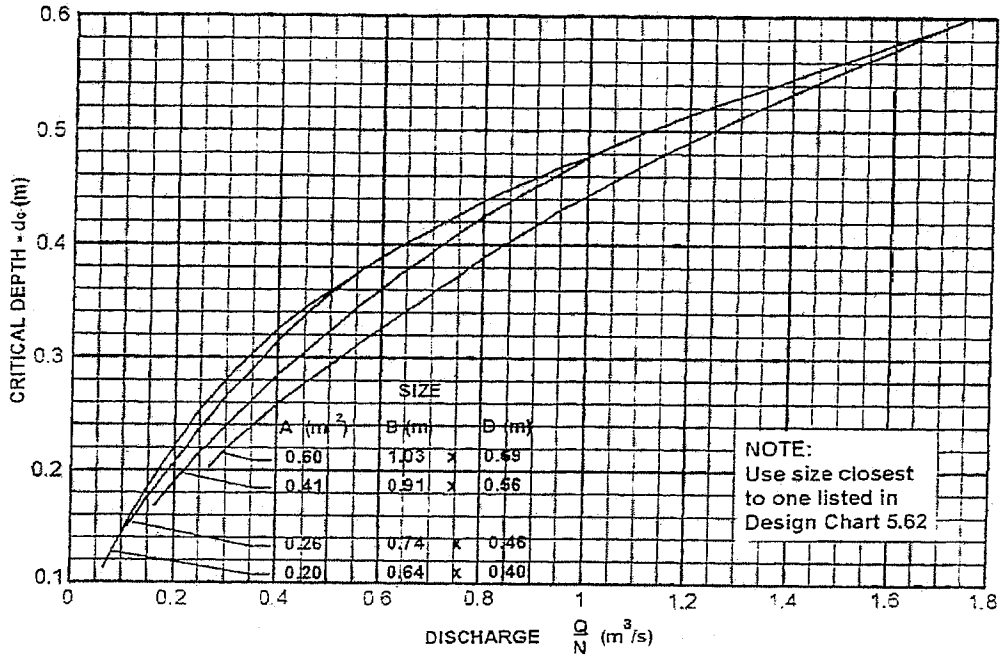


Source: Herr (1977)

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

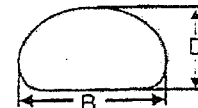


Design Chart 5.53: CSP Pipe Arch Culverts



$(d_c \neq D)$

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



Source: Herr (1977)

APPENDIX 'B'

CONVENTIONAL CULVERT DESIGN SHEET

HAWTHORNE ROAD & RIDEAU ROAD

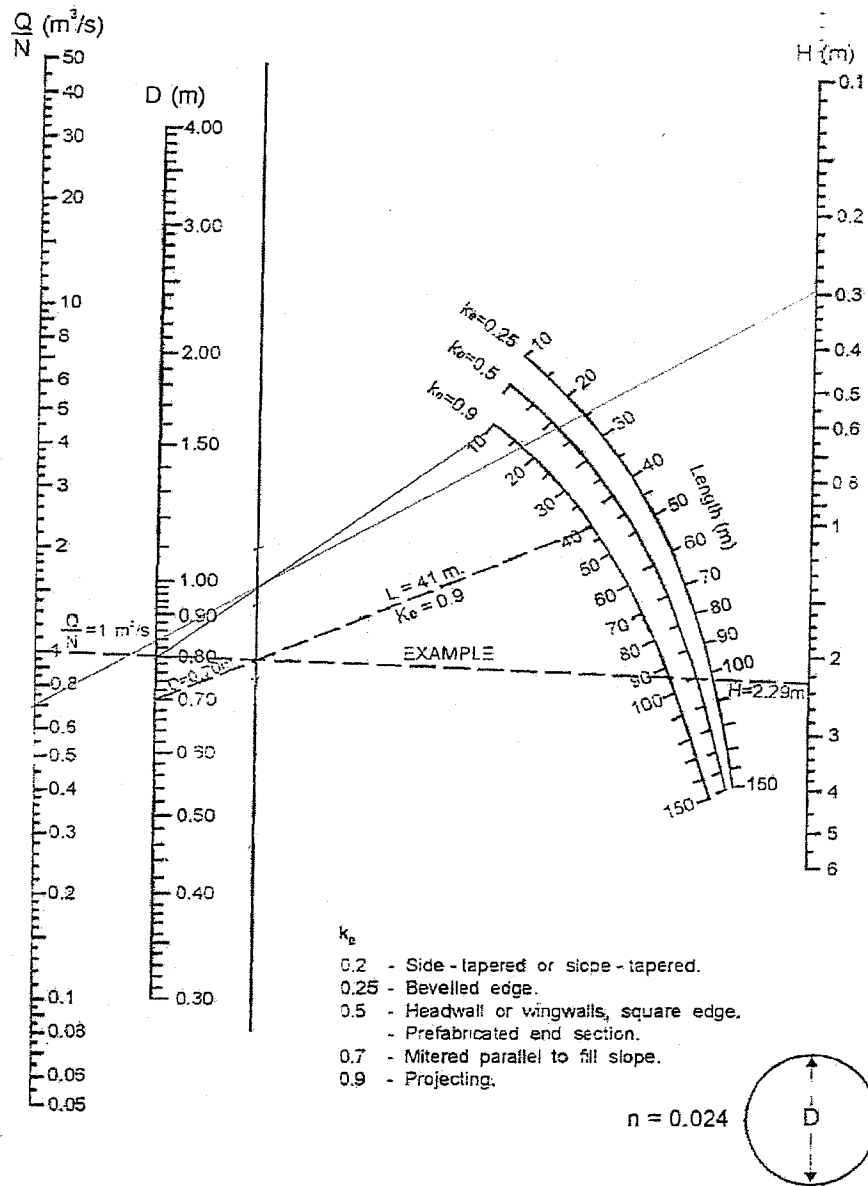
1:10 YEAR ROADSIDE CULVERT DESIGN

CONVENTIONAL CULVERT DESIGN

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

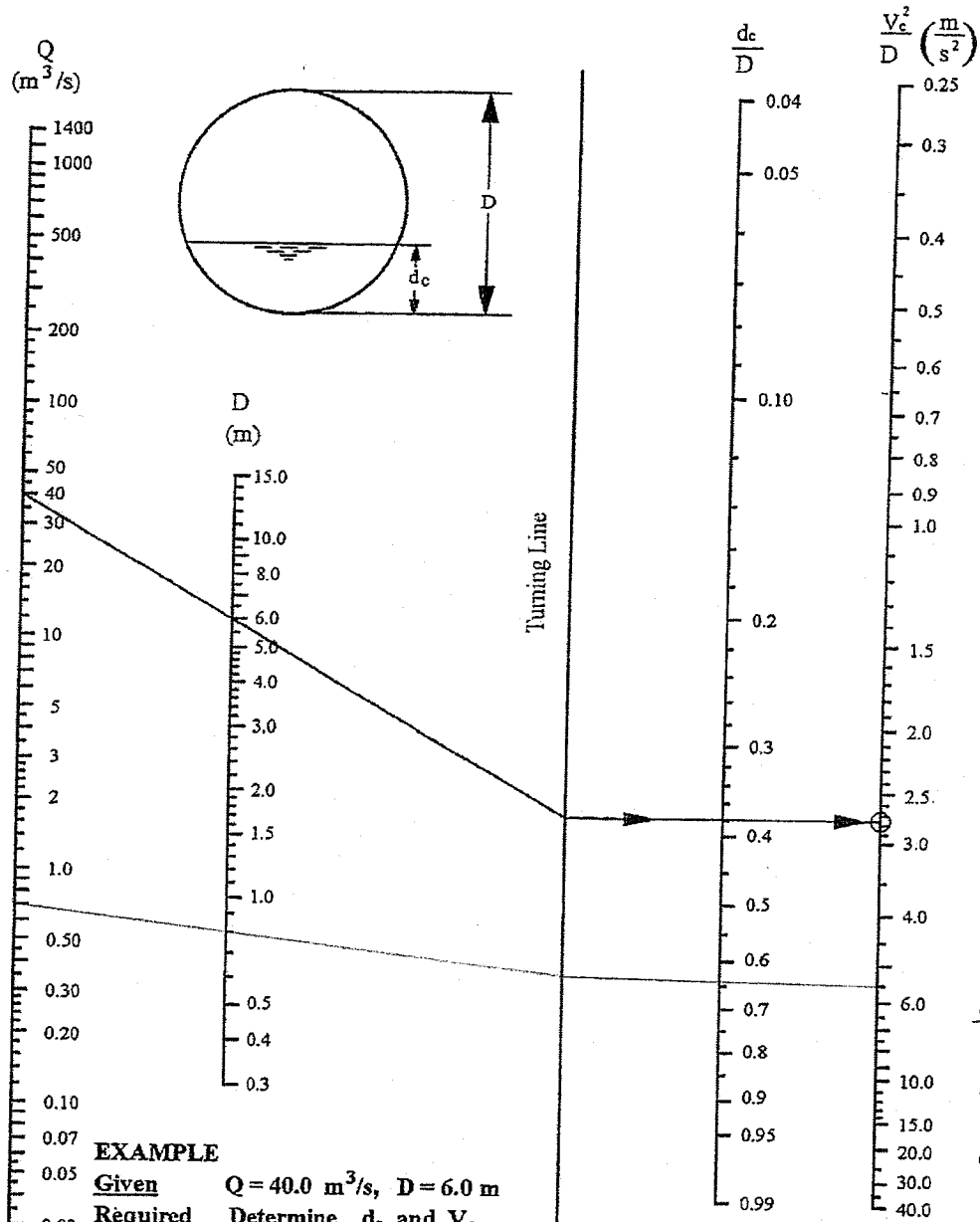
Station	DESIGN DATA							CULVERT DATA					INLET CONTROL			OUTLET CONTROL						GOVERNING HW	VEL V _o		
	Q (m ³ /s)	d (m)	d _e (m)	AHW (m)	Skew No.	L (m)	S (m/m)	Description	D or B x D (m)	N	Q/N (m ³ /s)	A (each) (m ²)	Q/NB (m ³ /s/m)	HW/D	HW (m)	K _e	H (m)	d _e (m)	(d _e + D)/2 (m)	TW (m)	h _o (m)			LS (m)	HW (m)
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	
<p>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</p> <p>8 Culvert Slope 10 D (circular) or B x D (other) 11 Number of Barrels 13 Area per barrel 14 For box only</p> <p>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_e > D)</p> <p>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</p> <p>26 Outlet velocity if required (Subsection 3.2.3)</p>																									

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



Source: Herr (1977)

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



EXAMPLE

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

Required Determine d_c and V_c

Solution Join $Q = 40.0 \text{ m}^3/\text{s}$ to $D = 6.0 \text{ m}$ 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 $d_c = 0.38 \times 6.0 = 2.28 \text{ m}$.

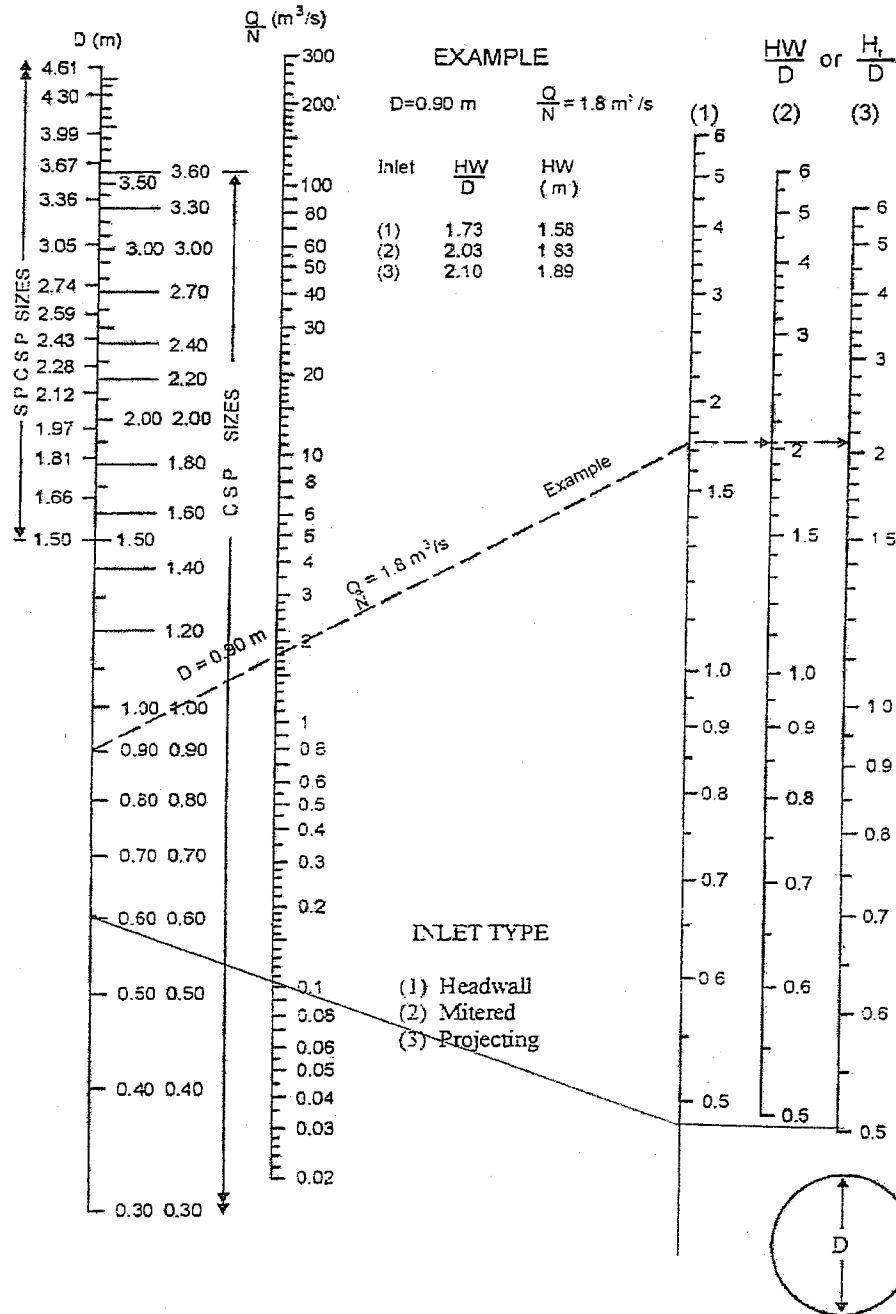
$V_c = (2.76 \times 6.0)^{0.5} = 4.07 \text{ m/s}$

$\frac{d_c}{D} = 0.55$
 $d_c = 0.55 \times 0.8$
 $d_c = 0.44$

Source: American Iron and Steel Institute

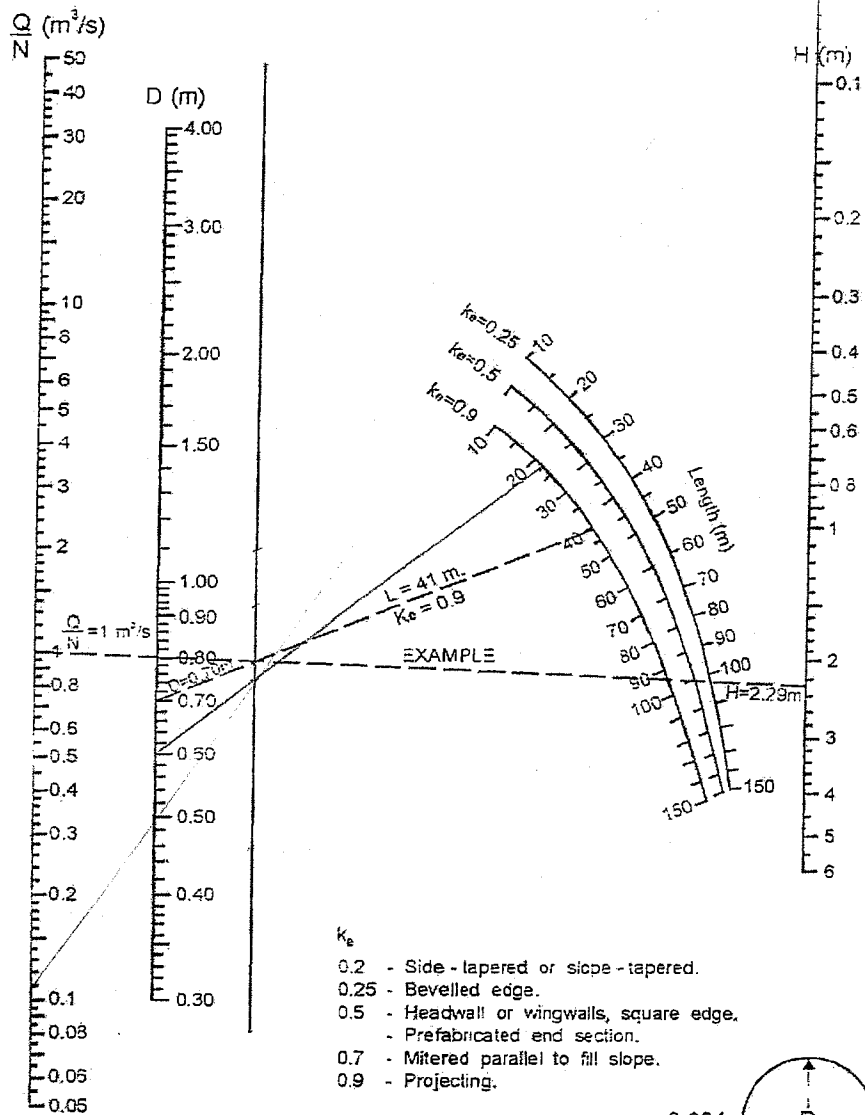
Culvert Crossing $\diamond 18$ to $\diamond 19$ 600 mm ϕ

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



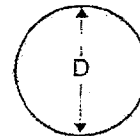
Source: Herr (1977)

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



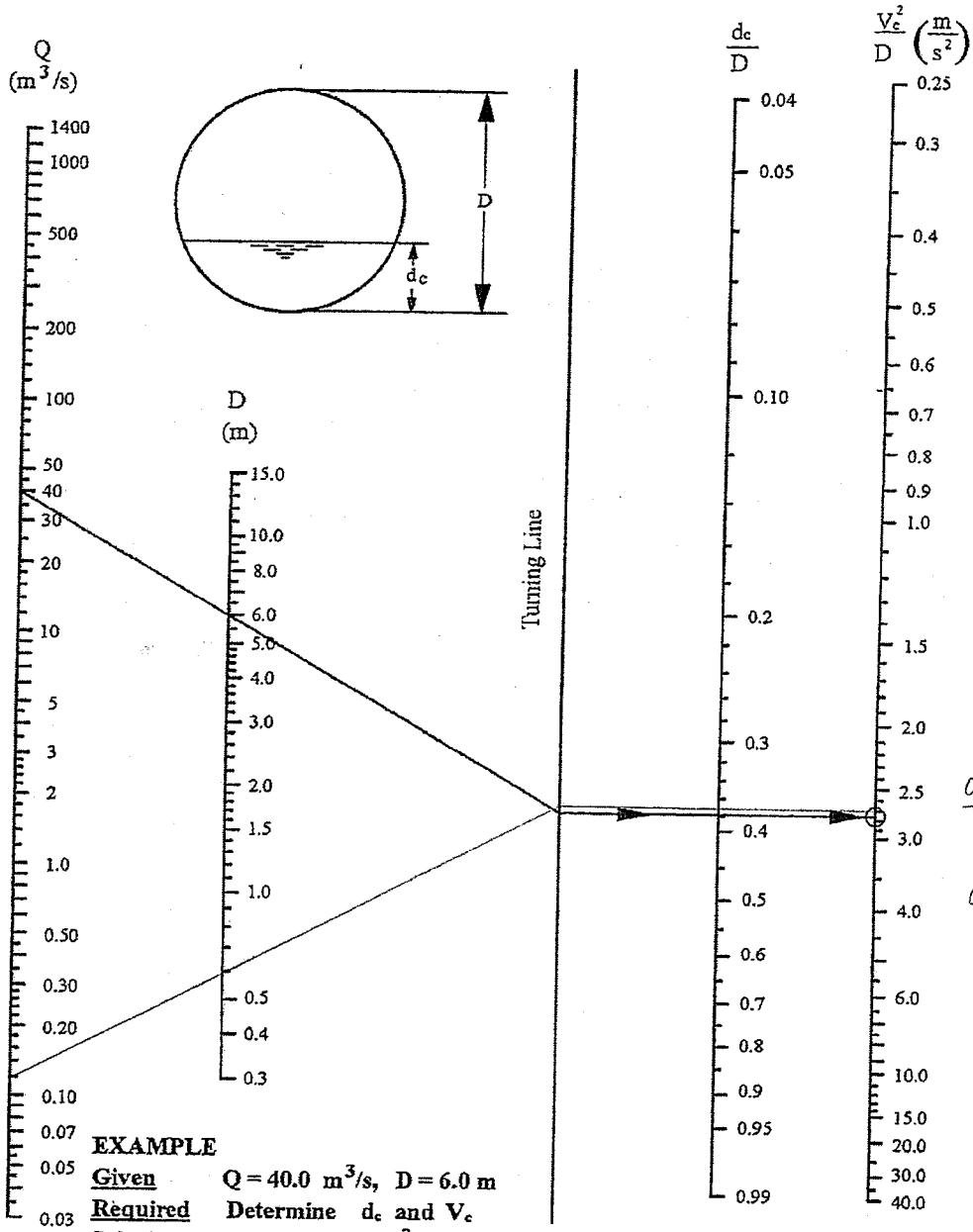
- K_e
- 0.2 - Side-tapered or slope-tapered.
 - 0.25 - Bevelled edge.
 - 0.5 - Headwall or wingwalls, square edge.
- Prefabricated end section.
 - 0.7 - Mitered parallel to fill slope.
 - 0.9 - Projecting.

$n = 0.024$



Source: Herr (1977)

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



$\frac{d_c}{D} = 0.425$
 $d_c = 0.425 \times 6$
 $= 2.55$

EXAMPLE

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

Required Determine d_c and V_c

Solution Join $Q = 40.0 \text{ m}^3/\text{s}$ to $D = 6.0 \text{ m}$ and extend to turning line.

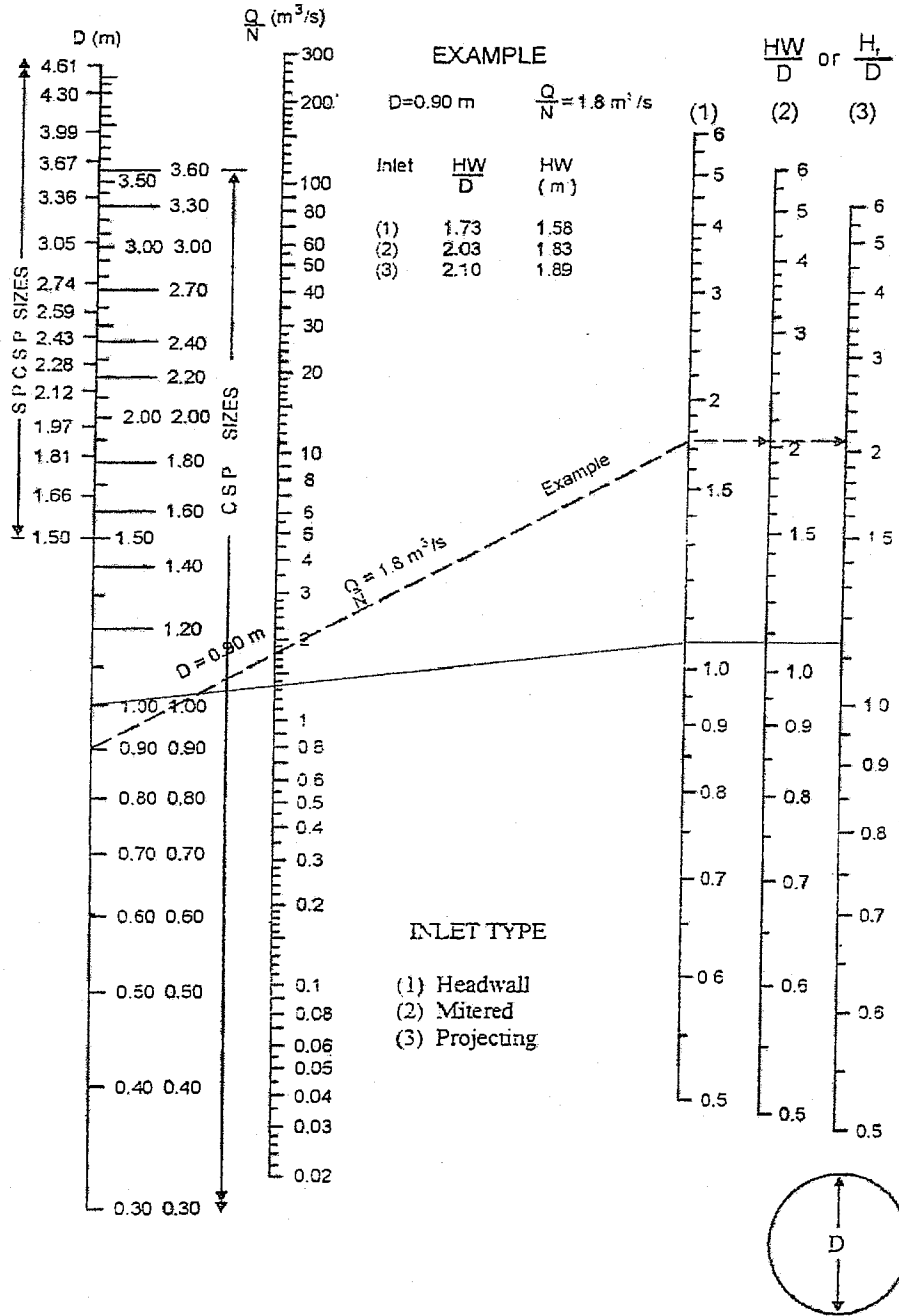
Draw a horizontal line perpendicular to the turning line to intersect $d_c/D = 0.38$ and $V_c^2/D = 2.76$

Calculate $d_c = 0.38 \times 6.0 = 2.28 \text{ m}$.
 $V_c = (2.76 \times 6.0)^{0.5} = 4.07 \text{ m/s}$

Source: American Iron and Steel Institute

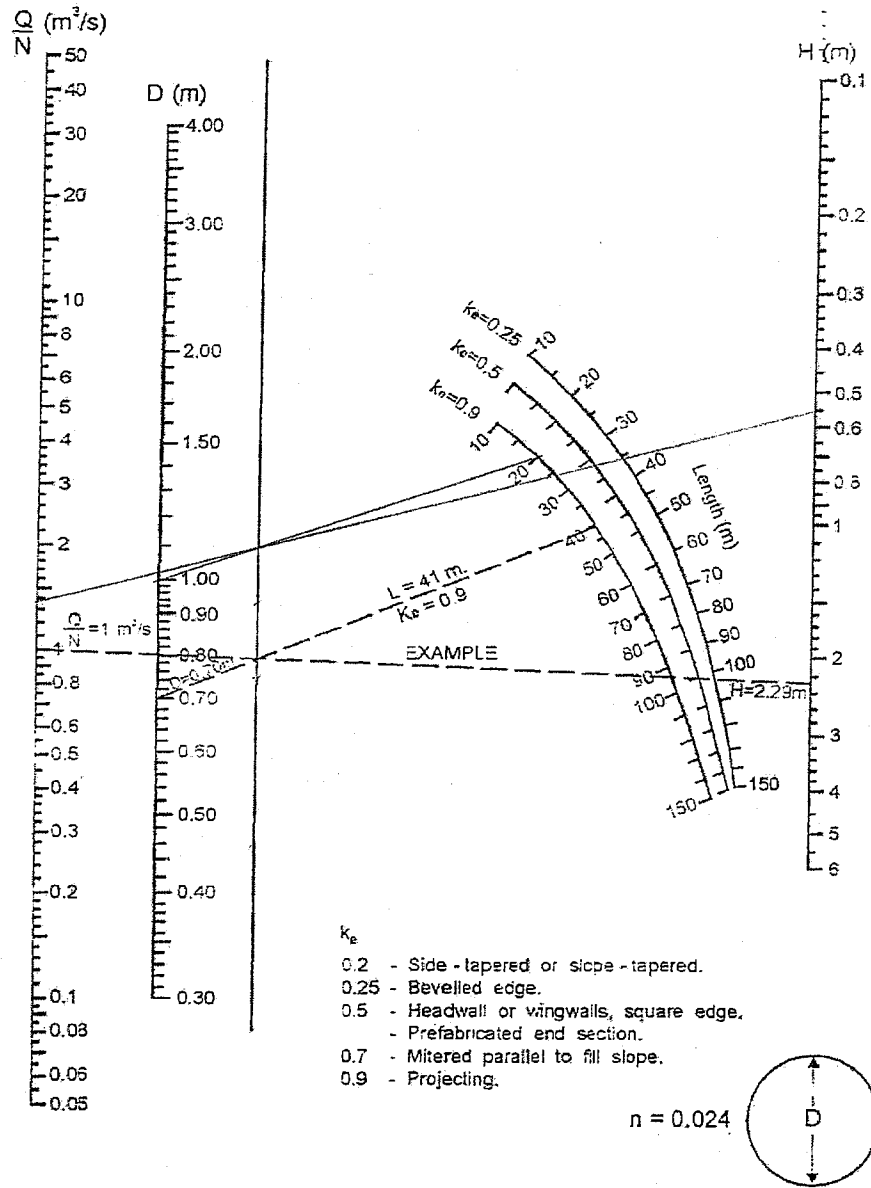
Culvert Crossing 14 to 23 1000 mm \varnothing

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



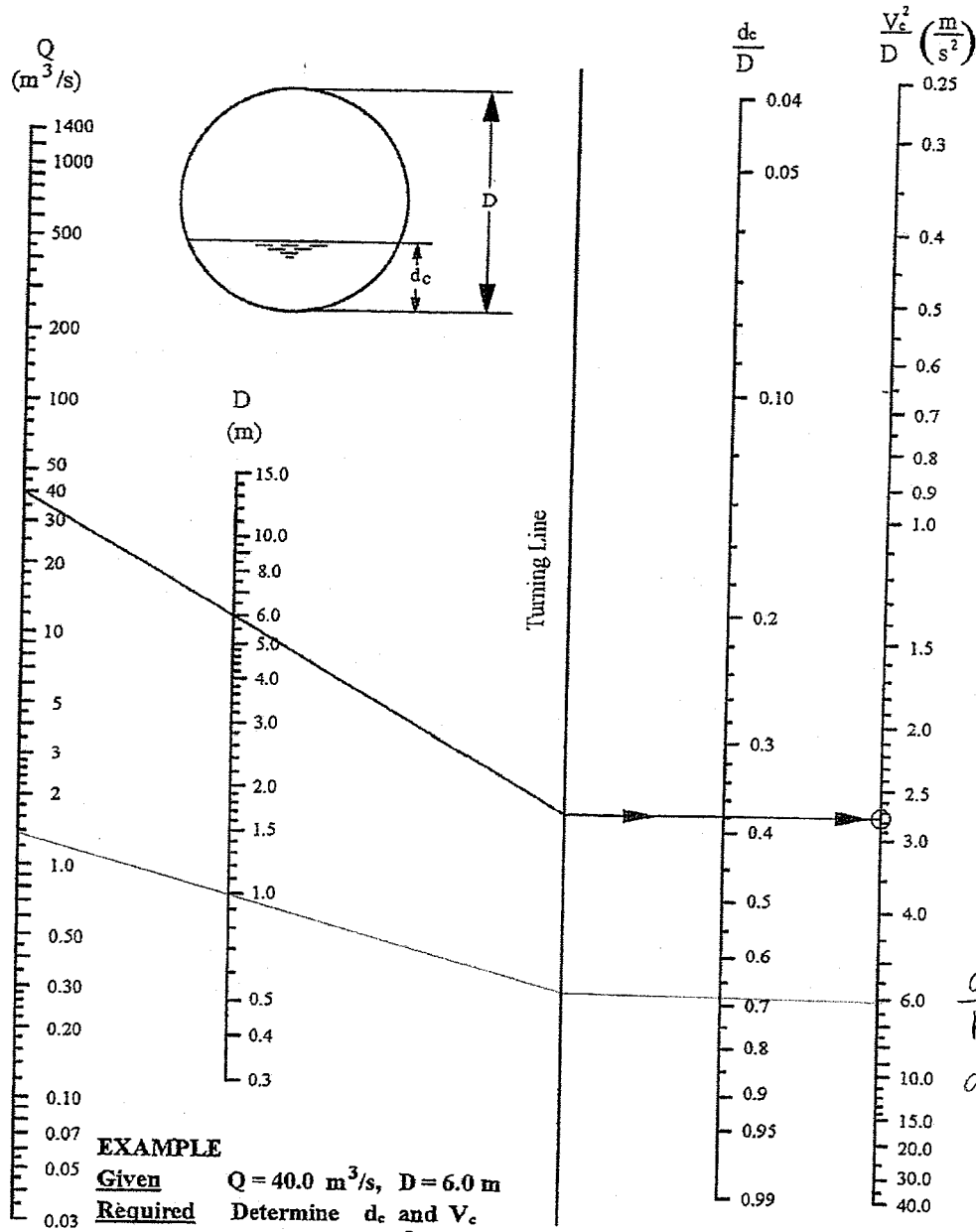
Source: Herr (1977)

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



Source: Herr (1977)

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



EXAMPLE

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

Required Determine d_c and V_c

Solution. Join $Q = 40.0 \text{ m}^3/s$ to $D = 6.0 \text{ m}$ and extend to turning line.

Draw a horizontal line perpendicular to the turning line to intersect

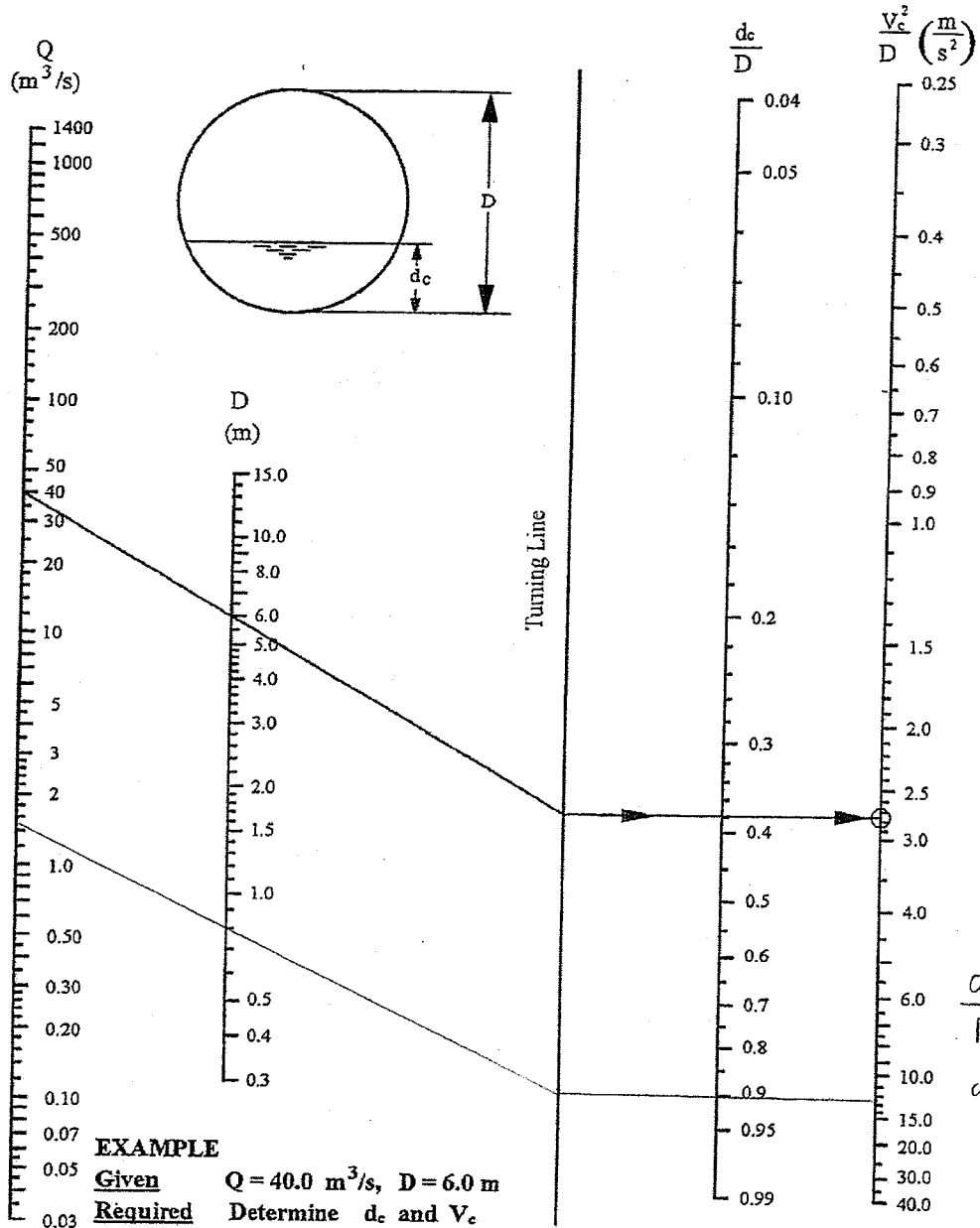
$d_c/D = 0.38$ and $V_c^2/D = 2.76$

Calculate $d_c = 0.38 \times 6.0 = 2.28 \text{ m}$.

$V_c = (2.76 \times 6.0)^{0.5} = 4.07 \text{ m/s}$

Source: American Iron and Steel Institute

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



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

Level of Service

Normal 70% TSS removal

Imperviousness 100% for internal roads

Extrapolating from Table 3.2 SWMPDM

water quality infiltration requirement = $35 \text{ m}^3/\text{ha}$

Area of Asphalt

Phase 1

$$\begin{aligned} \text{Length} &= 2250 \text{ m} \\ \text{width} &= \frac{7 \text{ m}}{15750 \text{ m}^2} \end{aligned}$$

Required Storage

$$= 1.575 \text{ ha} \times \frac{35 \text{ m}^3}{\text{ha}}$$

$$= 55.1 \text{ m}^3$$

Phase 2

$$\begin{aligned} &300 \text{ m} \\ &\frac{7 \text{ m}}{2100 \text{ m}^2} \end{aligned}$$

$$= 0.21 \text{ ha} \times \frac{35 \text{ m}^3}{\text{ha}}$$

$$= 7.35 \text{ m}^3$$

Required Length of 200 mm \varnothing Perforated Pipe

$$\text{Length} = \frac{55.1 \text{ m}^3}{\pi (0.1)^2 \text{ m}^2}$$

$$= \underline{\underline{1755 \text{ m}}}$$

$$= \frac{7.35 \text{ m}^3}{\pi (0.1)^2 \text{ m}^2}$$

$$= \underline{\underline{234 \text{ m}}}$$



A P P E N D I X '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



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

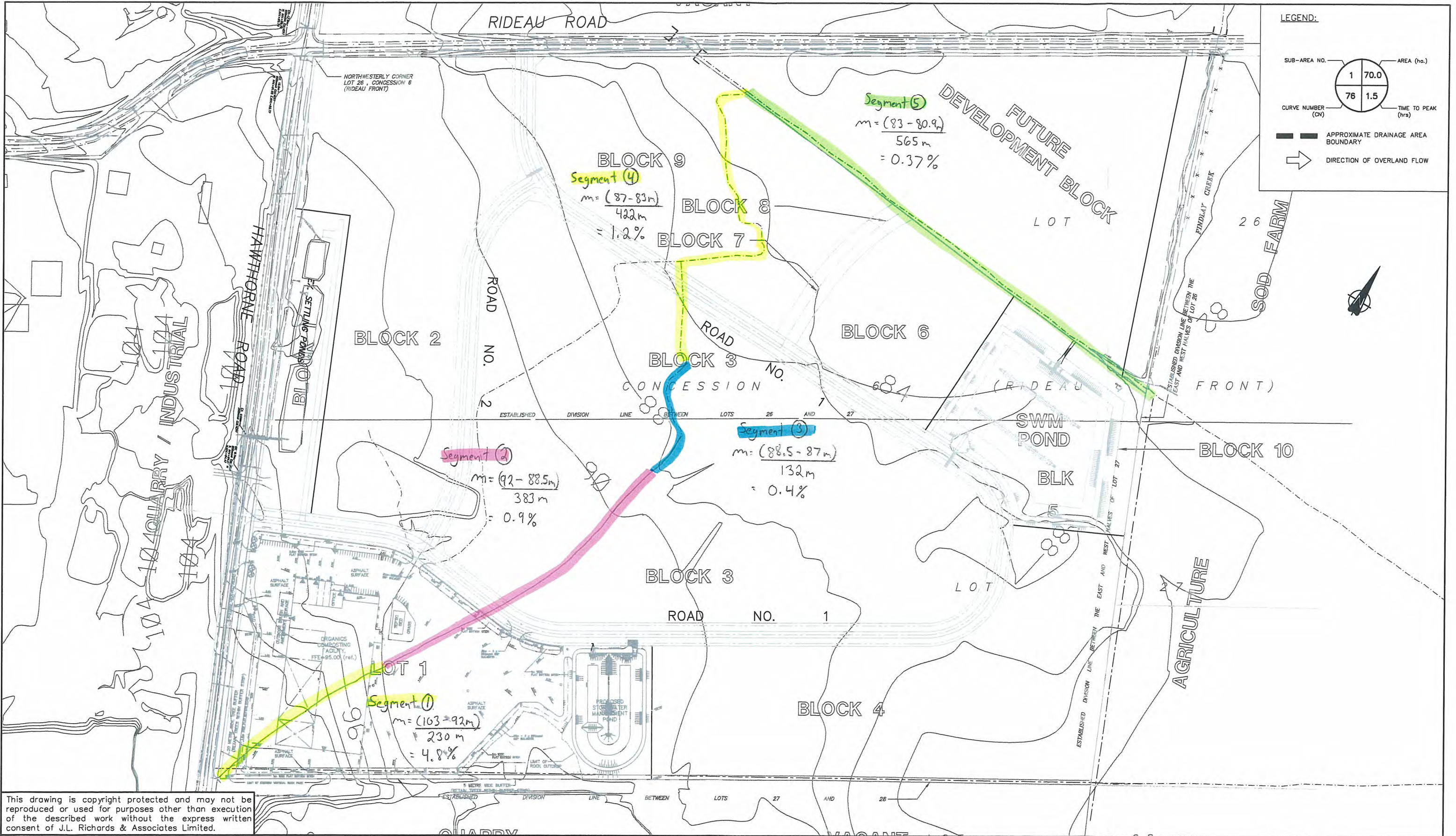
Gravel = 70% Impervious

Grass = 0% Impervious

$$\% \text{ Imp.} = 10\% \times 1 + 35\% \times 1 + 35\% \times 0.7 + 20\% \times 0$$

$$= 70\%$$





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PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

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

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

DRAWING NO.:
FIGURE 2
 JLR NO.:
 20983

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

JOB NO. 20983

PROJECT Hawthorne Industrial Park

Time of Concentration - Pre-development

BY MB DATE Jan 22/09

Segment ①

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

$$= 4.8\%$$

Uplands Method Curve B - Woodland

$$\text{Velocity} = 0.32 \text{ m/s}$$

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

$$= 719 \text{ sec}$$

Segment ②

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

$$= 0.9\%$$

Uplands Method Curve C - Pasture

$$\text{Velocity} = 0.21 \text{ m/s}$$

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

$$= 1824 \text{ sec}$$



JOB NO. 20983

PROJECT Hawthorne Industrial Park

Time of Concentration - Pre-development

BY MB DATE Jan 22/09

Segment (3)

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

$$= 0.4 \%$$

Uplands Method Curve A - Forest (heavy litter)

$$\text{Velocity} = 0.05 \text{ m/s}$$

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

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

Segment (4)

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

$$= 1.2 \%$$

Uplands Method Curve F - Grassed waterway

$$\text{Velocity} = 0.47 \text{ m/s}$$

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

$$= 898 \text{ sec}$$



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PROJECT Hawthorne Industrial Park

Time of Concentration - Pre-Development

BY MB DATE Jan 22/09

Segment ⑤

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

$$= 0.37\%$$

Uplands Method Curve F - Grassed Waterway

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

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

$$= 2018 \text{ sec}$$

$$\begin{aligned} \text{Total Time} &= \textcircled{1} + \textcircled{2} + \textcircled{3} + \textcircled{4} + \textcircled{5} \\ &= 719 + 1824 + 2640 + 898 + 2018 \\ &= 8099 \text{ sec} \end{aligned}$$

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

$$= 5399 \text{ sec}$$

$$= 90 \text{ min}$$



APPENDIX 'E'

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

```

00001> 2 Metric units
00002> *****
00003> * Project Name : Hawthorne Industrial Park Project Number: [20983] *
00004> * Date : April, 2009
00005> * Rev. # : N/A
00006> * Developed by : Mark Buchanan, E.I.T.
00007> * Reviewed by : Guy Forget, P.Eng.
00008> * Company : J.L. Richards & Associates Limited
00009> * License # : 4418403
00010> *****
00011> *
00012> *
00013> *****
00014> * FILENAME: V:\20983.DU\ENG\SWMHYMO\20983PST.DAT *
00015> * FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
00016> * OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE *
00017> *****
00018> *
00019> *****
00020> * SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE
00021> * PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00022> *****
00023> *
00024> *****
00025> * HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *
00026> * FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
00027> *****
00028> *
00029> *****
00030> * POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00031> *****
00032> *
00033> *****
00034> * CALCULATION OF 4 HR 25 MM STORM EVENT *
00035> *****
00036> *
00037> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00038> * [ ] <- storm filename, one per line for NSTORM time
00039> READ STORM STORM_FILENAME=["4HR25-15.STM"]
00040> *
00041> DEFAULT VALUES ICASEDef=[1], read and print values
00042> * DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
00043> *
00044> *
00045> *****
00046> * ORGAWORLD FILE *
00047> *****
00048> *
00049> * SUB-AREA No.1
00050> *
00051> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00052> * XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00053> * SCS curve number CN=[81],
00054> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00055> * LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (mi)
00056> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00057> * LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00058> * RAINFALL=[ , , , ] (mm/hr), END=-1
00059> *
00060> *
00061> * SUB-AREA No.2
00062> *
00063> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00064> * XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00065> * SCS curve number CN=[81],
00066> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00067> * LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00068> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00069> * LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00070> * RAINFALL=[ , , , ] (mm/hr), END=-1
00071> *
00072> *
00073> * SUB-AREA No.3
00074> *
00075> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[ 1.4 ] (ha),
00076> * XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00077> * SCS curve number CN=[81],
00078> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00079> * LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00080> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.51] (%),
00081> * LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0]
00082> * RAINFALL=[ , , , ] (mm/hr), END=-1
00083> *
00084> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
00085> *
00086> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
00087> *
00088> *
00089> * SUB-AREA No.4
00090> *
00091> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00092> * XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00093> * SCS curve number CN=[81],
00094> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00095> * LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00096> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.93] (%),
00097> * LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
00098> * RAINFALL=[ , , , ] (mm/hr), END=-1
00099> *
00100> *
00101> * SUB-AREA No.5
00102> *
00103> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[ 2.66 ] (ha),
00104> * XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00105> * SCS curve number CN=[81],
00106> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00107> * LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00108> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00109> * LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00110> * RAINFALL=[ , , , ] (mm/hr), END=-1
00111> *
00112> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
00113> *
00114> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+6]
00115> *
00116> *
00117> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00118> * RDT=[1.0] (min),
00119> *
00120> * TABLE of [ OUTFLOW-STORAGE ] values
00121> * (cms) - (ha-m)
00122> * [ 0.000, 0.0000 ]
00123> * [ 0.008, 0.0656 ]
00124> * [ 0.017, 0.1311 ]
00125> * [ 0.093, 0.2831 ]
00126> * [ 0.233, 0.3971 ]
00127> * [ 0.337, 0.4731 ]
00128> * [ 0.465, 0.5491 ]
00129> * [ 0.531, 0.5871 ]
00130> * [ 0.599, 0.6251 ]
00131> * [ 0.654, 0.6631 ]
00132> * [ 0.797, 0.7391 ]
00133> * [ 0.950, 0.8274 ]
00134> * [ 1.304, 0.9157 ]
00135> * [ 1.800, 1.0040 ]
00136> * [ 2.577, 1.0923 ]

```

```

00136> [ -1, -1 ] (max twenty pts)
00137> *****
00138> * Remaining Hawthorne Industrial Park *
00139> *****
00140> *
00141> *
00142> * SUB-AREA No.1
00143> *
00144> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00145> * XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00146> * SCS curve number CN=[81],
00147> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00148> * LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00149> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00150> * LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00151> * RAINFALL=[ , , , ] (mm/hr), END=-1
00152> *
00153> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00154> *
00155> *
00156> * SUB-AREA No.2
00157> *
00158> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00159> * XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00160> * SCS curve number CN=[81],
00161> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00162> * LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00163> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.65] (%),
00164> * LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00165> * RAINFALL=[ , , , ] (mm/hr), END=-1
00166> *
00167> *
00168> * SUB-AREA No.3
00169> *
00170> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00171> * XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00172> * SCS curve number CN=[81],
00173> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00174> * LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00175> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00176> * LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00177> * RAINFALL=[ , , , ] (mm/hr), END=-1
00178> *
00179> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00180> *
00181> *
00182> * SUB-AREA No.4
00183> *
00184> DESIGN NASHYD ID=[ 6 ], NHYD=["Pend-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00185> * DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00186> * RAINFALL=[ , , , ] (mm/hr), END=-1
00187> *
00188> *
00189> *
00190> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00191> *
00192> *
00193> * SUB-AREA No.5
00194> *
00195> DESIGN NASHYD ID = [10], NHYD=["A2"], DT=[2.5] min, AREA=[6.8] (ha),
00196> * DWF=[0] (cms), CN/C=[76], TP=[0.37] hrs,
00197> * RAINFALL=[ , , , ] (mm/hr), END=-1
00198> *
00199> *
00200> * SUB-AREA No.4
00201> *
00202> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5] min, AREA=[5.3] (ha),
00203> * DWF=[0] (cms), CN/C=[76], TP=[0.804] hrs,
00204> * RAINFALL=[ , , , ] (mm/hr), END=-1
00205> *
00206> ADD HYD IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
00207> *
00208> *
00209> *****
00210> * CALCULATION OF 3HR - 1:2 YEAR STORM EVENT *
00211> *****
00212> *
00213> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00214> * [ ] <- storm filename, one per line for NSTORM time
00215> *
00216> CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00217> * ICASEDef=[1],
00218> * A=[732.951], B=[6.199], and C=[0.810],
00219> *
00220> DEFAULT VALUES ICASEDef=[1], read and print values
00221> * DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
00222> *
00223> *
00224> *****
00225> * ORGAWORLD FILE *
00226> *****
00227> *
00228> * SUB-AREA No.1
00229> *
00230> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00231> * XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00232> * SCS curve number CN=[81],
00233> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00234> * LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (mi)
00235> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00236> * LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00237> * RAINFALL=[ , , , ] (mm/hr), END=-1
00238> *
00239> *
00240> * SUB-AREA No.2
00241> *
00242> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00243> * XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00244> * SCS curve number CN=[81],
00245> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00246> * LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00247> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00248> * LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00249> * RAINFALL=[ , , , ] (mm/hr), END=-1
00250> *
00251> *
00252> * SUB-AREA No.3
00253> *
00254> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00255> * XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00256> * SCS curve number CN=[81],
00257> * Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00258> * LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00259> * Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[ 0.51 ] (%),
00260> * LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0]
00261> * RAINFALL=[ , , , ] (mm/hr), END=-1
00262> *
00263> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
00264> *
00265> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
00266> *
00267> *
00268> * SUB-AREA No.4
00269> *
00270> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),

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00271> XIMP={0.97}, TIMP={0.97}, DWF={0.0} (cms), LOSS={2},
00272> SCS curve number CN={81},
00273> Pervious surfaces: IAPER={4.67} (mm), SLP={0.7} (%),
00274> LGP={40} (m), MNP={0.25}, SCP={0.0} (min)
00275> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.93} (%),
00276> LGI={164.82} (m), MNI={0.03}, SCI={0.0} (
00277> RAINFALL=[ , , , ] (mm/hr), END=-1
00278> *
00279> *
00280> * SUB-AREA No.5
00281>
00282> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT={2.5} (min), AREA={2.66} (ha),
00283> XIMP={0.97}, TIMP={0.97}, DWF={0.0} (cms), LOSS={2},
00284> SCS curve number CN={81},
00285> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00286> LGP={20.0} (m), MNP={0.25}, SCP={0.0} (min)
00287> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00288> LGI={207.25} (m), MNI={0.03}, SCI={0.0} (
00289> RAINFALL=[ , , , ] (mm/hr), END=-1
00290> *
00291> ADD HYD IDsum={8}, NHYD=["080"], IDs to add={6+7}
00292> *
00293> ADD HYD IDsum={9}, NHYD=["090"], IDs to add={5+8}
00294> *
00295> *
00296> ROUTE RESERVOIR IDout={10}, NHYD=["POND"], IDin={9},
00297> RDT={1.0} (min),
00298> TABLE of ( OUTFLOW-STORAGE ) values
00299> (cms) - (ha-m)
00300> [ 0.000, 0.0000]
00301> [ 0.008, 0.0656]
00302> [ 0.017, 0.1311]
00303> [ 0.093, 0.2831]
00304> [ 0.233, 0.3971]
00305> [ 0.337, 0.4731]
00306> [ 0.465, 0.5491]
00307> [ 0.531, 0.5871]
00308> [ 0.593, 0.6251]
00309> [ 0.654, 0.6631]
00310> [ 0.797, 0.7391]
00311> [ 0.950, 0.8274]
00312> [ 1.304, 0.9157]
00313> [ 1.880, 1.0040]
00314> [ 2.577, 1.0923]
00315> [ -1, -1 ] (max twenty pts)
00316>
00317> *****
00318> * Remaining Hawthorne Industrial Park *
00319> *
00320> *
00321> * SUB-AREA No.1
00322>
00323> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT={2.5} (min), AREA={19.9} (ha),
00324> XIMP={0.50}, TIMP={0.71}, DWF={0.0} (cms), LOSS={2},
00325> SCS curve number CN={81},
00326> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00327> LGP={100.0} (m), MNP={0.25}, SCP={0.0} (min)
00328> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00329> LGI={580} (m), MNI={0.03}, SCI={0.0} (min)
00330> RAINFALL=[ , , , ] (mm/hr), END=-1
00331> *
00332> ADD HYD IDsum={ 2 }, NHYD=["HIP02"], IDs to add={10+1}
00333> *
00334> *
00335> * SUB-AREA No.2
00336>
00337> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT={2.5} (min), AREA={17} (ha),
00338> XIMP={0.50}, TIMP={0.71}, DWF={0.0} (cms), LOSS={2},
00339> SCS curve number CN={81},
00340> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00341> LGP={100.0} (m), MNP={0.25}, SCP={0.0} (min)
00342> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00343> LGI={450} (m), MNI={0.03}, SCI={0.0} (min)
00344> RAINFALL=[ , , , ] (mm/hr), END=-1
00345> *
00346> *
00347> * SUB-AREA No.3
00348>
00349> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT={2.5} (min), AREA={18.1} (ha),
00350> XIMP={0.50}, TIMP={0.71}, DWF={0.0} (cms), LOSS={2},
00351> SCS curve number CN={81},
00352> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00353> LGP={100.0} (m), MNP={0.25}, SCP={0.0} (min)
00354> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00355> LGI={600} (m), MNI={0.03}, SCI={0.0} (min)
00356> RAINFALL=[ , , , ] (mm/hr), END=-1
00357> *
00358> ADD HYD IDsum={ 5 }, NHYD=["HIP05"], IDs to add={3+4}
00359> *
00360> *
00361> * SUB-AREA No.4
00362>
00363> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT={2.5} min, AREA={4.0} (ha),
00364> DWF={0} (cms), CNC={85}, TP={0.17} hrs,
00365> RAINFALL=[ , , , ] (mm/hr), END=-1
00366> *
00367> *
00368> *
00369> ADD HYD IDsum={ 7 }, NHYD=["HIP06"], IDs to add={2+5+6}
00370> *
00371> *
00372> * SUB-AREA No. 5
00373>
00374> DESIGN NASHYD ID = [10], NHYD=["A2"], DT={2.5} min, AREA={6.8} (ha),
00375> DWF={0} (cms), CNC={76}, TP={0.37} hrs,
00376> RAINFALL=[ , , , ] (mm/hr), END=-1
00377> *
00378> *
00379> * SUB-AREA NO 4
00380>
00381> DESIGN NASHYD ID = [1], NHYD=["A3"], DT={2.5} min, AREA={5.3} (ha),
00382> DWF={0} (cms), CNC={76}, TP={0.804} hrs,
00383> RAINFALL=[ , , , ] (mm/hr), END=-1
00384> *
00385> ADD HYD IDsum={2}, NHYD=["0020"], IDs to add={7+10+1}
00386> *
00387> *
00388> *
00389> *
00390> * CALCULATION OF 3HR - 1:5 YEAR STORM EVENT *
00391> *****
00392>
00393> START YZERO={0.0}, MPOINT={2}, NSTORM={0}, NRUN={0}
00394> [ ] <- storm filename, one per line for NSTORM time
00395> *
00396> CHICAGO STORM IUNITS={2}, TD={3.0} (hrs), TPRAT={0.333}, CSPT={10.0} (min)
00397> ICASECS={1},
00398> A={99.071}, B={6.053}, and C={0.814},
00399> *
00400> DEFAULT VALUES ICASEDef={1}, read and print values
00401> DEFVAL_FILENAME={V:\22973.DU\ENG\SWHYMO\ORGA.VAL}
00402> *
00403> *
00404> *
00405> * ORGAWORLD FILE *

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00406> *****
00407>
00408> * SUB-AREA No.1
00409>
00410> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT={2.5} (min), AREA={2.07} (ha),
00411> XIMP={0.84}, TIMP={0.84}, DWF={0.0} (cms), LOSS={2},
00412> SCS curve number CN={81},
00413> Pervious surfaces: IAPER={4.67} (mm), SLP={1.0} (%),
00414> LGP={20} (m), MNP={0.25}, SCP={0.0} (min)
00415> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.52} (%),
00416> LGI={204.72} (m), MNI={0.03}, SCI={0.0} (
00417> RAINFALL=[ , , , ] (mm/hr), END=-1
00418> *
00419> *
00420> * SUB-AREA No.2
00421>
00422> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT={2.5} (min), AREA={1.54} (ha),
00423> XIMP={0.92}, TIMP={0.92}, DWF={0.0} (cms), LOSS={2},
00424> SCS curve number CN={81},
00425> Pervious surfaces: IAPER={4.67} (mm), SLP={1.0} (%),
00426> LGP={5} (m), MNP={0.03}, SCP={0.0} (min),
00427> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.50} (%),
00428> LGI={244.34} (m), MNI={0.03}, SCI={0.0} (
00429> RAINFALL=[ , , , ] (mm/hr), END=-1
00430> *
00431> *
00432> * SUB-AREA No.3
00433>
00434> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT={2.5} (min), AREA={1.41} (ha),
00435> XIMP={0.97}, TIMP={0.97}, DWF={0.0} (cms), LOSS={2},
00436> SCS curve number CN={81},
00437> Pervious surfaces: IAPER={4.67} (mm), SLP={1.0} (%),
00438> LGP={5} (m), MNP={0.03}, SCP={0.0} (min),
00439> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.51} (%),
00440> LGI={225.63} (m), MNI={0.03}, SCI={0.0} (
00441> RAINFALL=[ , , , ] (mm/hr), END=-1
00442> *
00443> ADD HYD IDsum={4}, NHYD=["040"], IDs to add={1+2}
00444> *
00445> ADD HYD IDsum={5}, NHYD=["050"], IDs to add={3+4}
00446> *
00447> *
00448> * SUB-AREA No.4
00449>
00450> CALIB STANDHYD ID=[6], NHYD=["060"], DT={2.5} (min), AREA={0.89} (ha),
00451> XIMP={0.97}, TIMP={0.97}, DWF={0.0} (cms), LOSS={2},
00452> SCS curve number CN={81},
00453> Pervious surfaces: IAPER={4.67} (mm), SLP={0.7} (%),
00454> LGP={40} (m), MNP={0.25}, SCP={0.0} (min)
00455> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.93} (%),
00456> LGI={164.82} (m), MNI={0.03}, SCI={0.0} (
00457> RAINFALL=[ , , , ] (mm/hr), END=-1
00458> *
00459> *
00460> * SUB-AREA No.5
00461>
00462> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT={2.5} (min), AREA={2.66} (ha),
00463> XIMP={0.97}, TIMP={0.97}, DWF={0.0} (cms), LOSS={2},
00464> SCS curve number CN={81},
00465> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00466> LGP={20.0} (m), MNP={0.25}, SCP={0.0} (min)
00467> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00468> LGI={207.25} (m), MNI={0.03}, SCI={0.0} (
00469> RAINFALL=[ , , , ] (mm/hr), END=-1
00470> *
00471> ADD HYD IDsum={8}, NHYD=["080"], IDs to add={6+7}
00472> *
00473> ADD HYD IDsum={9}, NHYD=["090"], IDs to add={5+8}
00474> *
00475> *
00476> ROUTE RESERVOIR IDout={10}, NHYD=["POND"], IDin={9},
00477> RDT={1.0} (min),
00478> TABLE of ( OUTFLOW-STORAGE ) values
00479> (cms) - (ha-m)
00480> [ 0.000, 0.0000]
00481> [ 0.008, 0.0656]
00482> [ 0.017, 0.1311]
00483> [ 0.093, 0.2831]
00484> [ 0.233, 0.3971]
00485> [ 0.337, 0.4731]
00486> [ 0.465, 0.5491]
00487> [ 0.531, 0.5871]
00488> [ 0.593, 0.6251]
00489> [ 0.654, 0.6631]
00490> [ 0.797, 0.7391]
00491> [ 0.950, 0.8274]
00492> [ 1.304, 0.9157]
00493> [ 1.880, 1.0040]
00494> [ 2.577, 1.0923]
00495> [ -1, -1 ] (max twenty pts)
00496>
00497> *****
00498> * Remaining Hawthorne Industrial Park *
00499> *
00500> *
00501> * SUB-AREA No.1
00502>
00503> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT={2.5} (min), AREA={19.9} (ha),
00504> XIMP={0.50}, TIMP={0.71}, DWF={0.0} (cms), LOSS={2},
00505> SCS curve number CN={81},
00506> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00507> LGP={100.0} (m), MNP={0.25}, SCP={0.0} (min)
00508> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00509> LGI={580} (m), MNI={0.03}, SCI={0.0} (min)
00510> RAINFALL=[ , , , ] (mm/hr), END=-1
00511> *
00512> ADD HYD IDsum={ 2 }, NHYD=["HIP02"], IDs to add={10+1}
00513> *
00514> *
00515> * SUB-AREA No.2
00516>
00517> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT={2.5} (min), AREA={17} (ha),
00518> XIMP={0.50}, TIMP={0.71}, DWF={0.0} (cms), LOSS={2},
00519> SCS curve number CN={81},
00520> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00521> LGP={100.0} (m), MNP={0.25}, SCP={0.0} (min)
00522> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00523> LGI={450} (m), MNI={0.03}, SCI={0.0} (min)
00524> RAINFALL=[ , , , ] (mm/hr), END=-1
00525> *
00526> *
00527> * SUB-AREA No.3
00528>
00529> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT={2.5} (min), AREA={18.1} (ha),
00530> XIMP={0.50}, TIMP={0.71}, DWF={0.0} (cms), LOSS={2},
00531> SCS curve number CN={81},
00532> Pervious surfaces: IAPER={4.67} (mm), SLP={1.5} (%),
00533> LGP={100.0} (m), MNP={0.25}, SCP={0.0} (min)
00534> Impervious surfaces: IAIMP={1.57} (mm), SLP={0.61} (%),
00535> LGI={600} (m), MNI={0.03}, SCI={0.0} (min)
00536> RAINFALL=[ , , , ] (mm/hr), END=-1
00537> *
00538> ADD HYD IDsum={ 5 }, NHYD=["HIP05"], IDs to add={3+4}
00539> *
00540> *

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00541> *SUB-AREA No.4
00542>
00543> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0] (ha),
00544> DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
00545> RAINFALL=[ , , , ](mm/hr), END=-1
00546> *%-----|
00547>
00548>
00549> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00550> *%-----|
00551>
00552> * SUB-AREA No. 5
00553>
00554> DESIGN NASHYD ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8] (ha),
00555> DWF=[0](cms), CN/C=[76], TP=[0.37]hrs,
00556> RAINFALL=[ , , , ](mm/hr), END=-1
00557> *%-----|
00558>
00559> * SUB-AREA No 4
00560>
00561> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3] (ha),
00562> DWF=[0](cms), CN/C=[76], TP=[0.804]hrs,
00563> RAINFALL=[ , , , ](mm/hr), END=-1
00564> *%-----|
00565>
00566> ADD HYD IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
00567>
00568> ***** CALCULATION OF 3HR - 1:10 YEAR STORM EVENT *****
00569> *
00570> *****
00571>
00572> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00573> *%-----|
00574> [ ] <- storm filename, one per line for NSTORM time
00575> CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSPT=[10.0] (min)
00576> ICASEcs=[1],
00577> A=[1174.884], B=[6.014], and C=[0.816],
00578> *%-----|
00579>
00580> DEFAULT VALUES ICASEDef=[1], read and print values
00581> *%-----|
00582> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWHYMO\ORGA.VAL]
00583> *
00584> ***** ORGAWORLD FILE *****
00585> *
00586>
00587> * SUB-AREA No.1
00588>
00589> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00590> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00591> SCS curve number CN=[81],
00592> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00593> LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (mi)
00594> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00595> LGI=[204.72] (m), MNI=[0.03 ], SCI=[0.0]
00596> RAINFALL=[ , , , ](mm/hr), END=-1
00597> *%-----|
00598>
00599> * SUB-AREA No.2
00600>
00601> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00602> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00603> SCS curve number CN=[81],
00604> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00605> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00606> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00607> LGI=[244.34] (m), MNI=[0.03 ], SCI=[0.0]
00608> RAINFALL=[ , , , ](mm/hr), END=-1
00609> *%-----|
00610>
00611> * SUB-AREA No.3
00612>
00613> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00614> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00615> SCS curve number CN=[81],
00616> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00617> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00618> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.51] (%),
00619> LGI=[225.63] (m), MNI=[0.03], SCI=[0.0]
00620> RAINFALL=[ , , , ](mm/hr), END=-1
00621> *%-----|
00622>
00623> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
00624> *%-----|
00625>
00626> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
00627> *%-----|
00628>
00629> * SUB-AREA No.4
00630>
00631> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00632> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00633> SCS curve number CN=[81],
00634> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
00635> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00636> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.93] (%),
00637> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
00638> RAINFALL=[ , , , ](mm/hr), END=-1
00639> *%-----|
00640>
00641> * SUB-AREA No.5
00642>
00643> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00644> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00645> SCS curve number CN=[81],
00646> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00647> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00648> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00649> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0]
00650> RAINFALL=[ , , , ](mm/hr), END=-1
00651> *%-----|
00652>
00653> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
00654> *%-----|
00655>
00656> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+8]
00657> *%-----|
00658>
00659> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00660> RDT=[1.0] (min),
00661>
00662> TABLE of ( OUTFLOW-STORAGE ) values
00663> (cms) = (ha-m)
00664> [ 0.000, 0.0000]
00665> [ 0.008, 0.0656]
00666> [ 0.017, 0.1311]
00667> [ 0.093, 0.2831]
00668> [ 0.233, 0.3971]
00669> [ 0.337, 0.4731]
00670> [ 0.465, 0.5491]
00671> [ 0.531, 0.5871]
00672> [ 0.593, 0.6251]
00673> [ 0.654, 0.6631]
00674> [ 0.797, 0.7391]
00675> [ 0.950, 0.8274]
00676> [ 1.304, 0.9157]
00677> [ 1.880, 1.0040]
00678> [ 2.577, 1.0923]
00679> [ -1, -1 ] (max twenty pts)
00680>

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00676> *****
00677> * Remaining Hawthorne Industrial Park *
00678> *****
00679>
00680> * SUB-AREA No.1
00681>
00682> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00683> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00684> SCS curve number CN=[81],
00685> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00686> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00687> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00688> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00689> RAINFALL=[ , , , ](mm/hr), END=-1
00690> *%-----|
00691>
00692> ADD HYD IDsum=[ 2 ], NHYD=["HIPO2"], IDs to add=[10+1]
00693> *%-----|
00694>
00695> * SUB-AREA No.2
00696>
00697> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00698> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00699> SCS curve number CN=[81],
00700> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00701> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00702> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00703> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00704> RAINFALL=[ , , , ](mm/hr), END=-1
00705> *%-----|
00706>
00707> * SUB-AREA No.3
00708>
00709> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00710> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00711> SCS curve number CN=[81],
00712> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00713> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00714> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00715> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00716> RAINFALL=[ , , , ](mm/hr), END=-1
00717> *%-----|
00718>
00719> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00720> *%-----|
00721>
00722> *SUB-AREA No.4
00723>
00724> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0] (ha),
00725> DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
00726> RAINFALL=[ , , , ](mm/hr), END=-1
00727> *%-----|
00728>
00729>
00730> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00731> *%-----|
00732>
00733> * SUB-AREA No. 5
00734>
00735> DESIGN NASHYD ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8] (ha),
00736> DWF=[0] (cms), CN/C=[76], TP=[0.37]hrs,
00737> RAINFALL=[ , , , ](mm/hr), END=-1
00738> *%-----|
00739>
00740> * SUB-AREA No 4
00741>
00742> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3] (ha),
00743> DWF=[0] (cms), CN/C=[76], TP=[0.804]hrs,
00744> RAINFALL=[ , , , ](mm/hr), END=-1
00745> *%-----|
00746>
00747>
00748> ADD HYD IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
00749> *%-----|
00750>
00751> ***** CALCULATION OF 3HR - 1:25 YEAR STORM EVENT *****
00752> *
00753> *****
00754>
00755> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00756> *%-----|
00757> [ ] <- storm filename, one per line for NSTORM time
00758> CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSPT=[10.0] (min)
00759> ICASEcs=[1],
00760> A=[1402.884], B=[6.018], and C=[0.819],
00761> *%-----|
00762>
00763> DEFAULT VALUES ICASEDef=[1], read and print values
00764> *%-----|
00765> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWHYMO\ORGA.VAL]
00766> *%-----|
00767>
00768> ***** ORGAWORLD FILE *****
00769> *
00770> *****
00771>
00772> * SUB-AREA No.1
00773>
00774> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00775> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00776> SCS curve number CN=[81],
00777> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00778> LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (mi)
00779> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00780> LGI=[204.72] (m), MNI=[0.03 ], SCI=[0.0]
00781> RAINFALL=[ , , , ](mm/hr), END=-1
00782> *%-----|
00783>
00784> * SUB-AREA No.2
00785>
00786> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00787> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00788> SCS curve number CN=[81],
00789> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00790> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00791> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00792> LGI=[244.34] (m), MNI=[0.03 ], SCI=[0.0]
00793> RAINFALL=[ , , , ](mm/hr), END=-1
00794> *%-----|
00795>
00796> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
00797> *%-----|
00798>
00799> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
00800> *%-----|
00801>
00802> * SUB-AREA No.4
00803>
00804>
00805>
00806>
00807>
00808> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00809> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00810> SCS curve number CN=[81],

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00811> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[0.7] (%),
00812> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00813> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.93] (%),
00814> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
00815> RAINFALL=[ , , , ] (mm/hr), END=-1
00816> *%-----|
00817> * SUB-AREA No.5
00818>
00819>
00820> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00821> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00822> SCS curve number CN=[81],
00823> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
00824> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
00825> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
00826> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
00827> RAINFALL=[ , , , ] (mm/hr), END=-1
00828> *%-----|
00829> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00830> *%-----|
00831> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00832> *%-----|
00833>
00834> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00835> RDT=[1.0] (min),
00836> TABLE of ( OUTFLOW-STORAGE ) values
00837> (cms) - (ha-m)
00838> [ 0.000, 0.0000]
00839> [ 0.008, 0.0656]
00840> [ 0.017, 0.1311]
00841> [ 0.093, 0.2831]
00842> [ 0.233, 0.3971]
00843> [ 0.337, 0.4731]
00844> [ 0.465, 0.5491]
00845> [ 0.531, 0.5871]
00846> [ 0.593, 0.6251]
00847> [ 0.654, 0.6631]
00848> [ 0.797, 0.7391]
00849> [ 0.950, 0.8274]
00850> [ 1.304, 0.9157]
00851> [ 1.880, 1.0040]
00852> [ 2.577, 1.0923]
00853> [ -1, -1 ] (max twenty pts)
00854>
00855> *****
00856> * Remaining Hawthorne Industrial Park *
00857> *****
00858>
00859> * SUB-AREA No.1
00860>
00861> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00862> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00863> SCS curve number CN=[81],
00864> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
00865> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00866> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
00867> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00868> RAINFALL=[ , , , ] (mm/hr), END=-1
00869> *%-----|
00870> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00871> *%-----|
00872> *
00873> * SUB-AREA No.2
00874>
00875> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00876> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00877> SCS curve number CN=[81],
00878> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
00879> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00880> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
00881> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00882> RAINFALL=[ , , , ] (mm/hr), END=-1
00883> *%-----|
00884> *
00885> * SUB-AREA No.3
00886>
00887> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00888> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00889> SCS curve number CN=[81],
00890> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
00891> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00892> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.5] (%),
00893> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00894> RAINFALL=[ , , , ] (mm/hr), END=-1
00895> *%-----|
00896> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00897> *%-----|
00898> *
00899> * SUB-AREA No.4
00900>
00901> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00902> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00903> RAINFALL=[ , , , ] (mm/hr), END=-1
00904> *%-----|
00905>
00906>
00907> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00908> *%-----|
00909>
00910> * SUB-AREA No. 5
00911>
00912> DESIGN NASHYD ID = [10], NHYD=["A2"], DT=[2.5] min, AREA=[6.8] (ha),
00913> DWF=[0] (cms), CNC=[76], TP=[0.37] hrs,
00914> RAINFALL=[ , , , ] (mm/hr), END=-1
00915> *%-----|
00916>
00917> * SUB-AREA No 4
00918>
00919> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5] min, AREA=[5.3] (ha),
00920> DWF=[0] (cms), CNC=[76], TP=[0.804] hrs,
00921> RAINFALL=[ , , , ] (mm/hr), END=-1
00922> *%-----|
00923> ADD HYD IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
00924> *%-----|
00925>
00926>
00927> *****
00928> CALCULATION OF 3HR - 1:50 YEAR STORM EVENT *
00929> *****
00930>
00931> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00932> *%-----|
00933> [ ] <- storm filename, one per line for NSTORM time
00934> CHICAGO STORM IUNIT=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00935> ICASR=[1], A=[1569.580], B=[6.014], and C=[0.820],
00936>
00937> *%-----|
00938> DEFAULT VALUES ICASedef=[1], read and print values
00939> DEVAL_FILENAME=[V:\22973.DU\ENG\SWM\HYM\ORGA.VAL"]
00940> *%-----|
00941>
00942> *****
00943> * ORGAWORLD FILE *
00944> *****
00945>

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00946> * SUB-AREA No.1
00947>
00948> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00949> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00950> SCS curve number CN=[81],
00951> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.0] (%),
00952> LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (min)
00953> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.52] (%),
00954> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
00955> RAINFALL=[ , , , ] (mm/hr), END=-1
00956> *%-----|
00957> *
00958> * SUB-AREA No.2
00959>
00960> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00961> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00962> SCS curve number CN=[81],
00963> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.0] (%),
00964> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00965> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.52] (%),
00966> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
00967> RAINFALL=[ , , , ] (mm/hr), END=-1
00968> *%-----|
00969> *
00970> * SUB-AREA No.3
00971>
00972> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00973> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00974> SCS curve number CN=[81],
00975> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.0] (%),
00976> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00977> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.51] (%),
00978> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0] (min)
00979> RAINFALL=[ , , , ] (mm/hr), END=-1
00980> *%-----|
00981> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00982> *%-----|
00983> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00984> *%-----|
00985> *
00986> * SUB-AREA No.4
00987>
00988> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00989> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00990> SCS curve number CN=[81],
00991> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[0.7] (%),
00992> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00993> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.93] (%),
00994> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
00995> RAINFALL=[ , , , ] (mm/hr), END=-1
00996> *%-----|
00997> *
00998> * SUB-AREA No.5
00999>
01000> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
01001> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01002> SCS curve number CN=[81],
01003> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01004> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
01005> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
01006> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
01007> RAINFALL=[ , , , ] (mm/hr), END=-1
01008> *%-----|
01009> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
01010> *%-----|
01011> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
01012> *%-----|
01013>
01014> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
01015> RDT=[1.0] (min),
01016> TABLE of ( OUTFLOW-STORAGE ) values
01017> (cms) - (ha-m)
01018> [ 0.000, 0.0000]
01019> [ 0.008, 0.0656]
01020> [ 0.017, 0.1311]
01021> [ 0.093, 0.2831]
01022> [ 0.233, 0.3971]
01023> [ 0.337, 0.4731]
01024> [ 0.465, 0.5491]
01025> [ 0.531, 0.5871]
01026> [ 0.593, 0.6251]
01027> [ 0.654, 0.6631]
01028> [ 0.797, 0.7391]
01029> [ 0.950, 0.8274]
01030> [ 1.304, 0.9157]
01031> [ 1.880, 1.0040]
01032> [ 2.577, 1.0923]
01033> [ -1, -1 ] (max twenty pts)
01034>
01035> *****
01036> * Remaining Hawthorne Industrial Park *
01037> *****
01038>
01039> * SUB-AREA No.1
01040>
01041> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01042> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01043> SCS curve number CN=[81],
01044> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01045> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
01046> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
01047> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01048> RAINFALL=[ , , , ] (mm/hr), END=-1
01049> *%-----|
01050> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
01051> *%-----|
01052> *
01053> * SUB-AREA No.2
01054>
01055> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01056> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01057> SCS curve number CN=[81],
01058> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01059> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
01060> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
01061> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
01062> RAINFALL=[ , , , ] (mm/hr), END=-1
01063> *%-----|
01064> *
01065> * SUB-AREA No.3
01066>
01067> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
01068> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01069> SCS curve number CN=[81],
01070> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01071> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
01072> ImperVIOUS surfaces: IAImp=[1.57] (mm), SLPI=[0.5] (%),
01073> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
01074> RAINFALL=[ , , , ] (mm/hr), END=-1
01075> *%-----|
01076> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01077> *%-----|
01078> *
01079> * SUB-AREA No.4
01080>

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01081> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0] (ha),
01082> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17]hrs,
01083> RAINFALL=[ , , , ] (mm/hr), END=-1
01084> *-----
01085>
01086>
01087> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
01088> *-----
01089>
01090> * SUB-AREA No. 5
01091>
01092> DESIGN NASHYD ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8] (ha),
01093> DWF=[0] (cms), CNC=[76], TP=[0.37]hrs,
01094> RAINFALL=[ , , , ] (mm/hr), END=-1
01095> *-----
01096>
01097> * SUB-AREA No. 4
01098>
01099> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3] (ha),
01100> DWF=[0] (cms), CNC=[76], TP=[0.804]hrs,
01101> RAINFALL=[ , , , ] (mm/hr), END=-1
01102> *-----
01103> ADD HYD IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
01104> *-----
01105>
01106> *****
01107> * CALCULATION OF SHR - 1:100 YEAR STORM EVENT *
01108> *****
01109>
01110> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
01111> [ ] <- storm filename, one per line for NSTORM time
01112> *-----
01113> CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
01114> ICASE=[1],
01115> A=[1735.688], B=[6.014], and C=[0.820].
01116> *-----
01117> DEFAULT VALUES ICASEdef=[1], read and print values
01118> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWM\HYMO\ORGA.VAL"]
01119> *-----
01120>
01121> *****
01122> * ORGAWORLD FILE *
01123> *****
01124>
01125> * SUB-AREA No.1
01126>
01127> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
01128> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
01129> SCS curve number CN=[81],
01130> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01131> LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (m)
01132> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.52] (%),
01133> LGI=[204.72] (m), MNI=[0.03 ], SCI=[0.0]
01134> RAINFALL=[ , , , ] (mm/hr), END=-1
01135> *-----
01136>
01137> * SUB-AREA No.2
01138>
01139> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
01140> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
01141> SCS curve number CN=[81],
01142> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01143> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01144> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.50] (%),
01145> LGI=[244.34] (m), MNI=[0.03 ], SCI=[0.0]
01146> RAINFALL=[ , , , ] (mm/hr), END=-1
01147> *-----
01148>
01149> * SUB-AREA No.3
01150>
01151> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
01152> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01153> SCS curve number CN=[81],
01154> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01155> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01156> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[ 0.51 ] (%),
01157> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0]
01158> RAINFALL=[ , , , ] (mm/hr), END=-1
01159> *-----
01160> ADD HYD IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
01161> *-----
01162> ADD HYD IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
01163> *-----
01164>
01165> * SUB-AREA No.4
01166>
01167> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
01168> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01169> SCS curve number CN=[81],
01170> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
01171> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
01172> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.93] (%),
01173> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
01174> RAINFALL=[ , , , ] (mm/hr), END=-1
01175> *-----
01176>
01177> * SUB-AREA No.5
01178>
01179> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
01180> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01181> SCS curve number CN=[81],
01182> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01183> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (m)
01184> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.61] (%),
01185> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0]
01186> RAINFALL=[ , , , ] (mm/hr), END=-1
01187> *-----
01188> ADD HYD IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
01189> *-----
01190> ADD HYD IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
01191> *-----
01192>
01193> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
01194> RDT=[1.0] (min),
01195> TABLE of ( OUTFLOW-STORAGE ) values
01196> (cms) - (ha-m)
01197> [ 0.000, 0.0000]
01198> [ 0.008, 0.0656]
01199> [ 0.017, 0.1311]
01200> [ 0.033, 0.2631]
01201> [ 0.233, 0.3971]
01202> [ 0.337, 0.4731]
01203> [ 0.465, 0.5491]
01204> [ 0.531, 0.5871]
01205> [ 0.593, 0.6251]
01206> [ 0.654, 0.6631]
01207> [ 0.797, 0.7391]
01208> [ 0.950, 0.8274]
01209> [ 1.304, 0.9157]
01210> [ 1.880, 1.0040]
01211> [ 2.577, 1.0923]
01212> [ -1, -1 ] (max twenty pts)
01213>
01214> *****
01215> * Remaining Hawthorne Industrial Park *

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01216> *****
01217> *
01218> * SUB-AREA No.1
01219>
01220> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01221> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01222> SCS curve number CN=[81],
01223> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01224> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01225> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.61] (%),
01226> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01227> RAINFALL=[ , , , ] (mm/hr), END=-1
01228> *-----
01229> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
01230> *-----
01231>
01232> * SUB-AREA No.2
01233>
01234> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01235> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01236> SCS curve number CN=[81],
01237> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01238> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01239> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.65] (%),
01240> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
01241> RAINFALL=[ , , , ] (mm/hr), END=-1
01242> *-----
01243>
01244> * SUB-AREA No.3
01245>
01246> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
01247> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01248> SCS curve number CN=[81],
01249> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01250> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01251> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.5] (%),
01252> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
01253> RAINFALL=[ , , , ] (mm/hr), END=-1
01254> *-----
01255> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01256> *-----
01257>
01258> * SUB-AREA No.4
01259>
01260> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0] (ha),
01261> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17]hrs,
01262> RAINFALL=[ , , , ] (mm/hr), END=-1
01263> *-----
01264>
01265>
01266> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
01267> *-----
01268>
01269> * SUB-AREA No. 5
01270>
01271> DESIGN NASHYD ID = [10], NHYD=["A2"], DT=[2.5]min, AREA=[6.8] (ha),
01272> DWF=[0] (cms), CNC=[76], TP=[0.37]hrs,
01273> RAINFALL=[ , , , ] (mm/hr), END=-1
01274> *-----
01275>
01276> * SUB-AREA No.4
01277>
01278> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[5.3] (ha),
01279> DWF=[0] (cms), CNC=[76], TP=[0.804]hrs,
01280> RAINFALL=[ , , , ] (mm/hr), END=-1
01281> *-----
01282> ADD HYD IDsum=[2], NHYD=["0020"], IDs to add=[7+10+1]
01283> *-----
01284>
01285> FINISH
01286>
01287> *****Rough Pond 1.87 ha x 1.4 m deep*****
01288> TABLE of ( OUTFLOW-STORAGE ) values
01289> (cms) - (ha-m)
01290> [ 0.0, 0.0 ]
01291> [ 0.10, 0.374 ]
01292> [ 0.25, 0.748 ]
01293> [ 0.50, 1.122 ]
01294> [ 0.85, 1.496 ]
01295> [ 1.20, 1.870 ]
01296> [ 1.30, 2.244 ]
01297> [ 1.50, 2.618 ]
01298> [ -1, -1 ]
01299>
01300>
01301> *****Rough Pond 150x150 x 1.4 m deep*****
01302> (cms) - (ha-m)
01303> [ 0.0, 0.0 ]
01304> [ 0.16, 0.45 ]
01305> [ 0.31, 0.900 ]
01306> [ 0.60, 1.350 ]
01307> [ 0.95, 1.800 ]
01308> [ 1.40, 2.25 ]
01309> [ 1.45, 2.700 ]
01310> [ 1.50, 3.150 ]
01311> [ -1, -1 ] (max twenty pts)
01312>
01313>
01314>
01315>
01316>
01317>
01318>
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01321>
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01350>

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00001>
00002>
00003> SSSSS W W M M H H Y Y M M O O O 999 999
00004> S W W M M M H H Y Y M M O O O 9 9 9
00005> SSSSS W W M M M H H H H Y Y M M O O O # 9 9 9 9 Ver. 4.02
00006> S W W M M H H H Y Y M M O O O 9999 9999 July 1999
00007> SSSSS W W M M H H H Y Y M M O O O 9 9 9 9
00008> StormWater Management Hydrologic Model 9 9 9 # 4418403
00009>
00010>
00011>
00012> ***** SWMHYMO-99 Ver/4.02 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016>
00017> ***** Distributed by: J. F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 727-5199 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhyo@fsa.com *****
00021>
00022>
00023>
00024> ***** Licensed user: J. L. Richards & Associates Limited *****
00025> ***** Ottawa SERIAL#:4418403 *****
00026>
00027>
00028>
00029> ***** PROGRAM ARRAY DIMENSIONS *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 15000 *****
00032> ***** Max. number of flow points : 15000 *****
00033>
00034>
00035>
00036> ***** DETAILED OUTPUT *****
00037> *****
00038> ***** DATE: 2009-04-21 TIME: 10:30:14 RUN COUNTER: 000173 *****
00039> *****
00040> * Input filename: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\PSTPH1.dat *
00041> * Output filename: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\PSTPH1.out *
00042> * Summary filename: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\PSTPH1.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047>
00048>
00049>
00050> 001:0001-----
00051> *
00052> * Project Name : Hawthorne Industrial Park Project Number: [20983] *
00053> * Date : April, 2009 *
00054> * Revised : N/A *
00055> * Developed by : Mark Buchanan, E.I.T. *
00056> * Reviewed by : Guy Forget, P.Eng. *
00057> * Company : J.L. Richards & Associates Limited *
00058> * License # : 4418403 *
00059> *
00060> *
00061> *
00062> *
00063> * FILENAME: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\2098PST.DAT *
00064> * FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
00065> * OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE *
00066> *
00067> *
00068> * SWMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE *
00069> * PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00070> *
00071> *
00072> *
00073> * HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *
00074> * FOR DESIGN STORMS OF 1.5, 10, 25, 50, AND 100 YR *
00075> *
00076> *
00077> * POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00078> *
00079> *
00080> * CALCULATION OF 4 HR 25 MM STORM EVENT *
00081> *
00082> *
00083> * START Project dir.: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\
00084> Rainfall dir.: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\
00085> TZERO = .00 hrs on 0
00086> METOUT= 2 (output = METRIC)
00087> NRUN = 001
00088> NSTORM= 0
00089>
00090> 001:0002-----
00091>
00092> | READ STORM | Filename: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\4HR25-1
00093> | Ptotal= 25.00 mm | Comments: 4hr-15 min 25 MM STORM EVENT (CHICAGO DI
00094>
00095>
00096>
00097>
00098>
00099>
00100>
00101>
00102>
00103> 001:0003-----
00104>
00105> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\3RDSUB-1\SMWHYMO\ORGA.VAL
00106> | ICASEdv = 1 (read and print data)
00107> |
00108> | Filetitle=----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
00109> |
00110> | Horton's infiltration equation parameters:
00111> | [P= 50.00 mm/hr] [F= 7.50 mm/hr] [DCAY= 2.00 /hr] [F= .00 mm]
00112> | Parameters for PERVIOUS surfaces in STANDHYD:
00113> | [IAPER= 4.67 mm] [LGP=40.00 mm] [MNP= .250]
00114> | Parameters for IMPERVIOUS surfaces in STANDHYD:
00115> | [IRIMP= 1.57 mm] [CLIE= 1.50] [MNI= .035]
00116> | Parameters used in NASHYD:
00117> | [Ia= 4.67 mm] [N= 3.00]
00118> 001:0004-----
00119>
00120> * ORGAWORLD FILE *
00121> *****
00122> * SUB-AREA No.1 *
00123>
00124> | CALIB STANDHYD | Area (ha)= 2.07
00125> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
00126>
00127>
00128>
00129>
00130>
00131>
00132>
00133>
00134>
00135>

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00136> Storage Coeff. (min)= 10.80 (ii) 29.27 (ii)
00137> Unit Hyd. Tpeak (min)= 10.00 30.00
00138> Unit Hyd. peak (cms)= .11 .04
00139>
00140>
00141>
00142>
00143>
00144>
00145>
00146>
00147>
00148>
00149>
00150>
00151>
00152>
00153>
00154>
00155> * SUB-AREA No.2
00156>
00157> | CALIB STANDHYD | Area (ha)= 1.54
00158> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00159>
00160>
00161>
00162>
00163>
00164>
00165>
00166>
00167>
00168>
00169>
00170>
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00175>
00176>
00177>
00178>
00179>
00180>
00181>
00182>
00183>
00184>
00185>
00186> 001:0006-----
00187> *
00188> * SUB-AREA No.3
00189> *
00190> | CALIB STANDHYD | Area (ha)= 1.40
00191> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00192>
00193>
00194>
00195>
00196>
00197>
00198>
00199>
00200>
00201>
00202>
00203>
00204>
00205>
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00209>
00210>
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00212>
00213>
00214>
00215>
00216>
00217>
00218>
00219> 001:0007-----
00220>
00221> | ADD HYD (040 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00222> | (ha) (cms) (hrs) (mm) (cms)
00223> | ID1 01:010 2.07 .158 1.29 20.51 .000
00224> | +ID2 02:020 1.54 .121 1.33 21.97 .000
00225>
00226> | SUM 04:040 3.61 .278 1.33 21.13 .000
00227>
00228>
00229>
00230>
00231> 001:0008-----
00232>
00233> | ADD HYD (050 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00234> | (ha) (cms) (hrs) (mm) (cms)
00235> | ID1 03:030 1.40 .118 1.33 22.88 .000
00236> | +ID2 04:040 3.61 .278 1.33 21.13 .000
00237>
00238> | SUM 05:050 5.01 .396 1.33 21.62 .000
00239>
00240>
00241>
00242>
00243> 001:0009-----
00244>
00245> * SUB-AREA No.4
00246>
00247> | CALIB STANDHYD | Area (ha)= .89
00248> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00249>
00250>
00251>
00252>
00253>
00254>
00255>
00256>
00257>
00258>
00259>
00260>
00261>
00262>
00263>
00264>
00265>
00266>
00267>
00268>
00269>
00270>

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00271> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00272> THAN THE STORAGE COEFFICIENT.
00273> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00274>
00275>
00276> 001:0010-----
00277> * SUB-AREA No.5
00278> *
00279> | CALIB STANDHYD | Area (ha)= 2.66
00280> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00281>
00282> IMPERVIOUS PERVIOUS (i)
00283> Surface Area (ha)= 2.58 .08
00284> Dep. Storage (mm)= 1.57 4.67
00285> Average Slope (%)= .61 1.50
00286> Length (m)= 207.25 20.00
00287> Mannings n = .030 .250
00288>
00289> Max. eff. Inten. (mm/hr)= 45.63 5.66
00290> over (min)= 10.00 27.50
00291> Storage Coeff. (min)= 10.37 (ii) 26.38 (iii)
00292> Unit Hyd. Tpeak (min)= 10.00 27.50
00293> Unit Hyd. peak (cms)= .11 .04 *TOTALS*
00294> PEAK FLOW (cms)= .24 .00
00295> TIME TO PEAK (hrs)= 1.29 1.67 1.292
00296> RUNOFF VOLUME (mm)= 23.43 5.17 22.882
00297> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00298> RUNOFF COEFFICIENT = .94 .21 .915
00299>
00300> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00301> CN* = 81.0 Ia = Dep. Storage (Above)
00302> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00303> THAN THE STORAGE COEFFICIENT.
00304> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00305>
00306>
00307>
00308>
00309> 001:0011-----
00310> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00311> | (ha) (cms) (hrs) (mm) (cms)
00312> ID1 05:060 2.56 .099 1.25 22.88 .000
00313> +ID2 07:070 2.66 .238 1.29 22.88 .000
00314> =====
00315> SUM 08:080 3.55 .327 1.29 22.88 .000
00316>
00317> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00318>
00319>
00320>
00321> 001:0012-----
00322> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00323> | (ha) (cms) (hrs) (mm) (cms)
00324> ID1 05:050 5.01 .396 1.33 21.62 .000
00325> +ID2 08:080 3.55 .327 1.29 22.88 .000
00326> =====
00327> SUM 09:090 8.56 .716 1.29 22.14 .000
00328>
00329> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00330>
00331>
00332>
00333> 001:0013-----
00334> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00335> | IN>09: (090) |
00336> | OUT<10: (POND) |
00337> =====
00338> | OUTFLOW STORAGE TABLE |
00339> | (cms) (ha.m.) (cms) (ha.m.)
00340> .000 .0000E+00 | .593 .6251E+00
00341> .008 .6560E-01 | .654 .6631E+00
00342> .017 .1311E+00 | .797 .7391E+00
00343> .093 .2831E+00 | .950 .8274E+00
00344> .233 .5971E+00 | 1.304 .9157E+00
00345> .337 .4731E+00 | 1.880 .1004E+01
00346> .465 .5491E+00 | 2.577 .1092E+01
00347> .531 .5871E+00 | .000 .0000E+00
00348>
00349> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00350> (ha) (cms) (hrs) (mm)
00351> INFLOW >09: (090) 8.56 .716 1.292 22.143
00352> OUTFLOW <10: (POND) 8.56 .032 3.875 22.141
00353>
00354> PEAK FLOW REDUCTION [Qout/Quin] (%) = 4.470
00355> TIME SHIFT OF PEAK FLOW (min) = 155.00
00356> MAXIMUM STORAGE USED (ha.m.) = .1611E+00
00357>
00358>
00359> 001:0014-----
00360> *****
00361> * Remaining Hawthorne Industrial Park *
00362> *****
00363> *
00364> * SUB-AREA No.1
00365> *
00366> | CALIB STANDHYD | Area (ha)= 19.90
00367> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00368>
00369> IMPERVIOUS PERVIOUS (i)
00370> Surface Area (ha)= 14.13 5.77
00371> Dep. Storage (mm)= 1.57 4.67
00372> Average Slope (%)= .60 1.50
00373> Length (m)= 580.00 100.00
00374> Mannings n = .030 .250
00375>
00376> Max. eff. Inten. (mm/hr)= 34.39 11.90
00377> over (min)= 22.50 52.50
00378> Storage Coeff. (min)= 21.64 (ii) 52.08 (ii)
00379> Unit Hyd. Tpeak (min)= 22.50 52.50
00380> Unit Hyd. peak (cms)= .05 .02 *TOTALS*
00381> PEAK FLOW (cms)= .60 .11 .642 (iii)
00382> TIME TO PEAK (hrs)= 1.50 2.13 1.542
00383> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00384> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00385> RUNOFF COEFFICIENT = .94 .35 .643
00386>
00387> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00388> CN* = 81.0 Ia = Dep. Storage (Above)
00389> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00390> THAN THE STORAGE COEFFICIENT.
00391> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00392>
00393>
00394>
00395> 001:0015-----
00396> | ADD HYD (HIPO2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00397> | (ha) (cms) (hrs) (mm) (cms)
00398> ID1 10:POND 8.56 .032 3.88 22.14 .000
00399> +ID2 01:HIP01 19.90 .642 1.54 16.08 .000
00400> =====
00401> SUM 02:HIP02 28.46 .655 1.54 17.91 .000
00402>
00403> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00404>
00405>

00406>-----
00407> 001:0016-----
00408> * SUB-AREA No.2
00409> *
00410> | CALIB STANDHYD | Area (ha)= 17.00
00411> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00412>
00413> IMPERVIOUS PERVIOUS (i)
00414> Surface Area (ha)= 12.07 4.93
00415> Dep. Storage (mm)= 1.57 4.67
00416> Average Slope (%)= .65 1.50
00417> Length (m)= 450.00 100.00
00418> Mannings n = .030 .250
00419>
00420> Max. eff. Inten. (mm/hr)= 40.81 12.73
00421> over (min)= 17.50 47.50
00422> Storage Coeff. (min)= 16.94 (ii) 47.35 (iii)
00423> Unit Hyd. Tpeak (min)= 17.50 47.50
00424> Unit Hyd. peak (cms)= .07 .02 *TOTALS*
00425> PEAK FLOW (cms)= .60 .10 .625 (iii)
00426> TIME TO PEAK (hrs)= 1.42 2.00 1.458
00427> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00428> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00429> RUNOFF COEFFICIENT = .94 .35 .643
00430>
00431> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00432> CN* = 81.0 Ia = Dep. Storage (Above)
00433> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00434> THAN THE STORAGE COEFFICIENT.
00435> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00436>
00437>
00438>
00439>
00440> 001:0017-----
00441> * SUB-AREA No.3
00442> *
00443> | CALIB STANDHYD | Area (ha)= 18.10
00444> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00445>
00446> IMPERVIOUS PERVIOUS (i)
00447> Surface Area (ha)= 12.85 5.25
00448> Dep. Storage (mm)= 1.57 4.67
00449> Average Slope (%)= .50 1.50
00450> Length (m)= 600.00 100.00
00451> Mannings n = .030 .250
00452>
00453> Max. eff. Inten. (mm/hr)= 34.39 11.54
00454> over (min)= 22.50 55.00
00455> Storage Coeff. (min)= 23.33 (ii) 54.95 (ii)
00456> Unit Hyd. Tpeak (min)= 22.50 55.00
00457> Unit Hyd. peak (cms)= .05 .02 *TOTALS*
00458> PEAK FLOW (cms)= .53 .09 .542 (iii)
00459> TIME TO PEAK (hrs)= 1.50 2.17 1.542
00460> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00461> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00462> RUNOFF COEFFICIENT = .94 .35 .643
00463>
00464> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00465> CN* = 81.0 Ia = Dep. Storage (Above)
00466> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00467> THAN THE STORAGE COEFFICIENT.
00468> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00469>
00470>
00471>
00472>
00473> 001:0018-----
00474> | ADD HYD (HIPO5) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00475> | (ha) (cms) (hrs) (mm) (cms)
00476> ID1 03:HIP03 17.00 .625 1.46 16.08 .000
00477> +ID2 04:HIP04 18.10 .562 1.54 16.08 .000
00478> =====
00479> SUM 05:HIP05 35.10 1.166 1.46 16.08 .000
00480>
00481> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00482>
00483>
00484>
00485> 001:0019-----
00486> * SUB-AREA No.4
00487> *
00488> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=65.00
00489> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00490> | U.H. Tp (hrs)= .170
00491>
00492> Unit Hyd Qpeak (cms)= .899
00493>
00494>
00495> PEAK FLOW (cms)= .077 (i)
00496> TIME TO PEAK (hrs)= 1.375
00497> RUNOFF VOLUME (mm)= 6.343
00498> TOTAL RAINFALL (mm)= 24.999
00499> RUNOFF COEFFICIENT = .254
00500>
00501> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00502>
00503>
00504> 001:0020-----
00505> | ADD HYD (HIPO6) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00506> | (ha) (cms) (hrs) (mm) (cms)
00507> ID1 02:HIP02 28.46 .655 1.54 17.91 .000
00508> +ID2 05:HIP05 35.10 1.166 1.46 16.08 .000
00509> +ID3 06:Pond-B 4.00 .077 1.38 6.34 .000
00510> =====
00511> SUM 07:HIP06 67.56 1.887 1.50 16.28 .000
00512>
00513> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00514>
00515>
00516>
00517> 001:0021-----
00518> * SUB-AREA NO. 5
00519> *
00520> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00
00521> | 10:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00522> | U.H. Tp (hrs)= .370
00523>
00524> Unit Hyd Qpeak (cms)= .702
00525>
00526> PEAK FLOW (cms)= .053 (i)
00527> TIME TO PEAK (hrs)= 1.708
00528> RUNOFF VOLUME (mm)= 4.111
00529> TOTAL RAINFALL (mm)= 24.999
00530> RUNOFF COEFFICIENT = .164
00531>
00532> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00533>
00534>
00535> 001:0022-----
00536> * SUB-AREA NO 4
00537> *
00538> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00
00539> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00540> | U.H. Tp (hrs)= .804

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00541> Unit Hyd Qpeak (cms) = .252
00542>
00543>
00544> PEAK FLOW (cms) = .025 (i)
00545> TIME TO PEAK (hrs) = 2.333
00546> RUNOFF VOLUME (mm) = 4.110
00547> TOTAL RAINFALL (mm) = 24.999
00548> RUNOFF COEFFICIENT = .164
00549>
00550> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00551>
00552>
00553> 001:0023-----
00554>
00555> | ADD HYD (0020 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00556> | (ha) (cms) (hrs) (mm) (cms)
00557> | ID1 07:HIP06 67.56 1.887 1.50 16.28 .000
00558> | +ID2 10:A2 6.80 .053 1.71 4.11 .000
00559> | +ID3 01:A3 5.30 .025 2.33 4.11 .000
00560>
00561> |-----|
00562> | SUM 02:0020 79.66 1.941 1.50 14.43 .000
00563>
00564> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00565>
00566> 001:0024-----
00567> *****
00568> * CALCULATION OF SHR - 1:2 YEAR STORM EVENT *
00569> *****
00570>
00571> | START | Project dir.: V:\20983.DU\ENG\3RDSUB-1\SWHM\MO
00572> | Rainfall dir.: V:\20983.DU\ENG\3RDSUB-1\SWHM\MO
00573> | TZERO = .00 hrs on 0
00574> | METOD = 2 (output = METRIC)
00575> | NRUN = 001
00576> | NSTORM = 0
00577>
00578> 001:0002-----
00579>
00580> | CHICAGO STORM | IDF curve parameters: A= 732.951
00581> | Ptotal = 31.86 mm | B= 6.199
00582> | C= .810
00583>
00584> | used in: INTENSITY = A / (t + B)^C
00585>
00586> | Duration of storm = 3.00 hrs
00587> | Storm time step = 10.00 min
00588> | Time to peak ratio = .33
00589>
00590> |-----|
00591> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00592> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00593> | .17 2.815 | 1.00 76.805 | 1.83 5.095 | 2.67 2.684
00594> | .33 3.498 | 1.17 24.079 | 2.00 4.291 | 2.83 2.463
00595> | .50 4.687 | 1.33 12.364 | 2.17 3.718 | 3.00 2.279
00596> | .67 7.305 | 1.50 8.324 | 2.33 3.288 |
00597> | .83 18.209 | 1.67 6.303 | 2.50 2.953 |
00598>
00599>
00600> 001:0003-----
00601>
00602> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\3RDSUB-1\SWHM\MO\ORGA.VAL
00603> | ICASEdv = 1 (read and print data)
00604>
00605> | FileTitle = ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
00606> | Horton's infiltration equation parameters:
00607> | [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCRY= 2.00 /hr] [F= .00 mm]
00608> | Parameters for PEROVIOUS surfaces in STANDHYD:
00609> | [Laper = 4.67 mm] [LGP=40.00 m] [MNP= .250]
00610> | Parameters for IMPEROVIOUS surfaces in STANDHYD:
00611> | [Ximp= 1.57 mm] [CL= 1.50] [MVI= .035]
00612> | Parameters used in NASHYD:
00613> | [La = 4.67 mm] [N= 3.00]
00614>
00615> 001:0004-----
00616> *****
00617> * ORGAWORLD FILE *
00618> *****
00619> * SUB-AREA No.1
00620>
00621> | CALIB STANDHYD | Area (ha) = 2.07
00622> | 01:010 DT= 2.50 | Total Imp(%) = 84.00 Dir. Conn.(%) = 84.00
00623>
00624> |-----|
00625> | IMPEROVIOUS PEROVIOUS (i)
00626> | Surface Area (ha) = 1.74 .33
00627> | Dep. Storage (mm) = 1.57 4.67
00628> | Average Slope (%) = 1.52 1.00
00629> | Length (m) = 204.72 20.00
00630> | Mannings n = .030 .250
00631>
00632> | Max.eff.Inten.(mm/hr)= 76.81 11.88
00633> | over (min) 10.00 22.50
00634> | Storage Coeff. (min)= 8.77 (ii) 22.21 (ii)
00635> | Unit Hyd. Tpeak (min)= 10.00 22.50
00636> | Unit Hyd. peak (cms)= .12 .05
00637>
00638> |-----|
00639> | PEAK FLOW (cms) = .24 .01 *TOTALS*
00640> | TIME TO PEAK (hrs) = 1.08 1.38 .245 (iii)
00641> | RUNOFF VOLUME (mm) = 30.29 8.52 1.083
00642> | TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00643> | RUNOFF COEFFICIENT = .95 .27 .841
00644>
00645> | (i) CN PROCEDURE SELECTED FOR PEROVIOUS LOSSES:
00646> | CN* = 81.0 Ia = Dep. Storage (Above)
00647> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00648> | THAN THE STORAGE COEFFICIENT.
00649> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00650>
00651> 001:0005-----
00652> * SUB-AREA No.2
00653>
00654> | CALIB STANDHYD | Area (ha) = 1.54
00655> | 02:020 DT= 2.50 | Total Imp(%) = 92.00 Dir. Conn.(%) = 92.00
00656>
00657> |-----|
00658> | IMPEROVIOUS PEROVIOUS (i)
00659> | Surface Area (ha) = 1.42 .12
00660> | Dep. Storage (mm) = 1.57 4.67
00661> | Average Slope (%) = .50 1.00
00662> | Length (m) = 244.34 5.00
00663> | Mannings n = .030 .030
00664>
00665> | Max.eff.Inten.(mm/hr)= 76.81 15.07
00666> | over (min) 10.00 12.50
00667> | Storage Coeff. (min)= 9.87 (ii) 11.36 (ii)
00668> | Unit Hyd. Tpeak (min)= 10.00 12.50
00669> | Unit Hyd. peak (cms)= .11 .10
00670>
00671> |-----|
00672> | PEAK FLOW (cms) = .19 .00 *TOTALS*
00673> | TIME TO PEAK (hrs) = 1.08 1.17 1.083
00674> | RUNOFF VOLUME (mm) = 30.29 8.52 29.548
00675> | TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00676> | RUNOFF COEFFICIENT = .95 .27 .896
00677>
00678> | (i) CN PROCEDURE SELECTED FOR PEROVIOUS LOSSES:
00679> | CN* = 81.0 Ia = Dep. Storage (Above)
00680>
00681>
00682>
00683>
00684> 001:0011-----
00685>
00686> | ADD HYD (080 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00687> | (ha) (cms) (hrs) (mm) (cms)
00688> | ID1 06:060 .89 .139 1.04 29.64 .000
00689> | +ID2 07:070 2.66 .379 1.04 29.64 .000
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00676> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00677> THAN THE STORAGE COEFFICIENT.
00678> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00679>
00680>
00681> 001:0006-----
00682> *
00683> * SUB-AREA No.3
00684>
00685> | CALIB STANDHYD | Area (ha) = 1.40
00686> | 03:030 DT= 2.50 | Total Imp(%) = 97.00 Dir. Conn.(%) = 97.00
00687>
00688> |-----|
00689> | IMPEROVIOUS PEROVIOUS (i)
00690> | Surface Area (ha) = 1.36 .04
00691> | Dep. Storage (mm) = 1.57 4.67
00692> | Average Slope (%) = .51 1.00
00693> | Length (m) = 225.63 5.00
00694> | Mannings n = .030 .030
00695>
00696> | Max.eff.Inten.(mm/hr)= 76.81 16.59
00697> | over (min) 10.00 10.00
00698> | Storage Coeff. (min)= 9.35 (ii) 10.79 (ii)
00699> | Unit Hyd. Tpeak (min)= 10.00 10.00
00700> | Unit Hyd. peak (cms)= .12 .11
00701>
00702> |-----|
00703> | PEAK FLOW (cms) = .18 .00 *TOTALS*
00704> | TIME TO PEAK (hrs) = 1.08 1.13 1.083
00705> | RUNOFF VOLUME (mm) = 30.29 8.52 29.637
00706> | TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00707> | RUNOFF COEFFICIENT = .95 .27 .930
00708>
00709> | (i) CN PROCEDURE SELECTED FOR PEROVIOUS LOSSES:
00710> | CN* = 81.0 Ia = Dep. Storage (Above)
00711> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00712> | THAN THE STORAGE COEFFICIENT.
00713> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00714>
00715> 001:0007-----
00716>
00717> | ADD HYD (040 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00718> | (ha) (cms) (hrs) (mm) (cms)
00719> | ID1 01:010 2.07 .245 1.08 26.81 .000
00720> | +ID2 02:020 1.54 .192 1.08 28.55 .000
00721>
00722> |-----|
00723> | SUM 04:040 3.61 .436 1.08 27.55 .000
00724>
00725> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00726>
00727> 001:0008-----
00728>
00729> | ADD HYD (050 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00730> | (ha) (cms) (hrs) (mm) (cms)
00731> | ID1 03:030 1.40 .186 1.08 29.64 .000
00732> | +ID2 04:040 3.61 .436 1.08 27.55 .000
00733>
00734> |-----|
00735> | SUM 05:050 5.01 .623 1.08 28.13 .000
00736>
00737> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00738>
00739> 001:0009-----
00740> * SUB-AREA No.4
00741>
00742> | CALIB STANDHYD | Area (ha) = .89
00743> | 06:060 DT= 2.50 | Total Imp(%) = 97.00 Dir. Conn.(%) = 97.00
00744>
00745> |-----|
00746> | IMPEROVIOUS PEROVIOUS (i)
00747> | Surface Area (ha) = .86 .03
00748> | Dep. Storage (mm) = 1.57 4.67
00749> | Average Slope (%) = .93 .70
00750> | Length (m) = 164.82 40.00
00751> | Mannings n = .030 .250
00752>
00753> | Max.eff.Inten.(mm/hr)= 76.81 10.24
00754> | over (min) 7.50 30.00
00755> | Storage Coeff. (min)= 6.47 (ii) 30.53 (ii)
00756> | Unit Hyd. Tpeak (min)= 7.50 30.00
00757> | Unit Hyd. peak (cms)= .16 .04
00758>
00759> |-----|
00760> | PEAK FLOW (cms) = .14 .00 *TOTALS*
00761> | TIME TO PEAK (hrs) = 1.04 1.54 1.139 (iii)
00762> | RUNOFF VOLUME (mm) = 30.29 8.52 1.042
00763> | TOTAL RAINFALL (mm) = 31.86 31.86 29.637
00764> | RUNOFF COEFFICIENT = .95 .27 31.860
00765>
00766> | (i) CN PROCEDURE SELECTED FOR PEROVIOUS LOSSES:
00767> | CN* = 81.0 Ia = Dep. Storage (Above)
00768> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00769> | THAN THE STORAGE COEFFICIENT.
00770> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00771>
00772> 001:0010-----
00773> * SUB-AREA No.5
00774>
00775> | CALIB STANDHYD | Area (ha) = 2.66
00776> | 07:070 DT= 2.50 | Total Imp(%) = 97.00 Dir. Conn.(%) = 97.00
00777>
00778> |-----|
00779> | IMPEROVIOUS PEROVIOUS (i)
00780> | Surface Area (ha) = 2.58 .08
00781> | Dep. Storage (mm) = 1.57 4.67
00782> | Average Slope (%) = .61 1.50
00783> | Length (m) = 207.25 20.00
00784> | Mannings n = .030 .250
00785>
00786> | Max.eff.Inten.(mm/hr)= 76.81 12.71
00787> | over (min) 7.50 20.00
00788> | Storage Coeff. (min)= 8.42 (ii) 20.00 (ii)
00789> | Unit Hyd. Tpeak (min)= 7.50 20.00
00790> | Unit Hyd. peak (cms)= .14 .06
00791>
00792> |-----|
00793> | PEAK FLOW (cms) = .38 .00 *TOTALS*
00794> | TIME TO PEAK (hrs) = 1.04 1.33 .379 (iii)
00795> | RUNOFF VOLUME (mm) = 30.29 8.52 1.042
00796> | TOTAL RAINFALL (mm) = 31.86 31.86 29.637
00797> | RUNOFF COEFFICIENT = .95 .27 31.860
00798>
00799> | (i) CN PROCEDURE SELECTED FOR PEROVIOUS LOSSES:
00800> | CN* = 81.0 Ia = Dep. Storage (Above)
00801> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00802> | THAN THE STORAGE COEFFICIENT.
00803> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00804>
00805> 001:0011-----
00806>
00807> | ADD HYD (080 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00808> | (ha) (cms) (hrs) (mm) (cms)
00809> | ID1 06:060 .89 .139 1.04 29.64 .000
00810> | +ID2 07:070 2.66 .379 1.04 29.64 .000
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00811> SUM 08:080 3.55 .518 1.04 29.64 .000
00812>
00813> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00814>
00815>
00816> 001:0012-----
00817>
00818> | ADD HYD (090) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00819> | IN:09: (090) | (ha) (cms) (hrs) (mm) (ha.m.) (cms)
00820> | ID1 05:050 | 5.01 .623 1.08 28.13 .000
00821> | +ID2 08:080 | 3.55 .518 1.04 29.64 .000
00822>
00823> SUM 09:090 8.56 1.118 1.08 28.76 .000
00824>

00825> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00826>
00827>
00828> 001:0013-----

00830> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00831> | IN:09: (090) |
00832> | OUT<10: (POND) |

Table with columns: OUTFLOW STORAGE, OUTFLOW STORAGE, OUTFLOW STORAGE. Rows include values for 00833, 00834, 00835, 00836, 00837, 00838, 00839, 00840, 00841, 00842.

00843> ROUTING RESULTS AREA OPEAK TPEAK R.V.
00844> (ha) (cms) (hrs) (mm)
00845> INFLOW >09: (090) 8.56 1.118 1.083 28.757
00846> OUTFLOW<10: (POND) 8.56 .056 3.000 28.754

00848> PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.030
00849> TIME SHIFT OF PEAK FLOW (min) = 115.00
00850> MAXIMUM STORAGE USED (ha.m.) = .2095E+00

00851> 001:0014-----
00852>
00853>
00854> *****
00855> Remaining Hawthorne Industrial Park
00856> *****
00857> * SUB-AREA No.1

00861> | CALIB STANDHYD | Area (ha) = 19.90
00862> | 01:HIP01 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00

Table with columns: IMPERVIOUS, PERVIOUS (i). Rows include Surface Area, Dep. Storage, Average Slope, Length, Mannings n, Max. eff. Inten., Storage Coeff., Unit Hyd. Tpeak, Unit Hyd. peak.

00877> PEAK FLOW (cms) = .95 .21 1.020 (iii)
00878> TIME TO PEAK (hrs) = 1.21 1.71 2.250
00879> RUNOFF VOLUME (mm) = 31.86 31.86 31.860
00880> TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00881> RUNOFF COEFFICIENT = .95 .42 .685
00882>
00883> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00884> CN* = 81.0 Ia = Dep. Storage (Above)
00885> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00886> THAN THE STORAGE COEFFICIENT.
00887> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00890> 001:0015-----
00891>
00892> | ADD HYD (HIPO2) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00893> | IN:10:POND | (ha) (cms) (hrs) (mm) (ha.m.) (cms)
00894> | ID1 10:POND | 8.56 .056 3.00 28.75 .000
00895> | +ID2 01:HIP01 | 19.90 1.020 1.25 21.81 .000
00896>
00897> SUM 02:HIPO2 28.46 1.039 1.25 23.90 .000
00898>
00899> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00900>
00901>
00902> 001:0016-----
00903> * SUB-AREA No.2

00906> | CALIB STANDHYD | Area (ha) = 17.00
00907> | 03:HIPO3 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00

Table with columns: IMPERVIOUS, PERVIOUS (i). Rows include Surface Area, Dep. Storage, Average Slope, Length, Mannings n, Max. eff. Inten., Storage Coeff., Unit Hyd. Tpeak, Unit Hyd. peak.

00922> PEAK FLOW (cms) = .91 .19 .978 (iii)
00923> TIME TO PEAK (hrs) = 1.23 1.63 1.167
00924> RUNOFF VOLUME (mm) = 30.29 13.34 21.814
00925> TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00926> RUNOFF COEFFICIENT = .95 .42 .685
00927>
00928> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00929> CN* = 81.0 Ia = Dep. Storage (Above)
00930> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00931> THAN THE STORAGE COEFFICIENT.
00932> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00933>
00934>
00935> 001:0017-----
00936> * SUB-AREA No.3

00938> | CALIB STANDHYD | Area (ha) = 18.10
00939> | 04:HIPO4 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00

Table with columns: IMPERVIOUS, PERVIOUS (i). Rows include Surface Area, Dep. Storage, Average Slope.

00946> Length (m) = 600.00 100.00
00947> Mannings n = .030 .250
00948>
00949> Max. eff. Inten. (mm/hr) = 50.44 22.17
00950> over (min) = 20.00 45.00
00951> Storage Coeff. (min) = 20.01 (ii) 44.37 (ii)
00952> Unit Hyd. Tpeak (min) = 20.00 45.00
00953> Unit Hyd. peak (cms) = .06 .03
00954>
00955> PEAK FLOW (cms) = .80 .18 *TOTALS*
00956> TIME TO PEAK (hrs) = 1.25 1.79 .874 (iii)
00957> RUNOFF VOLUME (mm) = 30.29 13.34 21.814
00958> TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00959> RUNOFF COEFFICIENT = .95 .42 .685
00960>

00961> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00962> CN* = 81.0 Ia = Dep. Storage (Above)
00963> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00964> THAN THE STORAGE COEFFICIENT.
00965> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00966>

00967>
00968> 001:0018-----
00969>
00970> | ADD HYD (HIPO5) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00971> | IN:03:HIPO3 | (ha) (cms) (hrs) (mm) (ha.m.) (cms)
00972> | ID1 03:HIPO3 | 17.00 .978 1.17 21.81 .000
00973> | +ID2 04:HIPO4 | 18.10 .874 1.29 21.81 .000
00974>
00975> SUM 05:HIPO5 35.10 1.814 1.21 21.81 .000
00976>
00977> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00978>
00979>
00980> 001:0019-----
00981> * SUB-AREA No.4

00983> | DESIGN NASHYD | Area (ha) = 4.00 Curve Number (CN)=85.00
00984> | 06:Pond-B DT= 2.50 | Ia (mm) = 4.570 # of Linear Res. (N)= 3.00
00985> | U.H. Tp(hrs)= .170
00986>
00987> Unit Hyd Opeak (cms) = .899
00988>

00990> PEAK FLOW (cms) = .145 (i)
00991> TIME TO PEAK (hrs) = 1.167
00992> RUNOFF VOLUME (mm) = 10.266
00993> TOTAL RAINFALL (mm) = 31.860
00994> RUNOFF COEFFICIENT = .322
00995>
00996> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00997>

00998> 001:0020-----
00999>

10000> | ADD HYD (HIPO6) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
10001> | IN:02:HIPO2 | (ha) (cms) (hrs) (mm) (ha.m.) (cms)
10002> | ID1 02:HIPO2 | 28.46 1.039 1.25 23.90 .000
10003> | +ID2 05:HIPO5 | 35.10 1.814 1.21 21.81 .000
10004> | +ID3 06:Pond-B | 4.00 .145 1.17 10.27 .000
10005>
10006> SUM 07:HIPO6 67.56 2.992 1.21 22.01 .000
10007>

10008> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
10009>
10010>

10011> 001:0021-----
10012> * SUB-AREA NO. 5

10015> | DESIGN NASHYD | Area (ha) = 6.80 Curve Number (CN)=76.00
10016> | 10:A2 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
10017> | U.H. Tp(hrs)= .370

10018> Unit Hyd Opeak (cms) = .702
10019>
10020>
10021> PEAK FLOW (cms) = .102 (i)
10022> TIME TO PEAK (hrs) = 1.458
10023> RUNOFF VOLUME (mm) = 6.883
10024> TOTAL RAINFALL (mm) = 31.860
10025> RUNOFF COEFFICIENT = .216
10026>
10027> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

10030> 001:0022-----
10031> * SUB-AREA NO 4

10033> | DESIGN NASHYD | Area (ha) = 5.30 Curve Number (CN)=76.00
10034> | 01:A3 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
10035> | U.H. Tp(hrs)= .804

10037> Unit Hyd Opeak (cms) = .252
10038>
10039> PEAK FLOW (cms) = .048 (i)
10040> TIME TO PEAK (hrs) = 2.083
10041> RUNOFF VOLUME (mm) = 6.883
10042> TOTAL RAINFALL (mm) = 31.860
10043> RUNOFF COEFFICIENT = .216
10044>
10045> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
10046>
10047>

10048> 001:0023-----
10049>

10050> | ADD HYD (0020) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
10051> | IN:07:HIPO6 | (ha) (cms) (hrs) (mm) (ha.m.) (cms)
10052> | ID1 07:HIPO6 | 67.56 2.992 1.21 22.01 .000
10053> | +ID2 10:A2 | 6.80 .102 1.46 6.88 .000
10054> | +ID3 01:A3 | 5.30 .048 2.08 6.88 .000
10055>
10056> SUM 02:0020 79.66 3.077 1.21 19.71 .000
10057>
10058> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
10059>

10061> 001:0024-----
10062> *****
10063> * CALCULATION OF 3HR - 1:5 YEAR STORM EVENT
10064> *****

10066> | START | Project dir.: V:\20983.DU\ENG\3RDSUB-1\SRM\HYMO\
10067> Rainfall dir.: V:\20983.DU\ENG\3RDSUB-1\SRM\HYMO\
10068> TZERO = .00 hrs on 0
10069> METOUT= 2 (output = METRIC)
10070> NRUN = 001
10071> NSTORM= 0

10072> 001:0002-----
10073>

10074> | CHICAGO STORM | IDF curve parameters: A= 998.071
10075> | Ptotal= 42.51 mm | B= 6.053
10076> | C= .814
10077> used in: INTENSITY = A / (t + B)^C
10078>
10079> Duration of storm = 3.00 hrs
10080>

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01081> Storm time step = 10.00 min
01082> Time to peak ratio = .33
01083>
01084> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01085> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01086> .17 3.682 | 1.00 104.193 | 1.83 6.689 | 2.67 3.510
01087> .33 4.582 | 1.17 32.037 | 2.00 5.628 | 2.83 3.220
01088> .50 6.151 | 1.33 16.337 | 2.17 4.872 | 3.00 2.978
01089> .67 9.614 | 1.50 10.965 | 2.33 4.305 |
01090> .83 24.170 | 1.67 8.287 | 2.50 3.864 |
01091>
01092>
01093> 001:0003-----
01094>
01095> | DEFAULT VALUES | Filename: V:\20983.DUEN\3RDSUB-1\SWHYMO\ORGA.VAL
01096> | ICASedv = 1 (read and print data)
01097> | FileTitle = ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE -----
01098> | ----- PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----
01099> | Horton's infiltration equation parameters:
01100> | [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCR= 2.00 /hr] [F= .00 mm]
01101> | Parameters for PERVIOUS surfaces in STANDHYD:
01102> | [Iaper= 4.67 mm] [LGP=40.00 mm] [MNP= .250]
01103> | Parameters for IMPERVIOUS surfaces in STANDHYD:
01104> | [Iaimp= 1.57 mm] [CLi=1.50] [MNI= .035]
01105> | Parameters used in NSHYD:
01106> | [Ia= 4.67 mm] [N= 3.00]
01107>
01108> 001:0004-----
01109> *-----
01110> * ORGWORLD FILE
01111> *-----
01112> * SUB-AREA No.1
01113>
01114> | CALIB STANDHYD | Area (ha)= 2.07
01115> | Cl:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
01116>
01117> IMPERVIOUS PERVIOUS (i)
01118> Surface Area (ha)= 1.74 .33
01119> Dep. Storage (mm)= 1.57 4.67
01120> Average Slope (%)= .52 1.00
01121> Length (m)= 204.72 20.00
01122> Mannings n = .030 .250
01123>
01124> Max.eff.Inten.(mm/hr)= 104.19 24.26
01125> over (min) = 7.50 17.50
01126> Storage Coeff. (min)= 7.76 (ii) 17.86 (ii)
01127> Unit Hyd. Tpeak (min)= 7.50 17.50
01128> Unit Hyd. peak (cms)= .15 .06
01129>
01130> PEAK FLOW (cms)= .36 .01 *TOTALS*
01131> TIME TO PEAK (hrs)= 1.04 1.25 1.042 (iii)
01132> RUNOFF VOLUME (mm)= 40.94 14.70 36.745
01133> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01134> RUNOFF COEFFICIENT = .96 .35 .864
01135>
01136> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01137> CN* = 81.0 Ia = Dep. Storage (Above)
01138> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01139> THAN THE STORAGE COEFFICIENT.
01140> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01141>
01142>
01143> 001:0005-----
01144> *
01145> * SUB-AREA No.2
01146>
01147> | CALIB STANDHYD | Area (ha)= 1.54
01148> | O2:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
01149>
01150> IMPERVIOUS PERVIOUS (i)
01151> Surface Area (ha)= 1.42 .12
01152> Dep. Storage (mm)= 1.57 4.67
01153> Average Slope (%)= .50 1.00
01154> Length (m)= 244.34 5.00
01155> Mannings n = .030 .030
01156>
01157> Max.eff.Inten.(mm/hr)= 104.19 31.02
01158> over (min) = 7.50 10.00
01159> Storage Coeff. (min)= 8.73 (ii) 9.85 (ii)
01160> Unit Hyd. Tpeak (min)= 7.50 10.00
01161> Unit Hyd. peak (cms)= .14 .11
01162>
01163> PEAK FLOW (cms)= .28 .01 *TOTALS*
01164> TIME TO PEAK (hrs)= 1.04 1.13 1.042 (iii)
01165> RUNOFF VOLUME (mm)= 40.94 14.70 38.845
01166> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01167> RUNOFF COEFFICIENT = .96 .35 .914
01168>
01169> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01170> CN* = 81.0 Ia = Dep. Storage (Above)
01171> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01172> THAN THE STORAGE COEFFICIENT.
01173> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01174>
01175>
01176> 001:0006-----
01177> *
01178> * SUB-AREA No.3
01179>
01180> | CALIB STANDHYD | Area (ha)= 1.40
01181> | O3:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01182>
01183> IMPERVIOUS PERVIOUS (i)
01184> Surface Area (ha)= 1.36 .04
01185> Dep. Storage (mm)= 1.57 4.67
01186> Average Slope (%)= .51 1.00
01187> Length (m)= 225.63 5.00
01188> Mannings n = .030 .030
01189>
01190> Max.eff.Inten.(mm/hr)= 104.19 31.02
01191> over (min) = 7.50 10.00
01192> Storage Coeff. (min)= 8.28 (ii) 9.39 (ii)
01193> Unit Hyd. Tpeak (min)= 7.50 10.00
01194> Unit Hyd. peak (cms)= .14 .12
01195>
01196> PEAK FLOW (cms)= .27 .00 *TOTALS*
01197> TIME TO PEAK (hrs)= 1.04 1.13 1.042 (iii)
01198> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01199> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01200> RUNOFF COEFFICIENT = .96 .35 .945
01201>
01202> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01203> CN* = 81.0 Ia = Dep. Storage (Above)
01204> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01205> THAN THE STORAGE COEFFICIENT.
01206> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01207>
01208>
01209> 001:0007-----
01210> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01211> (ha) (cms) (hrs) (mm) (cms)
01212> ID1 01:010 2.07 .362 1.04 36.75 .000
01213> +ID2 02:020 1.54 .283 1.04 38.84 .000
01214>
01215>

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01216> SUM 04:040 3.61 .645 1.04 37.64 .000
01217>
01218> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01219>
01220>
01221> 001:0008-----
01222> | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01223> (ha) (cms) (hrs) (mm) (cms)
01224> ID1 03:030 1.40 .274 1.04 40.16 .000
01225> +ID2 04:040 3.61 .645 1.04 37.64 .000
01226>
01227> SUM 05:050 5.01 .918 1.04 38.34 .000
01228>
01229> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01230>
01231>
01232>
01233> 001:0009-----
01234> *
01235> * SUB-AREA No.4
01236>
01237> | CALIB STANDHYD | Area (ha)= .89
01238> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01239>
01240> IMPERVIOUS PERVIOUS (i)
01241> Surface Area (ha)= 1.84 .03
01242> Dep. Storage (mm)= 1.57 4.67
01243> Average Slope (%)= .93 .70
01244> Length (m)= 164.82 40.00
01245> Mannings n = .030 .250
01246>
01247> Max.eff.Inten.(mm/hr)= 104.19 20.32
01248> over (min) = 5.00 25.00
01249> Storage Coeff. (min)= 5.72 (ii) 24.02 (ii)
01250> Unit Hyd. Tpeak (min)= 5.00 25.00
01251> Unit Hyd. peak (cms)= .20 .05
01252>
01253> PEAK FLOW (cms)= .20 .00 *TOTALS*
01254> TIME TO PEAK (hrs)= 1.00 1.38 1.000
01255> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01256> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01257> RUNOFF COEFFICIENT = .96 .35 .945
01258>
01259> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01260> CN* = 81.0 Ia = Dep. Storage (Above)
01261> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01262> THAN THE STORAGE COEFFICIENT.
01263> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01264>
01265>
01266> 001:0010-----
01267> *
01268> * SUB-AREA No.5
01269>
01270> | CALIB STANDHYD | Area (ha)= 2.66
01271> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01272>
01273> IMPERVIOUS PERVIOUS (i)
01274> Surface Area (ha)= 2.58 .08
01275> Dep. Storage (mm)= 1.57 4.67
01276> Average Slope (%)= .51 1.50
01277> Length (m)= 207.25 20.00
01278> Mannings n = .030 .250
01279>
01280> Max.eff.Inten.(mm/hr)= 104.19 24.26
01281> over (min) = 7.50 17.50
01282> Storage Coeff. (min)= 7.45 (ii) 16.40 (ii)
01283> Unit Hyd. Tpeak (min)= 7.50 17.50
01284> Unit Hyd. peak (cms)= .15 .07
01285>
01286> PEAK FLOW (cms)= .54 .00 *TOTALS*
01287> TIME TO PEAK (hrs)= 1.04 1.25 1.042 (iii)
01288> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01289> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01290> RUNOFF COEFFICIENT = .96 .35 .945
01291>
01292> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01293> CN* = 81.0 Ia = Dep. Storage (Above)
01294> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01295> THAN THE STORAGE COEFFICIENT.
01296> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01297>
01298>
01299> 001:0011-----
01300> | ADD HYD (080 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01301> (ha) (cms) (hrs) (mm) (cms)
01302> ID1 06:060 .89 .205 1.00 40.16 .000
01303> +ID2 07:070 2.66 .538 1.04 40.16 .000
01304>
01305> SUM 08:080 3.55 .733 1.04 40.16 .000
01306>
01307> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01308>
01309>
01310>
01311> 001:0012-----
01312> | ADD HYD (090 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01313> (ha) (cms) (hrs) (mm) (cms)
01314> ID1 05:050 5.01 .918 1.04 38.34 .000
01315> +ID2 06:060 .017 3.55 .733 1.04 40.16 .000
01316>
01317> SUM 09:090 8.56 1.651 1.04 39.10 .000
01318>
01319> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01320>
01321>
01322>
01323> 001:0013-----
01324> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01325> | IN:09: (090 ) |
01326> | OUT:10: (POND ) |
01327>
01328> ===== OUTFLOW STORAGE TABLE =====
01329> OUTFLOW STORAGE | OUTFLOW STORAGE
01330> (cms) (ha.m.) | (cms) (ha.m.)
01331> .000 .0000E+00 | .593 .625E+00
01332> .008 .650E-01 | .654 .663E+00
01333> .017 .131E+00 | .797 .739E+00
01334> .093 .283E+00 | .950 .827E+00
01335> .233 .397E+00 | 1.304 .915E+00
01336> .337 .473E+00 | 1.880 .1004E+01
01337> .465 .549E+00 | 2.577 .1092E+01
01338> .531 .587E+00 | .000 .0000E+00
01339>
01340> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01341> (ha) (cms) (hrs) (mm)
01342> INFLOW >09: (090 ) 8.56 1.651 1.042 39.096
01343> OUTFLOW<10: (POND ) 8.56 .089 2.625 39.093
01344>
01345> PEAK FLOW REDUCTION [Qout/<in] (%) = 5.413
01346> TIME SHIFT OF PEAK FLOW (min) = 95.00
01347> MAXIMUM STORAGE USED (ha.m.) = 2758E+00
01348>
01349> 001:0014-----
01350>

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01351> * Remaining Hawthorne Industrial Park *

01352> *****

01353> * SUB-AREA No.1

01354> | CALIB STANDHYD | Area (ha)= 19.90

01355> | 01:H1P01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

01358> IMPERVIOUS PERVIOUS (i)

01360> Surface Area (ha)= 14.13 5.77

01361> Dep. Storage (mm)= 1.57 4.67

01362> Average Slope (%)= .60 1.50

01363> Length (m)= 580.00 100.00

01364> Mannings n = .030 .250

01365> Max.eff.Inten.(mm/hr)= 80.14 42.65

01366> over (min)= 15.00 35.00

01367> Storage Coeff. (min)= 15.43 (ii) 34.18 (ii)

01368> Unit Hyd. Tpeak (min)= 15.00 35.00

01370> Unit Hyd. peak (cms)= .07 .03

01371> *TOTALS*

01372> PEAK FLOW (cms)= 1.41 1.40 1.572 (iii)

01373> TIME TO PEAK (hrs)= 1.17 1.54 1.208

01374> RUNOFF VOLUME (mm)= 40.94 21.31 31.126

01375> TOTAL RAINFALL (mm)= 42.51 42.51 42.514

01376> RUNOFF COEFFICIENT = .96 .50 .732

01377> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

01378> CN* = 81.0 Ia = Dep. Storage (Above)

01380> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01381> THAN THE STORAGE COEFFICIENT.

01382> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01383> *****

01384> 001:0015-----

01385> | ADD HYD (HIP02) | ID: NHYD AREA OPEAK TPEAK R.V. DWF

01386> | (ha) (cms) (hrs) (mm) (cms) (cms)

01387> ID1 10:POND 8.56 .089 2.63 39.09 .000

01388> +ID2 01:H1P01 19.90 1.572 1.21 31.13 .000

01391> SUM 02:H1P02 28.46 1.615 1.21 33.52 .000

01392> *****

01393> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01394> *****

01395> 001:0016-----

01396> * SUB-AREA No.2

01400> | CALIB STANDHYD | Area (ha)= 17.00

01401> | 03:H1P03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

01403> IMPERVIOUS PERVIOUS (i)

01404> Surface Area (ha)= 12.07 4.93

01405> Dep. Storage (mm)= 1.57 4.67

01406> Average Slope (%)= .65 1.50

01407> Length (m)= 450.00 100.00

01408> Mannings n = .030 .250

01409> Max.eff.Inten.(mm/hr)= 89.76 47.48

01410> over (min)= 12.50 30.00

01411> Storage Coeff. (min)= 12.36 (ii) 30.32 (ii)

01412> Unit Hyd. Tpeak (min)= 12.50 30.00

01413> Unit Hyd. peak (cms)= .09 .04

01414> *TOTALS*

01415> PEAK FLOW (cms)= 1.36 .37 1.504 (iii)

01416> TIME TO PEAK (hrs)= 1.13 1.46 1.167

01417> RUNOFF VOLUME (mm)= 49.94 21.31 31.126

01418> TOTAL RAINFALL (mm)= 42.51 42.51 42.514

01419> RUNOFF COEFFICIENT = .96 .50 .732

01420> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

01421> CN* = 81.0 Ia = Dep. Storage (Above)

01422> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01423> THAN THE STORAGE COEFFICIENT.

01424> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01425> *****

01426> 001:0017-----

01427> * SUB-AREA No.3

01430> | CALIB STANDHYD | Area (ha)= 19.10

01431> | 04:H1P04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

01433> IMPERVIOUS PERVIOUS (i)

01434> Surface Area (ha)= 12.85 5.25

01435> Dep. Storage (mm)= 1.57 4.67

01436> Average Slope (%)= .50 1.50

01437> Length (m)= 600.00 100.00

01438> Mannings n = .030 .250

01439> Max.eff.Inten.(mm/hr)= 73.27 42.65

01440> over (min)= 17.50 35.00

01441> Storage Coeff. (min)= 17.24 (ii) 35.98 (ii)

01442> Unit Hyd. Tpeak (min)= 17.50 35.00

01443> Unit Hyd. peak (cms)= .07 .03

01444> *TOTALS*

01445> PEAK FLOW (cms)= 1.19 .35 1.364 (iii)

01446> TIME TO PEAK (hrs)= 1.21 1.54 1.250

01447> RUNOFF VOLUME (mm)= 40.94 21.31 31.126

01448> TOTAL RAINFALL (mm)= 42.51 42.51 42.514

01449> RUNOFF COEFFICIENT = .96 .50 .732

01450> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

01451> CN* = 81.0 Ia = Dep. Storage (Above)

01452> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01453> THAN THE STORAGE COEFFICIENT.

01454> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01455> *****

01456> 001:0018-----

01457> | ADD HYD (HIP05) | ID: NHYD AREA OPEAK TPEAK R.V. DWF

01458> | (ha) (cms) (hrs) (mm) (cms) (cms)

01459> ID1 03:H1P03 17.00 1.504 1.17 31.13 .000

01460> +ID2 04:H1P04 18.10 1.364 1.25 31.13 .000

01461> SUM 05:H1P05 35.10 2.800 1.17 31.13 .000

01462> *****

01463> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01464> *****

01465> 001:0019-----

01466> * SUB-AREA No.4

01470> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00

01471> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.570 # of Linear Res. (N)= 3.00

01472> U.H. Tp(hrs)= .170

01473> Unit Hyd Qpeak (cms)= .899

01474> PEAK FLOW (cms)= .260 (i)

01486> TIME TO PEAK (hrs)= 1.167

01487> RUNOFF VOLUME (mm)= 17.325

01488> TOTAL RAINFALL (mm)= 42.514

01489> RUNOFF COEFFICIENT = .408

01490> *****

01491> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01492> *****

01493> 001:0020-----

01494> | ADD HYD (HIP06) | ID: NHYD AREA OPEAK TPEAK R.V. DWF

01495> | (ha) (cms) (hrs) (mm) (cms) (cms)

01496> ID1 02:H1P02 28.46 1.615 1.21 33.52 .000

01497> +ID2 05:H1P05 35.10 2.800 1.17 31.13 .000

01498> +ID3 06:Pond-B 4.00 .260 1.17 17.32 .000

01500> SUM 07:H1P06 67.56 4.661 1.17 31.32 .000

01503> *****

01504> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01505> *****

01506> 001:0021-----

01507> * SUB-AREA No. 5

01510> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00

01511> | 10:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00

01512> U.H. Tp(hrs)= .370

01513> Unit Hyd Qpeak (cms)= .702

01514> PEAK FLOW (cms)= .187 (i)

01515> TIME TO PEAK (hrs)= 1.458

01516> RUNOFF VOLUME (mm)= 12.131

01517> TOTAL RAINFALL (mm)= 42.514

01518> RUNOFF COEFFICIENT = .285

01519> *****

01520> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01521> *****

01522> 001:0022-----

01523> * SUB-AREA No 4

01528> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00

01529> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00

01530> U.H. Tp(hrs)= .804

01531> Unit Hyd Qpeak (cms)= .252

01532> PEAK FLOW (cms)= .086 (i)

01533> TIME TO PEAK (hrs)= 2.042

01534> RUNOFF VOLUME (mm)= 12.131

01535> TOTAL RAINFALL (mm)= 42.514

01536> RUNOFF COEFFICIENT = .285

01537> *****

01538> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01539> *****

01540> 001:0023-----

01541> | ADD HYD (0020) | ID: NHYD AREA OPEAK TPEAK R.V. DWF

01542> | (ha) (cms) (hrs) (mm) (cms) (cms)

01543> ID1 07:H1P06 67.56 4.661 1.17 31.32 .000

01544> +ID2 10:A2 6.80 .187 1.46 12.13 .000

01545> +ID3 01:A3 5.30 .086 2.04 12.13 .000

01546> SUM 02:0020 79.66 4.812 1.21 28.40 .000

01547> *****

01548> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01549> *****

01550> 001:0024-----

01551> * CALCULATION OF 3HR - 1:10 YEAR STORM EVENT

01552> *****

01553> | START | Project dir.: V:\20983.DU\ENG\3RDSUB-1\SWHYMO\

01554> | METOUT= .00 hrs on 0 Rainfall dir.: V:\20983.DU\ENG\3RDSUB-1\SWHYMO\

01555> METOUT= 2 (output= METRIC)

01556> NRUN= 001

01557> NSTORM= 0

01558> *****

01559> 001:0002-----

01560> | CHICAGO STORM | IDF curve parameters: A=1174.184

01561> | Ptotal= 49.50 mm | B= 6.014

01562> C= .816

01563> used in: INTENSITY= A / (t + B)^C

01564> Duration of storm = 3.00 hrs

01565> Storm time step = 10.00 min

01566> Time to peak ratio = .33

01567> *****

01568> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN

01569> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr

01570> .17 4.248 | 1.00 122.142 | 1.83 7.733 | 2.67 4.049

01571> .33 5.290 | 1.17 37.285 | 2.00 6.502 | 2.83 3.714

01572> .50 7.108 | 1.33 18.954 | 2.17 5.625 | 3.00 3.434

01573> .67 11.130 | 1.50 12.700 | 2.33 4.969 |

01574> .83 28.100 | 1.67 9.588 | 2.50 4.458 |

01575> *****

01576> 001:0003-----

01577> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\3RDSUB-1\SWHYMO\ORGA.VAL

01578> | ICASEdv = 1 (read and print data)

01579> FileTitle= ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE

01580> PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60

01581> Horton's infiltration equation parameters:

01582> [F= 50.00 mm/hr] [F= 7.50 mm/hr] [ICAY= 2.00 /hr] [F= .00 mm]

01583> Parameters for PERVIOUS surfaces in STANDHYD:

01584> [IAper= 4.67 mm] [LGP=40.00 m] [MNP= .250]

01585> Parameters for IMPERVIOUS surfaces in STANDHYD:

01586> [IAimp= 1.57 mm] [CLI= 1.50] [MNI= .035]

01587> Parameters used in NASHYD:

01588> [Ia= 4.67 mm] [N= 3.00]

01589> *****

01590> 001:0004-----

01591> * SUB-AREA No.1

01595> | CALIB STANDHYD | Area (ha)= 2.07

01596> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00

01598> IMPERVIOUS PERVIOUS (i)

01599> Surface Area (ha)= 1.74 .33

01600> Dep. Storage (mm)= 1.57 4.67

01601> Average Slope (%)= .52 1.00

01602> Length (m)= 204.12 20.00

01603> Mannings n = .030 .250

01604> Max.eff.Inten.(mm/hr)= 122.14 34.69

01605> over (min)= 7.50 15.00

01621> Storage Coeff. (min)= 7.28 (ii) 16.04 (ii)
01622> Unit Hyd. Tpeak (min)= 7.50 15.00
01623> Unit Hyd. peak (cms)= .15 .07
01624> *TOTALS*
01625> PEAK FLOW (cms)= .43 .02 .437 (iii)
01626> TIME TO PEAK (hrs)= 1.04 1.21 1.042
01627> RUNOFF VOLUME (mm)= 47.93 19.25 43.345
01628> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01629> RUNOFF COEFFICIENT = .97 .39 .976
01630>
01631> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01632> CN* = 81.0 Ia = Dep. Storage (Above)
01633> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01634> THAN THE STORAGE COEFFICIENT.
01635> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01636>
01637>
01638> 001:0005-----
01639> * SUB-AREA No.2
01640>
01641> | CALIB STANDHYD | Area (ha)= 1.54
01642> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
01643>-----
01644> IMPERVIOUS PERVIOUS (i)
01645> Surface Area (ha)= 1.42 .12
01646> Dep. Storage (mm)= 1.57 4.67
01647> Average Slope (%)= .50 1.00
01648> Length (m)= 244.14 5.00
01649> Mannings n = .030 .030
01650>
01651> Max.eff.Inten.(mm/hr)= 122.14 42.32
01652> over (min)= 7.50 10.00
01653> Storage Coeff. (min)= 8.20 (ii) 9.19 (ii)
01654> Unit Hyd. Tpeak (min)= 7.50 10.00
01655> Unit Hyd. peak (cms)= .14 .12
01656> *TOTALS*
01657> PEAK FLOW (cms)= .33 .01 .341 (iii)
01658> TIME TO PEAK (hrs)= 1.04 1.13 1.042 (iii)
01659> RUNOFF VOLUME (mm)= 47.93 19.25 45.640
01660> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01661> RUNOFF COEFFICIENT = .97 .39 .922
01662>
01663> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01664> CN* = 81.0 Ia = Dep. Storage (Above)
01665> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01666> THAN THE STORAGE COEFFICIENT.
01667> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01668>
01669>
01670> 001:0006-----
01671> * SUB-AREA No.3
01672>
01673> | CALIB STANDHYD | Area (ha)= 1.40
01674> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01675>-----
01676> IMPERVIOUS PERVIOUS (i)
01677> Surface Area (ha)= 1.36 .04
01678> Dep. Storage (mm)= 1.57 4.67
01679> Average Slope (%)= .51 1.00
01680> Length (m)= 225.63 5.00
01681> Mannings n = .030 .030
01682>
01683> Max.eff.Inten.(mm/hr)= 122.14 48.18
01684> over (min)= 7.50 7.50
01685> Storage Coeff. (min)= 7.77 (ii) 8.70 (ii)
01686> Unit Hyd. Tpeak (min)= 7.50 7.50
01687> Unit Hyd. peak (cms)= .15 .14
01688> *TOTALS*
01689> PEAK FLOW (cms)= .33 .00 .329 (iii)
01690> TIME TO PEAK (hrs)= 1.04 1.08 1.042
01691> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01692> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01693> RUNOFF COEFFICIENT = .97 .39 .951
01694>
01695> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01696> CN* = 81.0 Ia = Dep. Storage (Above)
01697> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01698> THAN THE STORAGE COEFFICIENT.
01699> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01700>
01701>
01702> 001:0007-----
01703> * SUB-AREA No.4
01704>
01705> | ADD HYD (040) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01706> | 01:010 (ha) (cms) (hrs) (mm) (cms)
01707> +ID2 04:040 2.07 .437 1.04 43.35 .000
01708>-----
01709> SUM 04:040 3.61 .778 1.04 44.32 .000
01710>
01711> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01712>
01713> 001:0008-----
01714> | ADD HYD (050) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01715> | 01:010 (ha) (cms) (hrs) (mm) (cms)
01716> +ID2 04:040 1.40 .329 1.04 47.07 .000
01717> +ID2 04:040 3.61 .778 1.04 44.32 .000
01718>-----
01719> SUM 05:050 5.01 1.107 1.04 45.09 .000
01720>
01721> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01722>
01723> 001:0009-----
01724> * SUB-AREA No.4
01725>
01726> | CALIB STANDHYD | Area (ha)= .89
01727> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01728>-----
01729> IMPERVIOUS PERVIOUS (i)
01730> Surface Area (ha)= .86 .03
01731> Dep. Storage (mm)= 1.57 4.67
01732> Average Slope (%)= .93 .70
01733> Length (m)= 166.82 40.00
01734> Mannings n = .030 .250
01735>
01736> Max.eff.Inten.(mm/hr)= 122.14 31.19
01737> over (min)= 5.00 20.00
01738> Storage Coeff. (min)= 5.37 (ii) 20.78 (ii)
01739> Unit Hyd. Tpeak (min)= 5.00 20.00
01740> Unit Hyd. peak (cms)= .21 .06
01741> *TOTALS*
01742> PEAK FLOW (cms)= .24 .00 .245 (iii)
01743> TIME TO PEAK (hrs)= 1.00 1.29 1.000
01744> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01745> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01746> RUNOFF COEFFICIENT = .97 .39 .951
01747>
01748> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01749> CN* = 81.0 Ia = Dep. Storage (Above)
01750> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01751> THAN THE STORAGE COEFFICIENT.
01752> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01753>
01754>
01755>

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01756>
01757>
01758>
01759>
01760>
01761> 001:0010-----
01762> * SUB-AREA No.5
01763>
01764> | CALIB STANDHYD | Area (ha)= 2.66
01765> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01766>-----
01767> IMPERVIOUS PERVIOUS (i)
01768> Surface Area (ha)= 2.56 .08
01769> Dep. Storage (mm)= 1.57 4.67
01770> Average Slope (%)= .61 1.50
01771> Length (m)= 207.25 20.00
01772> Mannings n = .030 .250
01773>
01774> Max.eff.Inten.(mm/hr)= 122.14 34.69
01775> over (min)= 7.50 15.00
01776> Storage Coeff. (min)= 7.00 (ii) 14.75 (ii)
01777> Unit Hyd. Tpeak (min)= 7.50 15.00
01778> Unit Hyd. peak (cms)= .16 .08
01779> *TOTALS*
01780> PEAK FLOW (cms)= .64 .00 .645 (iii)
01781> TIME TO PEAK (hrs)= 1.04 1.21 1.042
01782> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01783> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01784> RUNOFF COEFFICIENT = .97 .39 .951
01785>
01786> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01787> CN* = 81.0 Ia = Dep. Storage (Above)
01788> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01789> THAN THE STORAGE COEFFICIENT.
01790> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01791>
01792>
01793> 001:0011-----
01794> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01795> | 01:060 (ha) (cms) (hrs) (mm) (cms)
01796> +ID2 07:070 2.66 .645 1.04 47.07 .000
01797>-----
01798> SUM 08:080 3.55 .876 1.04 47.07 .000
01799>
01800> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01801>
01802> 001:0012-----
01803> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01804> | 01:050 (ha) (cms) (hrs) (mm) (cms)
01805> +ID2 08:080 3.55 .876 1.04 47.07 .000
01806>-----
01807> SUM 09:090 8.56 1.984 1.04 45.91 .000
01808>
01809> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01810>
01811> 001:0013-----
01812> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01813> | IN>09: (090) |
01814> | OUT<10: (POND) |
01815>-----
01816> OUTFLOW STORAGE TABLE
01817> OUTFLOW STORAGE | OUTFLOW STORAGE
01818> (cms) (ha.m.) | (cms) (ha.m.)
01819> 0.00 0.000E+00 | .593 6231E+00
01820> .008 6560E-01 | .654 6631E+00
01821> .017 1311E+00 | .797 7391E+00
01822> .093 2831E+00 | .950 8274E+00
01823> .233 3971E+00 | 1.304 9157E+00
01824> .337 4731E+00 | 1.880 100E+01
01825> .465 5491E+00 | 2.577 1092E+01
01826> .531 5871E+00 | .000 0.000E+00
01827>
01828> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01829> (ha) (cms) (hrs) (mm)
01830> INFLOW >09: (090) 8.56 1.984 1.042 45.914
01831> OUTFLOW <10: (POND) 8.56 .132 2.278 45.912
01832>
01833> PEAK FLOW REDUCTION [Qout/Qin] (%)= 6.640
01834> TIME SHIFT OF PEAK FLOW (min)= 74.17
01835> MAXIMUM STORAGE USED (ha.m.)= 3146E+00
01836>
01837> 001:0014-----
01838> * Remaining Hawthorne Industrial Park *
01839> * SUB-AREA No.1
01840>
01841> | CALIB STANDHYD | Area (ha)= 19.90
01842> | 01:H1P01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
01843>-----
01844> IMPERVIOUS PERVIOUS (i)
01845> Surface Area (ha)= 14.13 5.77
01846> Dep. Storage (mm)= 1.57 4.67
01847> Average Slope (%)= .60 1.50
01848> Length (m)= 580.00 100.00
01849> Mannings n = .030 .250
01850>
01851> Max.eff.Inten.(mm/hr)= 93.86 60.56
01852> over (min)= 15.00 30.00
01853> Storage Coeff. (min)= 14.48 (ii) 30.78 (ii)
01854> Unit Hyd. Tpeak (min)= 15.00 30.00
01855> Unit Hyd. peak (cms)= .08 .04
01856> *TOTALS*
01857> PEAK FLOW (cms)= 1.70 .55 1.983 (iii)
01858> TIME TO PEAK (hrs)= 1.17 1.46 1.208
01859> RUNOFF VOLUME (mm)= 47.93 26.92 37.426
01860> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01861> RUNOFF COEFFICIENT = .97 .54 .756
01862>
01863> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01864> CN* = 81.0 Ia = Dep. Storage (Above)
01865> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01866> THAN THE STORAGE COEFFICIENT.
01867> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01868>
01869>
01870> 001:0015-----
01871> | ADD HYD (H1P02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01872> | 10:POND (ha) (cms) (hrs) (mm) (cms)
01873> +ID2 01:H1P01 19.90 1.983 1.21 37.43 .000
01874>-----
01875> SUM 02:H1P02 28.46 2.044 1.21 39.98 .000
01876>
01877> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01878>
01879>
01880>

01891>-----
01892> 001:0016-----
01893> *
01894> * SUB-AREA No.2
01895>-----
01896> | CALIB STANDHYD | Area (ha)= 17.00
01897> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
01898>-----
01899> IMPERVIOUS PERVIOUS (i)
01900> Surface Area (ha)= 12.07 4.93
01901> Dep. Storage (mm)= 1.57 4.67
01902> Average Slope (%)= .65 1.50
01903> Length (m)= 450.00 100.00
01904> Mannings n = .030 .250
01905>-----
01906> Max.eff.Inten.(mm/hr)= 105.17 63.81
01907> over (min) 12.50 27.50
01908> Storage Coeff. (min)= 11.60 (ii) 27.56 (ii)
01909> Unit Hyd. Tpeak (min)= 12.50 27.50
01910> Unit Hyd. peak (cms)= .09 .04
01911>-----
01912> PEAK FLOW (cms)= 1.63 .51 *TOTALS*
01913> TIME TO PEAK (hrs)= 1.13 1.42 1.167
01914> RUNOFF VOLUME (mm)= 47.93 26.92 37.426
01915> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01916> RUNOFF COEFFICIENT = .97 .54 .756
01917>-----
01918> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01919> CN* = 81.0 Ia = Dep. Storage (Above)
01920> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01921> THAN THE STORAGE COEFFICIENT.
01922> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01923>-----
01924> 001:0017-----
01925> *
01926> * SUB-AREA No.3
01927>-----
01928> | CALIB STANDHYD | Area (ha)= 18.10
01929> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
01930>-----
01931> IMPERVIOUS PERVIOUS (i)
01932> Surface Area (ha)= 12.85 5.25
01933> Dep. Storage (mm)= 1.57 4.67
01934> Average Slope (%)= .50 1.50
01935> Length (m)= 600.00 100.00
01936> Mannings n = .030 .250
01937>-----
01938> Max.eff.Inten.(mm/hr)= 93.86 57.19
01939> over (min) 15.00 32.50
01940> Storage Coeff. (min)= 15.61 (ii) 32.28 (ii)
01941> Unit Hyd. Tpeak (min)= 15.00 32.50
01942> Unit Hyd. peak (cms)= .07 .03
01943>-----
01944> PEAK FLOW (cms)= 1.49 .48 *TOTALS*
01945> TIME TO PEAK (hrs)= 1.17 1.50 1.208 (iii)
01946> RUNOFF VOLUME (mm)= 47.93 26.92 37.426
01947> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01948> RUNOFF COEFFICIENT = .97 .54 .756
01949>-----
01950> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01951> CN* = 81.0 Ia = Dep. Storage (Above)
01952> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01953> THAN THE STORAGE COEFFICIENT.
01954> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01955>-----
01956> 001:0018-----
01957> *
01958> | ADD HYD (HIPO5) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01959> | (ha) (cms) (hrs) (mm) (cms)
01960> ID1 03:HIP03 17.00 1.865 1.17 37.43 .000
01961> +ID2 04:HIP04 18.10 1.723 1.21 37.43 .000
01962>-----
01963> SUM 05:HIPO5 35.10 3.572 1.17 37.43 .000
01964>-----
01965> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01966>-----
01967> 001:0019-----
01968> *
01969> * SUB-AREA No.4
01970>-----
01971> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
01972> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01973> | U.H. Tp(hrs)= .170
01974>-----
01975> Unit Hyd Qpeak (cms)= .899
01976>-----
01977> PEAK FLOW (cms)= .345 (i)
01978> TIME TO PEAK (hrs)= 1.167
01979> RUNOFF VOLUME (mm)= 22.420
01980> TOTAL RAINFALL (mm)= 49.505
01981> RUNOFF COEFFICIENT = .453
01982>-----
01983> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01984>-----
01985> 001:0020-----
01986> *
01987> | ADD HYD (HIPO6) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01988> | (ha) (cms) (hrs) (mm) (cms)
01989> ID1 02:HIP02 28.46 2.044 1.21 39.98 .000
01990> +ID2 05:HIP05 35.10 3.572 1.17 37.43 .000
01991> +ID3 06:Pond-B 4.00 .345 1.17 22.42 .000
01992>-----
01993> SUM 07:HIP06 67.56 5.939 1.17 37.61 .000
01994>-----
01995> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01996>-----
01997> 001:0021-----
01998> *
01999> * SUB-AREA No.5
02000>-----
02001> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00
02002> | 10:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02003> | U.H. Tp(hrs)= .370
02004>-----
02005> Unit Hyd Qpeak (cms)= .702
02006>-----
02007> PEAK FLOW (cms)= .252 (i)
02008> TIME TO PEAK (hrs)= 1.417
02009> RUNOFF VOLUME (mm)= 16.075
02010> TOTAL RAINFALL (mm)= 49.505
02011> RUNOFF COEFFICIENT = .325
02012>-----
02013> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02014>-----
02015> 001:0022-----
02016> *
02017> * SUB-AREA No.4
02018>-----
02019> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00
02020> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02021> | U.H. Tp(hrs)= .804

02026>-----
02027> Unit Hyd Qpeak (cms)= .252
02028>-----
02029> PEAK FLOW (cms)= .115 (i)
02030> TIME TO PEAK (hrs)= 2.000
02031> RUNOFF VOLUME (mm)= 16.075
02032> TOTAL RAINFALL (mm)= 49.505
02033> RUNOFF COEFFICIENT = .325
02034>-----
02035> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02036>-----
02037> 001:0023-----
02038> *
02039> | ADD HYD (0020) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02040> | (ha) (cms) (hrs) (mm) (cms)
02041> ID1 07:HIP06 67.56 5.939 1.17 37.61 .000
02042> +ID2 10:A2 6.80 .252 1.42 16.08 .000
02043> +ID3 01:A3 5.30 .115 2.00 16.08 .000
02044>-----
02045> SUM 02:0020 79.66 6.135 1.17 34.34 .000
02046>-----
02047> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02048>-----
02049> 001:0024-----
02050> *
02051> * CALCULATION OF 3HR - 1.25 YEAR STORM EVENT *
02052>-----
02053> 001:0025-----
02054> *
02055> | START | Project dir.: V:\20983.DU\ENG\3RDSUB-1\SWHYM\O
02056> | Rainfall dir.: V:\20983.DU\ENG\3RDSUB-1\SWHYM\O
02057>-----
02058> TZERO = .00 hrs on 0
02059> METOUT= 2 (output = METRIC)
02060> NRUN = 001
02061> NSTORM= 0
02062>-----
02063> 001:0002-----
02064> | CHICAGO STORM | IDF curve parameters: A=1402.884
02065> | Total= 58.23 mm | B= 6.018
02066> C= .819
02067> used in: INTENSITY = A / (t + B)^C
02068>-----
02069> Duration of storm = 3.00 hrs
02070> Storm time step = 10.00 min
02071> Time to peak ratio = .33
02072>-----
02073> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02074> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02075> .17 4.934 | 1.00 144.693 | 1.83 9.014 | 2.67 4.701
02076> .33 6.152 | 1.17 43.904 | 2.00 7.571 | 2.83 4.310
02077> .50 8.282 | 1.33 22.224 | 2.17 6.544 | 3.00 3.983
02078> .67 13.006 | 1.50 14.852 | 2.33 5.776 |
02079> .83 33.041 | 1.67 11.192 | 2.50 5.179 |
02080>-----
02081> 001:0003-----
02082> *
02083> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\3RDSUB-1\SWHYM\ORGA.VAL
02084> | ICRSIZ= 1 (read and print data)
02085> FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ----
02086> ----- PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 ----
02087>-----
02088> Horton's infiltration equation parameters:
02089> [P= 50.00 mm/hr] [T= 7.50 mm/hr] [DCA= 2.00 /hr] [F= .00 mm]
02090> Parameters for IMPERVIOUS surfaces in STANDHYD:
02091> [IAPER= 4.67 mm] [LGP=40.00 m] [MNP= .250]
02092> Parameters for IMPERVIOUS surfaces in STANDHYD:
02093> [IIRIMP= 1.57 mm] [CLI= 1.50] [MNI= .035]
02094> Parameters used in NASHYD:
02095> [Ia= 4.67 mm] [N= 3.00]
02096>-----
02097> 001:0004-----
02098> *
02099> * ORGAROLD FILE
02100>-----
02101> * SUB-AREA No.1
02102>-----
02103> | CALIB STANDHYD | Area (ha)= 2.07
02104> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
02105>-----
02106> IMPERVIOUS PERVIOUS (i)
02107> Surface Area (ha)= 1.74 .33
02108> Dep. Storage (mm)= 1.57 4.67
02109> Average Slope (%)= .52 1.00
02110> Length (m)= 204.72 20.00
02111> Mannings n = .030 .250
02112>-----
02113> Max.eff.Inten.(mm/hr)= 144.69 47.07
02114> over (min) 7.50 15.00
02115> Storage Coeff. (min)= 6.81 (ii) 14.56 (ii)
02116> Unit Hyd. Tpeak (min)= 7.50 15.00
02117> Unit Hyd. peak (cms)= .16 .08
02118>-----
02119> PEAK FLOW (cms)= .52 .03 *TOTALS*
02120> TIME TO PEAK (hrs)= 1.04 1.21 1.042
02121> RUNOFF VOLUME (mm)= 56.66 25.35 51.647
02122> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02123> RUNOFF COEFFICIENT = .97 .44 .887
02124>-----
02125> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02126> CN* = 81.0 Ia = Dep. Storage (Above)
02127> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02128> THAN THE STORAGE COEFFICIENT.
02129> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02130>-----
02131> 001:0005-----
02132> *
02133> * SUB-AREA No.2
02134>-----
02135> | CALIB STANDHYD | Area (ha)= 1.54
02136> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
02137>-----
02138> IMPERVIOUS PERVIOUS (i)
02139> Surface Area (ha)= 1.42
02140> Dep. Storage (mm)= 1.57 4.67
02141> Average Slope (%)= .50 1.00
02142> Length (m)= 244.34 5.00
02143> Mannings n = .030 .030
02144>-----
02145> Max.eff.Inten.(mm/hr)= 144.69 65.19
02146> over (min) 7.50 7.50
02147> Storage Coeff. (min)= 7.66 (ii) 8.49 (ii)
02148> Unit Hyd. Tpeak (min)= 7.50 7.50
02149> Unit Hyd. peak (cms)= .15 .14
02150>-----
02151> PEAK FLOW (cms)= .40 .01 *TOTALS*
02152> TIME TO PEAK (hrs)= 1.04 1.08 .418 (iii)
02153> RUNOFF VOLUME (mm)= 56.66 25.35 54.152
02154> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02155> RUNOFF COEFFICIENT = .97 .44 .930
02156>-----
02157> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02158> CN* = 81.0 Ia = Dep. Storage (Above)

02161> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 02162> THAN THE STORAGE COEFFICIENT.
 02163> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 02164>
 02165>
 02166> 001:0006-----
 02167> * SUB-AREA No.3
 02169> | CALIB STANDHYD | Area (ha)= 1.40
 02170> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
 02172> IMPERVIOUS PERVIOUS (i)
 02173> Surface Area (ha)= 1.36 .04
 02175> Dep. Storage (mm)= 1.57 4.67
 02176> Average Slope (%)= .51 1.00
 02177> Length (m)= 225.63 5.00
 02178> Mannings n = .030 .030
 02179>
 02180> Max. eff. Inten. (mm/hr)= 144.69 65.19
 02181> over (min) 7.50 7.50
 02182> Storage Coeff. (min)= 7.26 (ii) 8.09 (iii)
 02183> Unit Hyd. Tpeak (min)= 7.50 7.50
 02184> Unit Hyd. peak (cms)= .15 .14
 02185>
 02186> PEAK FLOW (cms)= .40 .00 *TOTALS*
 02187> TIME TO PEAK (hrs)= 1.04 1.08 4.00 (iii)
 02188> RUNOFF VOLUME (mm)= 56.66 25.35 55.717
 02189> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
 02190> RUNOFF COEFFICIENT = .97 .44 .957
 02191>
 02192> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 02193> CN* = 81.0 Ia = Dep. Storage (Above)
 02194> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 02195> THAN THE STORAGE COEFFICIENT.
 02196> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 02197>
 02198> 001:0007-----
 02200>
 02201> | ADD HYD (040) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 02202> (ha) (cms) (hrs) (mm) (cms)
 02203> ID1 01:010 2.07 .532 1.04 51.65 .000
 02204> +ID2 02:020 1.54 .418 1.04 54.15 .000
 02205> =====
 02206> SUM 04:040 3.61 .950 1.04 52.72 .000
 02207>
 02208> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 02209>
 02210> 001:0008-----
 02212> | ADD HYD (050) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 02213> (ha) (cms) (hrs) (mm) (cms)
 02215> ID1 03:030 1.40 .400 1.04 55.72 .000
 02216> +ID2 04:040 3.61 .950 1.04 52.72 .000
 02217> =====
 02218> SUM 05:050 5.01 1.350 1.04 53.55 .000
 02219>
 02220> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 02221>
 02222> 001:0009-----
 02224> * SUB-AREA No.4
 02226> | CALIB STANDHYD | Area (ha)= .89
 02227> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
 02229> IMPERVIOUS PERVIOUS (i)
 02231> Surface Area (ha)= .86 .03
 02232> Dep. Storage (mm)= 1.57 4.67
 02233> Average Slope (%)= .93 .70
 02234> Length (m)= 164.82 40.00
 02235> Mannings n = .030 .250
 02236>
 02237> Max. eff. Inten. (mm/hr)= 144.69 44.12
 02238> over (min) 5.00 17.50
 02239> Storage Coeff. (min)= 5.02 (ii) 18.44 (iii)
 02240> Unit Hyd. Tpeak (min)= 5.00 17.50
 02241> Unit Hyd. peak (cms)= .22 .06
 02242>
 02243> PEAK FLOW (cms)= .30 .00 *TOTALS*
 02244> TIME TO PEAK (hrs)= 1.00 1.25 2.96 (iii)
 02245> RUNOFF VOLUME (mm)= 56.66 25.35 55.717
 02246> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
 02247> RUNOFF COEFFICIENT = .97 .44 .957
 02248>
 02249> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 02250> CN* = 81.0 Ia = Dep. Storage (Above)
 02251> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 02252> THAN THE STORAGE COEFFICIENT.
 02253> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 02254>
 02255> 001:0010-----
 02257> * SUB-AREA No.5
 02259> | CALIB STANDHYD | Area (ha)= 2.66
 02260> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
 02262> IMPERVIOUS PERVIOUS (i)
 02263> Surface Area (ha)= 2.58 .08
 02264> Dep. Storage (mm)= 1.57 4.67
 02266> Average Slope (%)= .61 1.50
 02267> Length (m)= 207.25 20.00
 02268> Mannings n = .030 .250
 02269>
 02270> Max. eff. Inten. (mm/hr)= 144.69 51.33
 02271> over (min) 7.50 12.50
 02272> Storage Coeff. (min)= 6.54 (ii) 13.16 (ii)
 02273> Unit Hyd. Tpeak (min)= 7.50 12.50
 02274> Unit Hyd. peak (cms)= .16 .09
 02275>
 02276> PEAK FLOW (cms)= .78 .01 *TOTALS*
 02277> TIME TO PEAK (hrs)= 1.04 1.17 1.042
 02278> RUNOFF VOLUME (mm)= 56.66 25.35 55.717
 02279> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
 02280> RUNOFF COEFFICIENT = .97 .44 .957
 02281>
 02282> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 02283> CN* = 81.0 Ia = Dep. Storage (Above)
 02284> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 02285> THAN THE STORAGE COEFFICIENT.
 02286> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 02287>
 02288> 001:0011-----
 02290> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 02291> (ha) (cms) (hrs) (mm) (cms)
 02292> ID1 06:060 .89 .296 1.00 55.72 .000
 02293> +ID2 07:070 2.66 .783 1.04 55.72 .000
 02294> =====
 02295> SUM 08:080 3.55 1.060 1.04 55.72 .000

02296> SUM 08:080 3.55 1.060 1.04 55.72 .000
 02297>
 02298> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 02299>
 02300> 001:0012-----
 02302> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 02303> (ha) (cms) (hrs) (mm) (cms)
 02304> ID1 05:050 5.01 1.350 1.04 53.55 .000
 02305> +ID2 08:080 3.55 1.060 1.04 55.72 .000
 02307> =====
 02308> SUM 09:090 8.56 2.410 1.04 54.45 .000
 02309>
 02310> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 02311>
 02312> 001:0013-----
 02314> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
 02315> | IN>09: (090) |
 02317> | OUT<10: (POND) |
 02318> =====
 02319> | OUTFLOW STORAGE TABLE |
 02320> | OUTFLOW STORAGE | OUTFLOW STORAGE |
 02321> (cms) (ha.m.) (cms) (ha.m.)
 02322> .000 .000E+00 | .593 .6251E+00
 02323> .008 .650E-01 | .654 .6831E+00
 02324> .017 .1311E+00 | .797 .7931E+00
 02325> .093 .2831E+00 | .950 .8274E+00
 02326> .233 .3971E+00 | 1.304 .9157E+00
 02327> .337 .4731E+00 | 1.880 .1004E+01
 02328> .465 .5491E+00 | 2.577 .1092E+01
 02329> .531 .5871E+00 | .000 .0000E+00
 02330>
 02331> ROUTING RESULTS AREA QPEAK TPEAK R.V.
 02332> TIME SHIFT OF PEAK FLOW (min)= 60.83
 02333> INFLOW >09: (090) 8.56 2.410 1.042 54.451
 02334> OUTFLOW<10: (POND) 8.56 .189 2.056 54.449
 02335>
 02336> PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.838
 02337> TIME SHIFT OF PEAK FLOW (min)= 60.83
 02338> MAXIMUM STORAGE USED (ha.m.) = .3612E+00
 02339> 001:0014-----
 02341> * Remaining Hawthorne Industrial Park *
 02342> * SUB-AREA No.1
 02344> | CALIB STANDHYD | Area (ha)= 19.90
 02345> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 02347> IMPERVIOUS PERVIOUS (i)
 02348> Surface Area (ha)= 14.13 5.77
 02349> Dep. Storage (mm)= 1.57 4.67
 02350> Average Slope (%)= .60 1.50
 02351> Length (m)= 580.00 100.00
 02352> Mannings n = .030 .250
 02353>
 02354> Max. eff. Inten. (mm/hr)= 124.54 81.98
 02355> over (min) 12.50 27.50
 02356> Storage Coeff. (min)= 12.93 (ii) 27.37 (ii)
 02357> Unit Hyd. Tpeak (min)= 12.50 27.50
 02358> Unit Hyd. peak (cms)= .09 .04
 02359>
 02360> PEAK FLOW (cms)= 2.16 .77 *TOTALS*
 02361> TIME TO PEAK (hrs)= 1.13 1.42 1.167
 02362> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
 02363> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
 02364> RUNOFF COEFFICIENT = .97 .59 .780
 02365>
 02366> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 02367> CN* = 81.0 Ia = Dep. Storage (Above)
 02368> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 02369> THAN THE STORAGE COEFFICIENT.
 02370> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 02371>
 02372> 001:0015-----
 02374> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 02375> (ha) (cms) (hrs) (mm) (cms)
 02376> ID1 10:POND 8.56 .189 2.06 54.45 .000
 02377> +ID2 01:HIP01 19.90 2.548 1.17 45.44 .000
 02378> =====
 02379> SUM 02:HIP02 28.46 2.622 1.17 48.15 .000
 02380>
 02381> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 02382>
 02383> 001:0016-----
 02385> * SUB-AREA No.2
 02387> | CALIB STANDHYD | Area (ha)= 17.00
 02388> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 02390> IMPERVIOUS PERVIOUS (i)
 02391> Surface Area (ha)= 12.07 4.93
 02392> Dep. Storage (mm)= 1.57 4.67
 02393> Average Slope (%)= .65 1.50
 02394> Length (m)= 450.00 100.00
 02395> Mannings n = .030 .250
 02396>
 02400> Max. eff. Inten. (mm/hr)= 144.69 87.13
 02401> over (min) 10.00 25.00
 02402> Storage Coeff. (min)= 10.21 (ii) 24.30 (ii)
 02403> Unit Hyd. Tpeak (min)= 10.00 25.00
 02404> Unit Hyd. peak (cms)= .11 .05
 02405>
 02406> PEAK FLOW (cms)= 2.10 .71 *TOTALS*
 02407> TIME TO PEAK (hrs)= 1.08 1.38 1.125
 02408> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
 02409> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
 02410> RUNOFF COEFFICIENT = .97 .59 .780
 02411>
 02412> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 02413> CN* = 81.0 Ia = Dep. Storage (Above)
 02414> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 02415> THAN THE STORAGE COEFFICIENT.
 02416> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 02417>
 02418> 001:0017-----
 02420> * SUB-AREA No.3
 02422> | CALIB STANDHYD | Area (ha)= 18.10
 02423> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 02425> IMPERVIOUS PERVIOUS (i)
 02426> Surface Area (ha)= 12.85 5.25
 02427> Dep. Storage (mm)= 1.57 4.67
 02428> Average Slope (%)= .50 1.50

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02431> Length (m) = 600.00 100.00
02432> Mannings n = .030 .250
02434> Max.eff.Inten.(mm/hr) = 111.10 77.71
02435> over (min) = 15.00 30.00
02436> Storage Coeff. (min) = 14.59 (ii) 29.34 (ii)
02437> Unit Hyd. Tpeak (min) = 15.00 30.00
02438> Unit Hyd. peak (cms) = .08 .04
02439>
02440> PEAK FLOW (cms) = 1.82 .67 *TOTALS*
02441> TIME TO PEAK (hrs) = 1.17 1.46 2.180 (iii)
02442> RUNOFF VOLUME (mm) = 56.66 34.22 45.437
02443> TOTAL RAINFALL (mm) = 58.23 58.23 58.226
02444> RUNOFF COEFFICIENT = .97 .59 780
02445>
02446> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02447> CN* = 81.0 Ia = Dep. Storage (Above)
02448> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02449> THAN THE STORAGE COEFFICIENT.
02450> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02451>
02452>-----
02453> 001:0018-----
02454>
02455> | ADD HYD (HIPO5 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02456> | (ha) (cms) (hrs) (mm) (cms)
02457> | ID1 03:HIP03 17.00 2.398 1.13 45.44 .000
02458> | +ID2 04:HIP04 18.10 2.180 1.21 45.44 .000
02459> |-----
02460> | SUM 05:HIPO5 35.10 4.439 1.13 45.44 .000
02461>
02462> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02463>-----
02464>
02465> 001:0019-----
02466> *
02467> *SUB-AREA No.4
02468>
02469> | DESIGN NASHYD | Area (ha) = 4.00 Curve Number (CN)=85.00
02470> | 06:Pond-B DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
02471> | U.H. Tp(hrs)= .170
02472>
02473> Unit Hyd Qpeak (cms) = .899
02474>
02475> PEAK FLOW (cms) = .459 (i)
02476> TIME TO PEAK (hrs) = 1.167
02477> RUNOFF VOLUME (mm) = 29.155
02478> TOTAL RAINFALL (mm) = 58.226
02479> RUNOFF COEFFICIENT = .501
02480>
02481> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02482>-----
02483>
02484> 001:0020-----
02485>
02486> | ADD HYD (HIPO6 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02487> | (ha) (cms) (hrs) (mm) (cms)
02488> | ID1 02:HIPO2 28.46 2.622 1.17 48.15 .000
02489> | +ID2 05:HIPO5 35.10 4.439 1.13 45.44 .000
02490> | +ID3 06:Pond-B 4.00 .459 1.17 29.15 .000
02491> |-----
02492> | SUM 07:HIPO6 67.56 7.499 1.17 45.61 .000
02493>
02494> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02495>-----
02496>
02497> 001:0021-----
02498> * SUB-AREA NO. 5
02499>
02500> | DESIGN NASHYD | Area (ha) = 6.80 Curve Number (CN)=76.00
02501> | 10:A2 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
02502> | U.H. Tp(hrs)= .370
02503>
02504> Unit Hyd Qpeak (cms) = .702
02505>
02506> PEAK FLOW (cms) = .343 (i)
02507> TIME TO PEAK (hrs) = 1.417
02508> RUNOFF VOLUME (mm) = 21.442
02509> TOTAL RAINFALL (mm) = 58.226
02510> RUNOFF COEFFICIENT = .368
02511>
02512> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02513>-----
02514>
02515> 001:0022-----
02516> * SUB-AREA NO 4
02517>
02518> | DESIGN NASHYD | Area (ha) = 5.30 Curve Number (CN)=76.00
02519> | 01:A3 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
02520> | U.H. Tp(hrs)= .804
02521>
02522> Unit Hyd Qpeak (cms) = .252
02523>
02524> PEAK FLOW (cms) = .155 (i)
02525> TIME TO PEAK (hrs) = 2.000
02526> RUNOFF VOLUME (mm) = 21.442
02527> TOTAL RAINFALL (mm) = 58.226
02528> RUNOFF COEFFICIENT = .368
02529>
02530> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02531>-----
02532>
02533> 001:0023-----
02534>
02535> | ADD HYD (0020 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02536> | (ha) (cms) (hrs) (mm) (cms)
02537> | ID1 07:HIP06 67.56 7.499 1.17 45.61 .000
02538> | +ID2 10:A2 6.80 .343 1.42 21.44 .000
02539> | +ID3 01:A3 5.30 .155 2.00 21.44 .000
02540> |-----
02541> | SUM 02:0020 79.66 7.772 1.17 41.94 .000
02542>
02543> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02544>-----
02545>
02546> 001:0024-----
02547>
02548> ***** CALCULATION OF 3HR - 1:50 YEAR STORM EVENT *****
02549> *****
02550>
02551> | START | Project dir.: V:\20983.DU\ENG\3RDSUB-1\SWM\HYMO\
02552> | Rainfall dir.: V:\20983.DU\ENG\3RDSUB-1\SWM\HYMO\
02553> | TZERO = .00 hrs on 0
02554> | METOUT= 2 (output = METRIC)
02555> | NRUN = 001
02556> | NSTORM= 0
02557>
02558> 001:0002-----
02559>
02560> | CHICAGO STORM | IDF curve parameters: A=1569.580
02561> | Ptotal= 64.81 mm | B= 6.014
02562> | C= .820
02563> used in: INTENSITY = A / (t + B)^C
02564>
02565> Duration of storm = 3.00 hrs

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02566> Storm time step = 10.00 min
02567> Time to peak ratio = .33
02568>
02569> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02570> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02571> .17 5.467 | 1.00 161.474 | 1.83 10.000 | 2.67 5.209
02572> .33 6.820 | 1.17 48.876 | 2.00 8.397 | 2.83 4.774
02573> .50 9.187 | 1.33 24.704 | 2.17 7.256 | 3.00 4.412
02574> .67 14.441 | 1.50 16.495 | 2.33 6.403 |
02575> .83 36.764 | 1.67 12.422 | 2.50 5.740 |
02576>
02577>-----
02578> 001:0003-----
02579>
02580> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\3RDSUB-1\SWM\HYMO\ORGA.VAL
02581> | ICASEDv = 1 (read and print data)
02582> | FileTitle=----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE -----
02583> | Horton's infiltration equation parameters:----- PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----
02584> | [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [P= .00 mm]
02585> | Parameters for PERVIOUS surfaces in STANDHYD:
02586> | [Iaper= 4.67 mm] [LGP=40.00 m] [MNP= .250]
02587> | Parameters for IMPERVIOUS surfaces in STANDHYD:
02588> | [Iimp= 1.57 mm] [CII= 1.50] [MNI= .035]
02589> | Parameters used in NASHYD:
02590> | [Ia= 4.67 mm] [N= 3.00]
02591>
02592>-----
02593> 001:0004-----
02594> *****
02595> * ORGAWORLD FILE *
02596> *****
02597> * SUB-AREA No.1
02598>
02599> | CALIB STANDHYD | Area (ha) = 2.07
02600> | 01:010 DT= 2.50 | Total Imp(%) = 84.00 Dir. Conn.(%) = 84.00
02601>
02602> IMPERVIOUS PERVIOUS (i)
02603> Surface Area (ha) = 1.74 .33
02604> Dep. Storage (mm) = 1.57 4.67
02605> Average Slope (%) = .52 1.00
02606> Length (m) = 204.72 20.00
02607> Mannings n = .030 .250
02608>
02609> Max.eff.Inten.(mm/hr) = 161.47 62.27
02610> over (min) = 7.50 12.50
02611> Storage Coeff. (min) = 6.51 (ii) 13.44 (ii)
02612> Unit Hyd. Tpeak (min) = 7.50 12.50
02613> Unit Hyd. peak (cms) = .16 .09
02614>
02615> PEAK FLOW (cms) = .59 .03 *TOTALS*
02616> TIME TO PEAK (hrs) = 1.04 1.17 .609 (iii)
02617> RUNOFF VOLUME (mm) = 63.24 30.21 1.042
02618> TOTAL RAINFALL (mm) = 64.81 64.81 64.806
02619> RUNOFF COEFFICIENT = .98 .47 .894
02620>
02621> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02622> CN* = 81.0 Ia = Dep. Storage (Above)
02623> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02624> THAN THE STORAGE COEFFICIENT.
02625> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02626>-----
02627>
02628> 001:0005-----
02629> *
02630> * SUB-AREA No.2
02631>
02632> | CALIB STANDHYD | Area (ha) = 1.54
02633> | 02:020 DT= 2.50 | Total Imp(%) = 92.00 Dir. Conn.(%) = 92.00
02634>
02635> IMPERVIOUS PERVIOUS (i)
02636> Surface Area (ha) = 1.42 .12
02637> Dep. Storage (mm) = 1.57 4.67
02638> Average Slope (%) = .50 1.00
02639> Length (m) = 244.34 5.00
02640> Mannings n = .030 .030
02641>
02642> Max.eff.Inten.(mm/hr) = 161.47 78.73
02643> over (min) = 7.50 7.50
02644> Storage Coeff. (min) = 7.33 (ii) 8.10 (ii)
02645> Unit Hyd. Tpeak (min) = 7.50 7.50
02646> Unit Hyd. peak (cms) = .15 .14
02647>
02648> PEAK FLOW (cms) = .46 .02 *TOTALS*
02649> TIME TO PEAK (hrs) = 1.04 1.08 .475 (iii)
02650> RUNOFF VOLUME (mm) = 63.24 30.21 60.594
02651> TOTAL RAINFALL (mm) = 64.81 64.81 64.806
02652> RUNOFF COEFFICIENT = .98 .47 .935
02653>
02654> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02655> CN* = 81.0 Ia = Dep. Storage (Above)
02656> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02657> THAN THE STORAGE COEFFICIENT.
02658> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02659>-----
02660>
02661> 001:0006-----
02662> *
02663> * SUB-AREA No.3
02664>
02665> | CALIB STANDHYD | Area (ha) = 1.40
02666> | 03:030 D2= 2.50 | Total Imp(%) = 97.00 Dir. Conn.(%) = 97.00
02667>
02668> IMPERVIOUS PERVIOUS (i)
02669> Surface Area (ha) = 1.36 .04
02670> Dep. Storage (mm) = 1.57 4.67
02671> Average Slope (%) = .51 1.00
02672> Length (m) = 225.63 5.00
02673> Mannings n = .030 .030
02674>
02675> Max.eff.Inten.(mm/hr) = 161.47 78.73
02676> over (min) = 7.50 7.50
02677> Storage Coeff. (min) = 6.95 (ii) 7.72 (ii)
02678> Unit Hyd. Tpeak (min) = 7.50 7.50
02679> Unit Hyd. peak (cms) = .16 .15
02680>
02681> PEAK FLOW (cms) = .45 .01 *TOTALS*
02682> TIME TO PEAK (hrs) = 1.04 1.08 .454 (iii)
02683> RUNOFF VOLUME (mm) = 63.24 30.21 62.245
02684> TOTAL RAINFALL (mm) = 64.81 64.81 64.806
02685> RUNOFF COEFFICIENT = .98 .47 .960
02686>
02687> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02688> CN* = 81.0 Ia = Dep. Storage (Above)
02689> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02690> THAN THE STORAGE COEFFICIENT.
02691> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02692>-----
02693>
02694> 001:0007-----
02695>
02696> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02697> | (ha) (cms) (hrs) (mm) (cms)
02698> | ID1 01:010 2.07 .609 1.04 57.95 .000
02699> | +ID2 02:020 1.54 .475 1.04 60.59 .000
02700>

```

02701> SUM 04:040 3.61 1.084 1.04 59.08 .000
02702>
02703> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02704>
02705>
02706> 001:0008-----
02707> | ADD HYD (050) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02708> | 06:060 DT= 2.50 | (ha) (cms) (hrs) (mm) (cms)
02709> ID1 03:030 1.40 4.54 1.04 62.25 .000
02710> +ID2 04:040 3.61 1.084 1.04 59.08 .000
02711> SUM 05:050 5.01 1.538 1.04 59.96 .000
02712>
02713> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02714>
02715>
02716>
02717> 001:0009-----
02718> * SUB-AREA No.4
02719> | CALIB STANDHYD | Area (ha)= .89
02720> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02721>
02722> IMPERVIOUS PERVIOUS (i)
02723> Surface Area (ha)= .86 .03
02724> Dep. Storage (mm)= 1.57 4.67
02725> Average Slope (%)= .93 .70
02726> Length (m)= 164.82 40.00
02727> Mannings n = .030 .250
02728>
02729> Max. eff. Inten. (mm/hr)= 161.47 53.28
02730> over (min)= 5.00 17.50
02731> Storage Coeff. (min)= 4.80 (ii) 17.24 (ii)
02732> Unit Hyd. Tpeak (min)= 5.00 17.50
02733> Unit Hyd. peak (cms)= .23 .07
02734>
02735> PEAK FLOW (cms)= .33 .00 *TOTALS*
02736> TIME TO PEAK (hrs)= 1.00 1.25 .335 (iii)
02737> RUNOFF VOLUME (mm)= 63.24 30.21 62.245
02738> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02739> RUNOFF COEFFICIENT = .98 .47 .960
02740>
02741> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02742> CN* = 81.0 Ia = Dep. Storage (Above)
02743> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02744> THAN THE STORAGE COEFFICIENT.
02745> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02746>
02747>
02748>
02749>
02750> 001:0010-----
02751> * SUB-AREA No.5
02752> | CALIB STANDHYD | Area (ha)= 2.66
02753> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02754>
02755> IMPERVIOUS PERVIOUS (i)
02756> Surface Area (ha)= 2.58 .08
02757> Dep. Storage (mm)= 1.57 4.67
02758> Average Slope (%)= .61 1.50
02759> Length (m)= 207.25 20.00
02760> Mannings n = .030 .250
02761>
02762> Max. eff. Inten. (mm/hr)= 161.47 62.27
02763> over (min)= 7.50 12.50
02764> Storage Coeff. (min)= 6.26 (ii) 12.39 (ii)
02765> Unit Hyd. Tpeak (min)= 7.50 12.50
02766> Unit Hyd. peak (cms)= .17 .09
02767>
02768> PEAK FLOW (cms)= .88 .01 *TOTALS*
02769> TIME TO PEAK (hrs)= 1.04 1.17 1.042
02770> RUNOFF VOLUME (mm)= 63.24 30.21 62.245
02771> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02772> RUNOFF COEFFICIENT = .98 .47 .960
02773>
02774> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02775> CN* = 81.0 Ia = Dep. Storage (Above)
02776> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02777> THAN THE STORAGE COEFFICIENT.
02778> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02779>
02780>
02781>
02782>
02783> 001:0011-----
02784> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02785> | 06:060 DT= 2.50 | (ha) (cms) (hrs) (mm) (cms)
02786> ID1 06:060 .89 .335 1.00 62.25 .000
02787> +ID2 07:070 2.66 .866 1.04 62.25 .000
02788> SUM 08:080 3.55 1.197 1.04 62.25 .000
02789>
02790> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02791>
02792>
02793>
02794>
02795> 001:0012-----
02796> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02797> | 06:060 DT= 2.50 | (ha) (cms) (hrs) (mm) (cms)
02798> ID1 05:050 5.01 1.538 1.04 59.96 .000
02799> +ID2 08:080 3.55 1.197 1.04 62.25 .000
02800> SUM 09:090 8.56 2.735 1.04 60.91 .000
02801>
02802> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02803>
02804>
02805>
02806>
02807> 001:0013-----
02808> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02809> | IN>09: (090) |
02810> | OUT<10: (POND) |
02811>
02812> ===== OUTFLOW STORAGE TABLE =====
02813> OUTFLOW STORAGE | OUTFLOW STORAGE
02814> (cms) (ha.m.) | (cms) (ha.m.)
02815> .000 .000E+00 | .523 .6251E+00
02816> .008 .6560E+01 | .654 .6631E+00
02817> .017 .1311E+00 | .797 .7391E+00
02818> .093 .2831E+00 | .950 .8274E+00
02819> .233 .3971E+00 | 1.304 .9157E+00
02820> .337 .4731E+00 | 1.880 .1004E+01
02821> .465 .5491E+00 | 2.577 .1092E+01
02822> .531 .5871E+00 | .000 .0000E+00
02823>
02824> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02825> (ha) (cms) (hrs) (mm)
02826> INFLOW >09: (090) 8.56 2.735 1.042 60.910
02827> OUTFLOW <10: (POND) 8.56 .233 1.944 60.908
02828>
02829> PEAK FLOW REDUCTION [Qout/Qin] (%)= 8.503
02830> TIME SHIFT OF PEAK FLOW (min)= 54.17
02831> MAXIMUM STORAGE USED (ha.m.)=.3967E+00
02832>
02833>
02834> 001:0014-----
02835>

02836> * Remaining Hawthorne Industrial Park *
02837> *****
02838> * SUB-AREA No.1
02839> | CALIB STANDHYD | Area (ha)= 19.90
02840> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
02841>
02842> IMPERVIOUS PERVIOUS (i)
02843> Surface Area (ha)= 14.12 5.77
02844> Dep. Storage (mm)= 1.57 4.67
02845> Average Slope (%)= .60 1.50
02846> Length (m)= 580.00 100.00
02847> Mannings n = .030 .250
02848>
02849> Max. eff. Inten. (mm/hr)= 138.95 102.13
02850> over (min)= 12.50 25.00
02851> Storage Coeff. (min)= 12.38 (ii) 25.60 (ii)
02852> Unit Hyd. Tpeak (min)= 12.50 25.00
02853> Unit Hyd. peak (cms)= .09 .04
02854>
02855> PEAK FLOW (cms)= 2.46 .95 *TOTALS*
02856> TIME TO PEAK (hrs)= 1.13 1.38 1.167
02857> RUNOFF VOLUME (mm)= 63.24 39.90 51.566
02858> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02859> RUNOFF COEFFICIENT = .98 .62 .796
02860>
02861> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02862> CN* = 81.0 Ia = Dep. Storage (Above)
02863> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02864> THAN THE STORAGE COEFFICIENT.
02865> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02866>
02867>
02868>
02869> 001:0015-----
02870> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02871> | 01:HIP02 DT= 2.50 | (ha) (cms) (hrs) (mm) (cms)
02872> ID1 10:POND 8.56 .233 1.94 60.91 .000
02873> +ID2 01:HIP01 19.90 3.001 1.17 51.57 .000
02874> SUM 02:HIP02 28.46 3.092 1.17 54.37 .000
02875>
02876> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02877>
02878>
02879>
02880> 001:0016-----
02881> * SUB-AREA No.2
02882> | CALIB STANDHYD | Area (ha)= 17.00
02883> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
02884>
02885> IMPERVIOUS PERVIOUS (i)
02886> Surface Area (ha)= 12.07 4.93
02887> Dep. Storage (mm)= 1.57 4.67
02888> Average Slope (%)= .65 1.50
02889> Length (m)= 450.00 100.00
02890> Mannings n = .030 .250
02891>
02892> Max. eff. Inten. (mm/hr)= 161.47 109.61
02893> over (min)= 10.00 22.50
02894> Storage Coeff. (min)= 9.77 (ii) 22.63 (ii)
02895> Unit Hyd. Tpeak (min)= 10.00 22.50
02896> Unit Hyd. peak (cms)= .11 .05
02897>
02898> PEAK FLOW (cms)= 2.38 .88 *TOTALS*
02899> TIME TO PEAK (hrs)= 1.08 1.33 1.125
02900> RUNOFF VOLUME (mm)= 63.24 39.90 51.566
02901> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02902> RUNOFF COEFFICIENT = .98 .62 .796
02903>
02904> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02905> CN* = 81.0 Ia = Dep. Storage (Above)
02906> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02907> THAN THE STORAGE COEFFICIENT.
02908> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02909>
02910>
02911>
02912>
02913> 001:0017-----
02914> * SUB-AREA No.3
02915> | CALIB STANDHYD | Area (ha)= 18.10
02916> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
02917>
02918> IMPERVIOUS PERVIOUS (i)
02919> Surface Area (ha)= 12.85 5.25
02920> Dep. Storage (mm)= 1.57 4.67
02921> Average Slope (%)= .50 1.50
02922> Length (m)= 600.00 100.00
02923> Mannings n = .030 .250
02924>
02925> Max. eff. Inten. (mm/hr)= 138.95 96.02
02926> over (min)= 12.50 27.50
02927> Storage Coeff. (min)= 13.34 (ii) 26.90 (ii)
02928> Unit Hyd. Tpeak (min)= 12.50 27.50
02929> Unit Hyd. peak (cms)= .09 .04
02930>
02931> PEAK FLOW (cms)= 2.16 .83 *TOTALS*
02932> TIME TO PEAK (hrs)= 1.13 1.42 1.296 (iii)
02933> RUNOFF VOLUME (mm)= 63.24 39.90 51.566
02934> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02935> RUNOFF COEFFICIENT = .98 .62 .796
02936>
02937> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02938> CN* = 81.0 Ia = Dep. Storage (Above)
02939> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02940> THAN THE STORAGE COEFFICIENT.
02941> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02942>
02943>
02944>
02945>
02946> 001:0018-----
02947> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02948> | 05:HIP05 DT= 2.50 | (ha) (cms) (hrs) (mm) (cms)
02949> ID1 03:HIP03 17.00 2.819 1.13 51.57 .000
02950> +ID2 04:HIP04 18.10 2.596 1.17 51.57 .000
02951> SUM 05:HIP05 35.10 5.372 1.13 51.57 .000
02952>
02953> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02954>
02955>
02956>
02957>
02958> 001:0019-----
02959> * SUB-AREA No.4
02960> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
02961> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02962> U.H. Tp(hrs)= .170
02963>
02964> Unit Hyd Tpeak (cms)= .899
02965>
02966> PEAK FLOW (cms)= .551 (i)

02971> TIME TO PEAK (hrs)= 1.125
02972> RUNOFF VOLUME (mm)= 34.455
02973> TOTAL RAINFALL (mm)= 64.806
02974> RUNOFF COEFFICIENT = .532
02975>
02976> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02977>
02978>
02979> 001:0020-----
02980>
02981> | ADD HYD (HIPO6) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02982> | ID1 02:HIPO2 | (ha) (cms) (hrs) (mm) (cms)
02983> | +ID2 05:HIPO5 | 28.46 3.092 1.17 54.37 .000
02984> | +ID3 06:Pond-B | 35.10 5.372 1.13 51.57 .000
02985> | +ID3 06:Pond-B | 4.00 .551 1.13 34.45 .000
02986> -----
02987> | SUM 07:HIPO6 | 67.56 8.958 1.13 51.73 .000
02988>
02989> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02990>
02991>
02992> 001:0021-----
02993> * SUB-AREA NO. 5
02994>
02995> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00
02996> | 10:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02997> | U.H. Tp(hrs)= .370
02998>
02999> Unit Hyd Qpeak (cms)= .702
03000>
03001> PEAK FLOW (cms)= .417 (i)
03002> TIME TO PEAK (hrs)= 1.417
03003> RUNOFF VOLUME (mm)= 25.767
03004> TOTAL RAINFALL (mm)= 64.806
03005> RUNOFF COEFFICIENT = .398
03006>
03007> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03008>
03009>
03010> 001:0022-----
03011> * SUB-AREA NO 4
03012>
03013> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00
03014> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
03015> | U.H. Tp(hrs)= .804
03016>
03017> Unit Hyd Qpeak (cms)= .252
03018>
03019> PEAK FLOW (cms)= .188 (i)
03020> TIME TO PEAK (hrs)= 2.000
03021> RUNOFF VOLUME (mm)= 25.767
03022> TOTAL RAINFALL (mm)= 64.806
03023> RUNOFF COEFFICIENT = .398
03024>
03025> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03026>
03027>
03028> 001:0023-----
03029>
03030> | ADD HYD (0020) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
03031> | ID1 07:HIPO6 | (ha) (cms) (hrs) (mm) (cms)
03032> | +ID2 10:A2 | 67.56 8.958 1.13 51.73 .000
03033> | +ID3 01:A3 | 6.80 .417 1.42 25.77 .000
03034> | +ID3 01:A3 | 5.30 .198 2.00 25.77 .000
03035> -----
03036> | SUM 02:0020 | 79.66 9.240 1.17 47.79 .000
03037>
03038> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03039>
03040>
03041> 001:0024-----
03042> *****
03043> * CALCULATION OF 3HR = 1:100 YEAR STORM EVENT *
03044> *****
03045>
03046> | START | Project dir.: V:\20983.DU\ENG\3RDSUB-1\SWHMYMO
03047> | Rainfall dir.: V:\20983.DU\ENG\3RDSUB-1\SWHMYMO
03048> | TZERO = .00 hrs on 0
03049> | METOUT= 2 (output = METRIC)
03050> | NRUN = 001
03051> | NSTORM= 0
03052>
03053> 001:0002-----
03054>
03055> | CHICAGO STORM | IDF curve parameters: A=1735.688
03056> | Ptotal= 71.66 mm | B= 6.014
03057> | C= .820
03058> used in: INTENSITY = A / (t + B)^C
03059>
03060> Duration of storm = 3.00 hrs
03061> Storm time step = 10.00 min
03062> Time to peak ratio = .33
03063>
03064> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
03065> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
03066> .17 6.046 | 1.00 178.559 | 1.83 11.059 | 2.67 5.760
03067> .33 7.542 | 1.17 54.049 | 2.00 9.285 | 2.83 5.280
03068> .50 10.159 | 1.33 27.319 | 2.17 8.024 | 3.00 4.879
03069> .67 15.969 | 1.50 18.240 | 2.33 7.080 |
03070> .83 40.655 | 1.67 13.737 | 2.50 6.347 |
03071>
03072>
03073> 001:0003-----
03074>
03075> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\3RDSUB-1\SWHMYMO\ORGA.VAL
03076> | ICASEdv = 1 (read and print data)
03077> | FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ----
03078> | Horton's infiltration equation parameters:
03079> | [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAV= 2.00 /hr] [F= .00 mm]
03080> | Parameters for PERVIOUS surfaces in STANDHYD:
03081> | [Iaper= 4.67 mm] [LGP=40.00 m] [MNP= .250]
03082> | Parameters for IMPERVIOUS surfaces in STANDHYD:
03083> | [Iimp= 1.57 mm] [CII= 1.50] [MVI= .035]
03084> | Parameters used in NASHYD:
03085> | [Ia= 4.67 mm] [N= 3.00]
03086>
03087>
03088> 001:0004-----
03089> *****
03090> * ORGAWORLD FILE *
03091> *****
03092> * SUB-AREA No.1
03093>
03094> | CALIB STANDHYD | Area (ha)= 2.07
03095> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
03096>
03097>
03098> Surface Area (ha)= 1.74 IMPERVIOUS PERVIOUS (i)
03099> Dep. Storage (mm)= 1.57 .33
03100> Average Slope (%)= 1.57 4.67
03101> Length (m)= 204.72 20.00
03102> Mannings n = .030 .250
03103>
03104> Max. eff. Inten. (mm/hr)= 178.56 74.05
03105> over (min) 7.50 12.50

03106> Storage Coeff. (min)= 6.26 (ii) 12.72 (ii)
03107> Unit Hyd. Tpeak (min)= 7.50 12.50
03108> Unit Hyd. peak (cms)= .17 .09
03109>
03110> PEAK FLOW (cms)= .66 .04 *TOTALS*
03111> TIME TO PEAK (hrs)= 1.04 1.17 (iii)
03112> RUNOFF VOLUME (mm)= 70.09 35.46 1.042
03113> TOTAL RAINFALL (mm)= 71.66 71.66 64.553
03114> RUNOFF COEFFICIENT = .98 49 71.665
03115> .901
03116> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03117> CN* = 81.0 Ia = Dep. Storage (Above)
03118> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03119> THAN THE STORAGE COEFFICIENT.
03120> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03121>
03122>
03123> 001:0005-----
03124>
03125> * SUB-AREA No.2
03126>
03127> | CALIB STANDHYD | Area (ha)= 1.54
03128> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
03129>
03130>
03131> Surface Area (ha)= 1.42 IMPERVIOUS PERVIOUS (i)
03132> Dep. Storage (mm)= 1.57 4.67
03133> Average Slope (%)= .50 1.00
03134> Length (m)= 244.34 5.00
03135> Mannings n = .030 .030
03136>
03137> Max. eff. Inten. (mm/hr)= 178.56 93.23
03138> over (min) 7.50 7.50
03139> Storage Coeff. (min)= 7.04 (ii) 7.76 (ii)
03140> Unit Hyd. Tpeak (min)= 7.50 7.50
03141> Unit Hyd. peak (cms)= .16 .15
03142>
03143> PEAK FLOW (cms)= .51 .02 *TOTALS*
03144> TIME TO PEAK (hrs)= 1.04 1.08 .534 (iii)
03145> RUNOFF VOLUME (mm)= 70.09 35.46 67.324
03146> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03147> RUNOFF COEFFICIENT = .98 49 .939
03148>
03149> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03150> CN* = 81.0 Ia = Dep. Storage (Above)
03151> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03152> THAN THE STORAGE COEFFICIENT.
03153> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03154>
03155>
03156> 001:0006-----
03157> *
03158> * SUB-AREA No.3
03159>
03160> | CALIB STANDHYD | Area (ha)= 1.40
03161> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03162>
03163>
03164> Surface Area (ha)= 1.36 IMPERVIOUS PERVIOUS (i)
03165> Dep. Storage (mm)= 1.57 4.67
03166> Average Slope (%)= .51 1.00
03167> Length (m)= 225.63 5.00
03168> Mannings n = .030 .030
03169>
03170> Max. eff. Inten. (mm/hr)= 178.56 93.23
03171> over (min) 7.50 7.50
03172> Storage Coeff. (min)= 6.67 (ii) 7.39 (ii)
03173> Unit Hyd. Tpeak (min)= 7.50 7.50
03174> Unit Hyd. peak (cms)= .16 .15
03175>
03176> PEAK FLOW (cms)= .50 .01 *TOTALS*
03177> TIME TO PEAK (hrs)= 1.04 1.08 .509 (iii)
03178> RUNOFF VOLUME (mm)= 70.09 35.46 1.042
03179> TOTAL RAINFALL (mm)= 71.66 71.66 69.056
03180> RUNOFF COEFFICIENT = .98 49 71.665
03181> .964
03182> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03183> CN* = 81.0 Ia = Dep. Storage (Above)
03184> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03185> THAN THE STORAGE COEFFICIENT.
03186> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03187>
03188>
03189> 001:0007-----
03190>
03191> | ADD HYD (040) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
03192> | ID1 01:010 | (ha) (cms) (hrs) (mm) (cms)
03193> | +ID2 02:020 | 2.07 .685 1.04 64.55 .000
03194> | +ID2 02:020 | 1.54 .534 1.04 67.32 .000
03195> -----
03196> | SUM 04:040 | 3.61 1.220 1.04 65.74 .000
03197>
03198> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03199>
03200>
03201> 001:0008-----
03202>
03203> | ADD HYD (050) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
03204> | ID1 03:030 | (ha) (cms) (hrs) (mm) (cms)
03205> | +ID2 04:040 | 3.61 1.220 1.04 65.74 .000
03206> -----
03207> | SUM 05:050 | 5.01 1.729 1.04 66.66 .000
03208>
03209> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03210>
03211>
03212>
03213> 001:0009-----
03214>
03215> * SUB-AREA No.4
03216>
03217> | CALIB STANDHYD | Area (ha)= .89
03218> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03219>
03220>
03221> Surface Area (ha)= .86 IMPERVIOUS PERVIOUS (i)
03222> Dep. Storage (mm)= 1.57 .03
03223> Average Slope (%)= .93 .70
03224> Length (m)= 164.82 40.00
03225> Mannings n = .030 .250
03226>
03227> Max. eff. Inten. (mm/hr)= 178.56 67.61
03228> over (min) 5.00 15.00
03229> Storage Coeff. (min)= 4.62 (ii) 15.92 (ii)
03230> Unit Hyd. Tpeak (min)= 5.00 15.00
03231> Unit Hyd. peak (cms)= .24 .07
03232>
03233> PEAK FLOW (cms)= .37 .00 *TOTALS*
03234> TIME TO PEAK (hrs)= 1.00 1.21 .374 (iii)
03235> RUNOFF VOLUME (mm)= 70.09 35.46 1.000
03236> TOTAL RAINFALL (mm)= 71.66 71.66 69.056
03237> RUNOFF COEFFICIENT = .98 49 71.665
03238> .964
03239> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03240> CN* = 81.0 Ia = Dep. Storage (Above)

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03511>
03512> Unit Hyd Qpeak (cms) = .252
03513>
03514> PEAK FLOW (cms) = .223 (i)
03515> TIME TO PEAK (hrs) = 1.958
03516> RUNOFF VOLUME (mm) = 30.490
03517> TOTAL RAINFALL (mm) = 71.665
03518> RUNOFF COEFFICIENT = .425
03519>
03520> (i.) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03521>
03522>
03523> 001:0023-----
03524>
03525> | ADD HYD (0020 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03526> |-----|-----| (ha) (cms) (hrs) (mm) (cms)
03527> | ID1 07:H1P06 67.56 10.299 1.13 58.18 .000
03528> | +ID2 10:A2 6.80 .497 1.42 30.49 .000
03529> | +ID3 01:A3 5.30 .223 1.96 30.49 .000
03530> |-----|-----|
03531> | SUM 02:0020 79.66 10.662 1.17 53.97 .000
03532>
03533> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03534>
03535>
03536> 001:0024-----
03537> FINISH
03538>
03539> *****
03540> WARNINGS / ERRORS / NOTES
03541>
03542> Simulation ended on 2009-04-21 at 10:30:17
03543>
03544>
03545>

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00001> 2 Metric units
00002> #*****
00003> # Project Name : Hawthorne Industrial Park Project Number: [20983] *
00004> # Date : January, 2009
00005> # Revisd : WA
00006> # Developed by : Mark Buchanan, E.I.T.
00007> # Reviewed by : Guy Forget, P.Eng.
00008> # Company : J.L. Richards & Associates Limited
00009> # License : 4418403
00010> #*****
00011> *
00012> *
00013> #*****
00014> # FILENAME: V:\20983.DU\ENG\SWM\HYMO\20983PST.DAT
00015> # FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
00016> # OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE *
00017> #*****
00018> *
00019> #*****
00020> # SWM HYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE
00021> # PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00022> #*****
00023> #*****
00024> #*****
00025> # HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *
00026> # FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
00027> #*****
00028> #*****
00029> #*****
00030> # POST-DEVELOPMENT UNCONTROLLED CONDITIONS
00031> #*****
00032> #*****
00033> #*****
00034> # CALCULATION OF 4 HR 25 MM STORM EVENT
00035> #*****
00036> #*****
00037> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00038> # [ ] <- storm filename, one per line for NSTORM time
00039> READ STORM STORM_FILENAME=[\"4HR25-15.STM\"]
00040> #*****
00041> DEFAULT VALUES ICASEdef=[1], read and print values
00042> DEFVAL_FILENAME=[V:\22975.DU\ENG\SWM\HYMO\\"ORGA.VAL\"]
00043> #*****
00044> #*****
00046> # ORGAWORLD FILE
00047> #*****
00048> #*****
00049> * SUB-AREA No.1
00050> #*****
00051> CALIB STANDHYD ID=[ 1 ], NHYD=[\"010\"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00052> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00053> SCS curve number CN=[81],
00054> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00055> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (min)
00056> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00057> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00058> RAINFALL=[ , , , ] (mm/hr), END=-1
00059> #*****
00060> #*****
00061> * SUB-AREA No.2
00062> #*****
00063> CALIB STANDHYD ID=[ 2 ], NHYD=[\"020\"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00064> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00065> SCS curve number CN=[81],
00066> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00067> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00068> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00069> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00070> RAINFALL=[ , , , ] (mm/hr), END=-1
00071> #*****
00072> #*****
00073> * SUB-AREA No.3
00074> #*****
00075> CALIB STANDHYD ID=[ 3 ], NHYD=[\"030\"], DT=[2.5] (min), AREA=[1.4] (ha),
00076> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00077> SCS curve number CN=[81],
00078> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00079> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00080> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.51] (%),
00081> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0]
00082> RAINFALL=[ , , , ] (mm/hr), END=-1
00083> #*****
00084> ADD HYD IDsum=[4], NHYD=[\"040\"], IDs to add=[1+2]
00085> #*****
00086> ADD HYD IDsum=[5], NHYD=[\"050\"], IDs to add=[3+4]
00087> #*****
00088> #*****
00089> * SUB-AREA No.4
00090> #*****
00091> CALIB STANDHYD ID=[6], NHYD=[\"060\"], DT=[2.5] (min), AREA=[0.89] (ha),
00092> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00093> SCS curve number CN=[81],
00094> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
00095> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00096> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00097> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
00098> RAINFALL=[ , , , ] (mm/hr), END=-1
00099> #*****
00100> #*****
00101> * SUB-AREA No.5
00102> #*****
00103> CALIB STANDHYD ID=[ 7 ], NHYD=[\"070\"], DT=[2.5] (min), AREA=[2.66] (ha),
00104> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00105> SCS curve number CN=[81],
00106> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00107> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
00108> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00109> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0]
00110> RAINFALL=[ , , , ] (mm/hr), END=-1
00111> #*****
00112> ADD HYD IDsum=[8], NHYD=[\"080\"], IDs to add=[6+7]
00113> #*****
00114> ADD HYD IDsum=[9], NHYD=[\"090\"], IDs to add=[5+8]
00115> #*****
00116> #*****
00117> ROUTE RESERVOIR IDout=[10], NHYD=[\"POND\"], IDin=[9],
00118> RDT=[1.0] (min),
00119> #*****
00120> #*****
00121> # TABLE of ( OUTFLOW-STORAGE ) values
00122> # (cms) (ha-m)
00123> [ 0.000, 0.0000 ]
00124> [ 0.008, 0.0656 ]
00125> [ 0.017, 0.1311 ]
00126> [ 0.093, 0.2831 ]
00127> [ 0.233, 0.3971 ]
00128> [ 0.337, 0.4731 ]
00129> [ 0.465, 0.5491 ]
00130> [ 0.531, 0.5871 ]
00131> [ 0.593, 0.6251 ]
00132> [ 0.654, 0.6631 ]
00133> [ 0.797, 0.7891 ]
00134> [ 0.950, 0.8274 ]
00135> [ 1.304, 0.9157 ]
00136> [ 1.880, 1.0040 ]
00137> [ 2.577, 1.0923 ]

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00138> [ -1 , -1 ] (max twenty pts)
00139> #*****
00140> # Remaining Hawthorne Industrial Park
00141> #*****
00142> * SUB-AREA No.1
00143> #*****
00144> CALIB STANDHYD ID=[ 1 ], NHYD=[\"HIP01\"], DT=[2.5] (min), AREA=[19.9] (ha),
00145> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00146> SCS curve number CN=[81],
00147> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00148> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00149> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00150> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00151> RAINFALL=[ , , , ] (mm/hr), END=-1
00152> #*****
00153> ADD HYD IDsum=[ 2 ], NHYD=[\"HIP02\"], IDs to add=[10+1]
00154> #*****
00155> #*****
00156> * SUB-AREA No.2
00157> #*****
00158> CALIB STANDHYD ID=[ 3 ], NHYD=[\"HIP03\"], DT=[2.5] (min), AREA=[17] (ha),
00159> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00160> SCS curve number CN=[81],
00161> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00162> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00163> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.65] (%),
00164> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00165> RAINFALL=[ , , , ] (mm/hr), END=-1
00166> #*****
00167> #*****
00168> * SUB-AREA No.3
00169> #*****
00170> CALIB STANDHYD ID=[ 4 ], NHYD=[\"HIP04\"], DT=[2.5] (min), AREA=[15.6] (ha),
00171> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00172> SCS curve number CN=[81],
00173> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00174> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00175> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00176> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00177> RAINFALL=[ , , , ] (mm/hr), END=-1
00178> #*****
00179> ADD HYD IDsum=[ 5 ], NHYD=[\"HIP05\"], IDs to add=[3+4]
00180> #*****
00181> ADD HYD IDsum=[ 6 ], NHYD=[\"HIP06\"], IDs to add=[5+2]
00182> #*****
00183> #*****
00184> * SUB-AREA No.4
00185> #*****
00186> CALIB STANDHYD ID=[ 7 ], NHYD=[\"HIP07\"], DT=[2.5] (min), AREA=[12.2] (ha),
00187> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00188> SCS curve number CN=[81],
00189> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00190> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00191> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.7] (%),
00192> LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min)
00193> RAINFALL=[ , , , ] (mm/hr), END=-1
00194> #*****
00195> #*****
00196> #*****
00197> * SUB-AREA No.5
00198> #*****
00199> DESIGN NASHYD ID=[ 8 ], NHYD=[\"Pond-Block\"], DT=[2.5] min, AREA=[4.0] (ha),
00200> DWF=[0] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00201> RAINFALL=[ , , , ] (mm/hr), END=-1
00202> #*****
00203> #*****
00204> #*****
00205> ADD HYD IDsum=[ 9 ], NHYD=[\"HIP08\"], IDs to add=[6+7+8]
00206> #*****
00207> #*****
00208> * SUB-AREA No. 6
00209> #*****
00210> DESIGN NASHYD ID = [1], NHYD=[\"A3\"], DT=[2.5] min, AREA=[2.7] (ha),
00211> DWF=[0] (cms), CN/C=[76], TP=[0.80] hrs,
00212> RAINFALL=[ , , , ] (mm/hr), END=-1
00213> #*****
00214> #*****
00215> ADD HYD IDsum=[2], NHYD=[\"Ultimate\"], IDs to add=[9+1]
00216> #*****
00217> #*****
00218> #*****
00219> #*****
00220> #*****
00221> #*****
00222> #*****
00223> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00224> # [ ] <- storm filename, one per line for NSTORM time
00225> #*****
00226> CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TFRAT=[0.333], CSDT=[10.0] (min)
00227> ICASEcs=[1],
00228> A=[732.951], B=[6.199], and C=[0.810],
00229> #*****
00230> DEFAULT VALUES ICASEdef=[1], read and print values
00231> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWM\HYMO\\"ORGA.VAL\"]
00232> #*****
00233> #*****
00234> #*****
00235> # ORGAWORLD FILE
00236> #*****
00237> #*****
00238> * SUB-AREA No.1
00239> #*****
00240> CALIB STANDHYD ID=[ 1 ], NHYD=[\"010\"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00241> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00242> SCS curve number CN=[81],
00243> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00244> LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (min)
00245> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00246> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00247> RAINFALL=[ , , , ] (mm/hr), END=-1
00248> #*****
00249> #*****
00250> * SUB-AREA No.2
00251> #*****
00252> CALIB STANDHYD ID=[ 2 ], NHYD=[\"020\"], DT=[2.5] (min), AREA=[1.54] (ha),
00253> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00254> SCS curve number CN=[81],
00255> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00256> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00257> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00258> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00259> RAINFALL=[ , , , ] (mm/hr), END=-1
00260> #*****
00261> #*****
00262> * SUB-AREA No.3
00263> #*****
00264> CALIB STANDHYD ID=[ 3 ], NHYD=[\"030\"], DT=[2.5] (min), AREA=[1.4] (ha),
00265> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00266> SCS curve number CN=[81],
00267> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00268> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00269> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[ 0.51 ] (%),
00270> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0]

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00271> RAINFALL=[ , , , ](mm/hr) , END=-1
00272> *%-----
00273> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00274> *%-----
00275> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00276> *%-----
00277> *
00278> * SUB-AREA No.4
00279>
00280> 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), SLP=[0.7](%),
LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.93](%),
LGI=[164.82](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00288> *%-----
00289> *
00290> * SUB-AREA No.5
00291>
00292> 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), SLP=[1.5](%),
LGP=[20.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[207.25](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00299> *%-----
00300> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00302> *%-----
00303> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00304> *%-----
00305>
00306> 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)
00327> *****
00328> * Remaining Hawthorne Industrial Park *
00329> *****
00330> *
00331> * SUB-AREA No.1
00332>
00333> 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), SLP=[1.5](%),
LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[580](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00341> *%-----
00342> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00343> *%-----
00344> *
00345> * SUB-AREA No.2
00346>
00347> 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), SLP=[1.5](%),
LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[580](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00354> *%-----
00355> *
00356> * SUB-AREA No.3
00357>
00358> 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), SLP=[1.5](%),
LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[580](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00367> *%-----
00368> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00369> *%-----
00370> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
00371> *%-----
00372> *
00373> * SUB-AREA No.4
00374>
00375> 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), SLP=[1.5](%),
LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[580](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00384> *%-----
00385> *
00386> * SUB-AREA No.5
00387>
00388> 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
00392> *%-----
00393>
00394> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
00395> *%-----
00396> *
00397> * SUB-AREA No. 6
00398> *
00399> 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
04002> *%-----
04003>
04004> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
04005> *%-----

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00406> *****
00407> *****
00408> * CALCULATION OF 3HR - 1.5 YEAR STORM EVENT *
00409> *****
00410>
00411> START TZERO=[0.0], MFTOUT=[2], NSTORM=[0], NRUN=[0]
00412> *%-----
00413> * [ ] <- storm filename, one per line for NSTORM time
00414> CHICAGO STORM UNITS=[2], TD=[3.0](hrs), TPRAT=[0.333], CSDT=[10.0](min)
00415> ICASECS=[1],
A=[596.071], B=[6.053], and C=[0.814],
00417> *%-----
00418> DEFAULT VALUES ICASEDef=[1], read and print values
00419> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL"]
00420> *%-----
00422> *****
00423> * ORGAWORLD FILE *
00424> *****
00425>
00426> * SUB-AREA No.1
00427>
00428> 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), SLP=[1.0](%),
LGP=[5](m), MNP=[0.03], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.50](%),
LGI=[244.34](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00437> *
00438> * SUB-AREA No.2
00439>
00440> 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), SLP=[1.0](%),
LGP=[5](m), MNP=[0.03], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.50](%),
LGI=[244.34](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00449> *
00450> * SUB-AREA No.3
00451>
00452> 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), SLP=[1.0](%),
LGP=[5](m), MNP=[0.03], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.51](%),
LGI=[ 225.63 ](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00460> *%-----
00461> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00462> *%-----
00463> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00464> *%-----
00465> *
00466> * SUB-AREA No.4
00467>
00468> 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), SLP=[0.7](%),
LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.93](%),
LGI=[164.82](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00476> *%-----
00477> *
00478> * SUB-AREA No.5
00479>
00480> 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), SLP=[2.5](%),
LGP=[20.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[207.25](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00489> *%-----
00490> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00491> *%-----
00492> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00493> *%-----
00494> 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)
00515> *****
00516> * Remaining Hawthorne Industrial Park *
00517> *****
00518> *
00519> * SUB-AREA No.1
00520>
00521> 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), SLP=[1.5](%),
LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[580](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00529> *%-----
00530> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00531> *%-----
00532> *
00533> * SUB-AREA No.2
00534>
00535> 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), SLP=[1.5](%),
LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
Impervious surfaces: IAimp=[1.57](mm), SLP=[0.61](%),
LGI=[580](m), MNI=[0.03], SCI=[0.0](min)
RAINFALL=[ , , , ](mm/hr) , END=-1
00539> *%-----
00540>

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00541> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00542> RAINFALL=[ , , , ] (mm/hr), END=-1
00543> *%-----
00544> *
00545> * SUB-AREA No.3
00546>
00547> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
00548> XIMP=[0.50], TIMP=[0.71], DWF=[0.71], LOSS=[2],
00549> SCS curve number CN=[81],
00550> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00551> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00552> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.5] (%),
00553> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00554> RAINFALL=[ , , , ] (mm/hr), END=-1
00555> *%-----
00556> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00557> *%-----
00558> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
00559> *%-----
00560> *
00561> * SUB-AREA No.4
00562>
00563> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
00564> XIMP=[0.50], TIMP=[0.71], DWF=[0.71], LOSS=[2],
00565> SCS curve number CN=[81],
00566> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00567> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00568> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.7] (%),
00569> LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min)
00570> RAINFALL=[ , , , ] (mm/hr), END=-1
00571> *%-----
00572> *%-----
00573> *
00574> * SUB-AREA No.5
00575> *
00576> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00577> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00578> RAINFALL=[ , , , ] (mm/hr), END=-1
00579> *%-----
00580> *
00581> *
00582> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
00583> *%-----
00584> *
00585> * SUB-AREA No. 6
00586> *
00587> DESIGN NASHYD ID = [ 1 ], NHYD=["A3"], DT=[2.5] min, AREA=[2.7] (ha),
00588> DWF=[0] (cms), CN/C=[76], TP=[0.80] hrs,
00589> RAINFALL=[ , , , ] (mm/hr), END=-1
00590> *%-----
00591> *
00592> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
00593> *%-----
00594> *
00595> *****
00596> * CALCULATION OF 3HR - 1:10 YEAR STORM EVENT *
00597> *****
00598> *
00599> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00600> * [ ] <- storm filename, one per line for NSTORM time
00601> *%-----
00602> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00603> ICASDef=[1],
00604> A=[1174.184], B=[6.014], and C=[0.816],
00605> *%-----
00606> DEFAULT VALUES ICASDef=[1], read and print values
00607> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWHYMO\ORGA.VAL]
00608> *%-----
00609> *
00610> *****
00611> * ORGAWORLD FILE *
00612> *****
00613> *
00614> * SUB-AREA No.1
00615> *
00616> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00617> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00618> SCS curve number CN=[81],
00619> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00620> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00621> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.52] (%),
00622> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
00623> RAINFALL=[ , , , ] (mm/hr), END=-1
00624> *%-----
00625> *
00626> * SUB-AREA No.2
00627> *
00628> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00629> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00630> SCS curve number CN=[81],
00631> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00632> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00633> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.50] (%),
00634> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
00635> RAINFALL=[ , , , ] (mm/hr), END=-1
00636> *%-----
00637> *
00638> * SUB-AREA No.3
00639> *
00640> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00641> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00642> SCS curve number CN=[81],
00643> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00644> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00645> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.51] (%),
00646> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0] (min)
00647> RAINFALL=[ , , , ] (mm/hr), END=-1
00648> *%-----
00649> ADD HYD IDsum=[4], NHYD=[ "040"], IDs to add=[1+2]
00650> *%-----
00651> ADD HYD IDsum=[5], NHYD=[ "050"], IDs to add=[3+4]
00652> *%-----
00653> *
00654> * SUB-AREA No.4
00655> *
00656> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00657> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00658> SCS curve number CN=[81],
00659> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
00660> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00661> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.93] (%),
00662> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
00663> RAINFALL=[ , , , ] (mm/hr), END=-1
00664> *%-----
00665> *
00666> * SUB-AREA No.5
00667> *
00668> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00669> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00670> SCS curve number CN=[81],
00671> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00672> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (m)
00673> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.61] (%),
00674> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
00675> RAINFALL=[ , , , ] (mm/hr), END=-1

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00676> *%-----
00677> ADD HYD IDsum=[8], NHYD=[ "080"], IDs to add=[6+7]
00678> *%-----
00679> ADD HYD IDsum=[9], NHYD=[ "090"], IDs to add=[5+8]
00680> *%-----
00681> *
00682> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00683> RDT=[1.0] (min),
00684> *****
00685> TABLE of ( OUTFLOW-STORAGE ) values
00686> ( cms ) ( ha-m )
00687> [ 0.00, 0.0000 ]
00688> [ 0.008, 0.0656 ]
00689> [ 0.017, 0.1311 ]
00690> [ 0.092, 0.2831 ]
00691> [ 0.233, 0.3971 ]
00692> [ 0.337, 0.4731 ]
00693> [ 0.465, 0.5491 ]
00694> [ 0.531, 0.5871 ]
00695> [ 0.593, 0.6251 ]
00696> [ 0.654, 0.6631 ]
00697> [ 0.717, 0.7391 ]
00698> [ 0.950, 0.8274 ]
00699> [ 1.304, 0.9157 ]
00700> [ 1.880, 1.0040 ]
00701> [ 2.577, 1.0923 ]
00702> [ -1, -1 ] (max twenty pts)
00703> *****
00704> * Remaining Hawthorne Industrial Park *
00705> *%-----
00706> *
00707> * SUB-AREA No.1
00708> *
00709> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00710> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00711> SCS curve number CN=[81],
00712> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00713> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00714> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.6] (%),
00715> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00716> RAINFALL=[ , , , ] (mm/hr), END=-1
00717> *%-----
00718> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00719> *%-----
00720> *
00721> * SUB-AREA No.2
00722> *
00723> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00724> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00725> SCS curve number CN=[81],
00726> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00727> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00728> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.65] (%),
00729> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00730> RAINFALL=[ , , , ] (mm/hr), END=-1
00731> *%-----
00732> *
00733> * SUB-AREA No.3
00734> *
00735> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
00736> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00737> SCS curve number CN=[81],
00738> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00739> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00740> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.5] (%),
00741> LGI=[500] (m), MNI=[0.03], SCI=[0.0] (min)
00742> RAINFALL=[ , , , ] (mm/hr), END=-1
00743> *%-----
00744> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00745> *%-----
00746> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
00747> *%-----
00748> *
00749> * SUB-AREA No.4
00750> *
00751> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
00752> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00753> SCS curve number CN=[81],
00754> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00755> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00756> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.52] (%),
00757> LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min)
00758> RAINFALL=[ , , , ] (mm/hr), END=-1
00759> *%-----
00760> *
00761> * SUB-AREA No.5
00762> *
00763> *
00764> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00765> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00766> RAINFALL=[ , , , ] (mm/hr), END=-1
00767> *%-----
00768> *
00769> *
00770> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
00771> *%-----
00772> *
00773> * SUB-AREA No. 6
00774> *
00775> DESIGN NASHYD ID = [ 1 ], NHYD=["A3"], DT=[2.5] min, AREA=[2.7] (ha),
00776> DWF=[0] (cms), CN/C=[76], TP=[0.80] hrs,
00777> RAINFALL=[ , , , ] (mm/hr), END=-1
00778> *%-----
00779> *
00780> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
00781> *%-----
00782> *
00783> *****
00784> * CALCULATION OF 3HR - 1:25 YEAR STORM EVENT *
00785> *****
00786> *
00787> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00788> * [ ] <- storm filename, one per line for NSTORM time
00789> *%-----
00790> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00791> ICASDef=[1],
00792> A=[1402.884], B=[6.018], and C=[0.819],
00793> *%-----
00794> DEFAULT VALUES ICASDef=[1], read and print values
00795> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWHYMO\ORGA.VAL]
00796> *%-----
00797> *
00798> *****
00799> * ORGAWORLD FILE *
00800> *****
00801> *
00802> * SUB-AREA No.1
00803> *
00804> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00805> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00806> SCS curve number CN=[81],
00807> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00808> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (m)
00809> Impervious surfaces: IALIMP=[1.57] (mm), SLP=[0.52] (%),
00810> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)

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00811> RAINFALL=[ , , , ](mm/hr) , END=-1
00812> *
00813> * SUB-AREA No.2
00814>
00815>
00816> 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=[0.51](%),
LGI=[225.63](m), MNI=[0.03], SCI=[0.0]
00817> RAINFALL=[ , , , ](mm/hr) , END=-1
00818>
00819>
00820>
00821>
00822>
00823>
00824> *
00825> *
00826> * SUB-AREA No.3
00827>
00828> 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]
00829> RAINFALL=[ , , , ](mm/hr) , END=-1
00830>
00831>
00832>
00833>
00834>
00835>
00836> *
00837> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
00838> *
00839> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
00840> *
00841> *
00842> * SUB-AREA No.4
00843>
00844> CALIB STANDHYD ID=[ 5 ], 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]
00845> RAINFALL=[ , , , ](mm/hr) , END=-1
00846>
00847>
00848>
00849>
00850>
00851>
00852> *
00853> *
00854> * SUB-AREA No.5
00855>
00856> 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](min),
Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.61](%),
LGI=[207.25](m), MNI=[0.03], SCI=[0.0]
00857> RAINFALL=[ , , , ](mm/hr) , END=-1
00858>
00859>
00860>
00861>
00862>
00863>
00864> *
00865> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
00866> *
00867> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+8]
00868> *
00869>
00870> 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)
00871>
00872>
00873>
00874>
00875>
00876>
00877>
00878>
00879>
00880>
00881>
00882>
00883>
00884>
00885>
00886>
00887>
00888>
00889>
00890>
00891>
00892> * Remaining Hawthorne Industrial Park *
00893> *
00894>
00895> * SUB-AREA No.1
00896>
00897> 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](min),
Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.6](%),
LGI=[580](m), MNI=[0.03], SCI=[0.0]
00898> RAINFALL=[ , , , ](mm/hr) , END=-1
00899>
00900>
00901>
00902>
00903>
00904>
00905> *
00906> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00907> *
00908> *
00909> * SUB-AREA No.2
00910>
00911> 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](min),
Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.61](%),
LGI=[450](m), MNI=[0.03], SCI=[0.0]
00912> RAINFALL=[ , , , ](mm/hr) , END=-1
00913>
00914>
00915>
00916>
00917>
00918>
00919>
00920> *
00921> * SUB-AREA No.3
00922>
00923> 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](min),
Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.5](%),
LGI=[600](m), MNI=[0.03], SCI=[0.0]
00924> RAINFALL=[ , , , ](mm/hr) , END=-1
00925>
00926>
00927>
00928>
00929>
00930>
00931> *
00932> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00933> *
00934> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
00935> *
00936> *
00937> * SUB-AREA No.4
00938>
00939> 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](min),
Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.7](%),
LGI=[210](m), MNI=[0.03], SCI=[0.0]
00940>
00941>
00942>
00943>
00944>
00945>

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00946> RAINFALL=[ , , , ](mm/hr) , END=-1
00947>
00948> *
00949> * SUB-AREA No.5
00950>
00951>
00952> 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
00953>
00954>
00955> *
00956> *
00957> *
00958> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
00959> *
00960> *
00961> * SUB-AREA No.6
00962> *
00963> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
DWF=[0](cms), CN/C=[76], TP=[0.80]hrs,
RAINFALL=[ , , , ](mm/hr) , END=-1
00964>
00965> *
00966> *
00967>
00968> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
00969> *
00970> *
00971> *****
00972> * CALCULATION OF 3HR - 1:50 YEAR STORM EVENT *
00973> *****
00974>
00975> START TZERO=[0.0], MROUT=[2], NSTORM=[0], NRUN=[0]
00976> * [ ] <-- storm filename, one per line for NSTORM time
00977> *
00978> CHICAGO STORM IUNITS=[2], TD=[3.0](hrs), TPRAT=[0.333], CSDT=[10.0](min)
00979> ICASEC=[1],
A=[1569.580], B=[6.014], and C=[0.820],
00980>
00981> *
00982> DEFAULT VALUES ICASEDef=[1], read and print values
00983> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWM\HYMO\ORGA.VAL]
00984> *
00985> *
00986> *
00987> *
00988> *
00989> *
00990> * SUB-AREA No.1
00991>
00992> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
XIMP=[0.84], 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=[0.25](%),
LGI=[204.72](m), MNI=[0.03], SCI=[0.0]
00993> RAINFALL=[ , , , ](mm/hr) , END=-1
00994>
00995>
00996>
00997>
00998>
00999> *
01000> *
01001> *
01002> * SUB-AREA No.2
01003>
01004> 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]
01005> RAINFALL=[ , , , ](mm/hr) , END=-1
01006>
01007>
01008>
01009>
01010>
01011>
01012> *
01013> *
01014> * SUB-AREA No.3
01015>
01016> 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]
01017> RAINFALL=[ , , , ](mm/hr) , END=-1
01018>
01019>
01020>
01021>
01022>
01023>
01024> *
01025> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
01026> *
01027> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
01028> *
01029> *
01030> * SUB-AREA No.4
01031>
01032> 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]
01033> RAINFALL=[ , , , ](mm/hr) , END=-1
01034>
01035>
01036>
01037>
01038>
01039> *
01040> *
01041> *
01042> * SUB-AREA No.5
01043>
01044> 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](min),
Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.61](%),
LGI=[207.25](m), MNI=[0.03], SCI=[0.0]
01045> RAINFALL=[ , , , ](mm/hr) , END=-1
01046>
01047>
01048>
01049>
01050>
01051>
01052> *
01053> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
01054> *
01055> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+8]
01056> *
01057> *
01058> ROUTE RESERVOIR IDout=[9], 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)
01059>
01060>
01061>
01062>
01063>
01064>
01065>
01066>
01067>
01068>
01069>
01070>
01071>
01072>
01073>
01074>
01075>
01076>
01077>
01078>
01079>
01080> * Remaining Hawthorne Industrial Park *

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01081> *****
01082> *
01083> * SUB-AREA No.1
01084>
01085> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01086> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01087> SCS curve number CN=[81],
01088> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01089> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01090> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
01091> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01092> RAINFALL=[ , , , ] (mm/hr), END=-1
01093> *
01094> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
01095> *
01096> * SUB-AREA No.2
01097>
01098> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01099> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01100> SCS curve number CN=[81],
01101> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01102> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01103> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
01104> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
01105> RAINFALL=[ , , , ] (mm/hr), END=-1
01106> *
01107> * SUB-AREA No.3
01108>
01109> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
01110> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01111> SCS curve number CN=[81],
01112> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01113> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01114> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
01115> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
01116> RAINFALL=[ , , , ] (mm/hr), END=-1
01117> *
01118> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01119> *
01120> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
01121> *
01122> * SUB-AREA No.4
01123>
01124> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
01125> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01126> SCS curve number CN=[81],
01127> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01128> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01129> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.7] (%),
01130> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01131> RAINFALL=[ , , , ] (mm/hr), END=-1
01132> *
01133> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
01134> *
01135> * SUB-AREA No.5
01136>
01137> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
01138> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
01139> RAINFALL=[ , , , ] (mm/hr), END=-1
01140> *
01141> * SUB-AREA No.6
01142>
01143> DESIGN NASHYD ID=[ 1 ], NHYD=["A3"], DT=[2.5] min, AREA=[2.7] (ha),
01144> DWF=[0] (cms), CN/C=[76], TP=[0.80] hrs,
01145> RAINFALL=[ , , , ] (mm/hr), END=-1
01146> *
01147> ADD HYD IDsum=[ 2 ], NHYD=["Ultimate"], IDs to add=[9+1]
01148> *
01149> * SUB-AREA No.7
01150>
01151> DESIGN NASHYD ID=[ 1 ], NHYD=["A3"], DT=[2.5] min, AREA=[2.7] (ha),
01152> DWF=[0] (cms), CN/C=[76], TP=[0.80] hrs,
01153> RAINFALL=[ , , , ] (mm/hr), END=-1
01154> *
01155> ADD HYD IDsum=[ 2 ], NHYD=["Ultimate"], IDs to add=[9+1]
01156> *
01157> *****
01158> *****
01159> *****
01160> *****
01161> *****
01162> *****
01163> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
01164> *
01165> *
01166> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDD=[10.0] (min)
01167> ICASECS=[1],
01168> A=[1735.688], B=[6.014], and C=[0.820],
01169> *
01170> DEFAULT VALUES ICASEDef=[1], read and print values
01171> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWGHYMO\ORGA.VAL]
01172> *
01173> *****
01174> *****
01175> *****
01176> *****
01177> *****
01178> * SUB-AREA No.1
01179>
01180> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
01181> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
01182> SCS curve number CN=[81],
01183> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01184> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (m)
01185> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
01186> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
01187> RAINFALL=[ , , , ] (mm/hr), END=-1
01188> *
01189> * SUB-AREA No.2
01190>
01191> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
01192> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
01193> SCS curve number CN=[81],
01194> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01195> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01196> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
01197> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
01198> RAINFALL=[ , , , ] (mm/hr), END=-1
01199> *
01200> * SUB-AREA No.3
01201>
01202> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
01203> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01204> SCS curve number CN=[81],
01205> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01206> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01207> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.51] (%),
01208> LGI=[225.63] (m), MNI=[0.03], SCI=[0.0] (min)
01209> RAINFALL=[ , , , ] (mm/hr), END=-1
01210> *
01211> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
01212> *
01213> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
01214> *
01215> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]

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01216> *
01217> * SUB-AREA No.4
01218>
01219> CALIB STANDHYD ID=[ 6 ], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
01220> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01221> SCS curve number CN=[81],
01222> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
01223> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
01224> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.93] (%),
01225> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
01226> RAINFALL=[ , , , ] (mm/hr), END=-1
01227> *
01228> * SUB-AREA No.5
01229>
01230> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
01231> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01232> SCS curve number CN=[81],
01233> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01234> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (m)
01235> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
01236> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
01237> RAINFALL=[ , , , ] (mm/hr), END=-1
01238> *
01239> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
01240> *
01241> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
01242> *
01243> *
01244> *
01245>
01246> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
01247> RDT=[1.0] (min),
01248> TABLE of ( OUTFLOW-STORAGE ) values
01249> ( cms ) - ( ha-m )
01250> [ 0.000, 0.0000 ]
01251> [ 0.008, 0.0656 ]
01252> [ 0.017, 0.1311 ]
01253> [ 0.093, 0.2831 ]
01254> [ 0.233, 0.3971 ]
01255> [ 0.337, 0.4731 ]
01256> [ 0.465, 0.5491 ]
01257> [ 0.531, 0.5871 ]
01258> [ 0.593, 0.6251 ]
01259> [ 0.654, 0.6631 ]
01260> [ 0.797, 0.7391 ]
01261> [ 0.950, 0.874 ]
01262> [ 1.304, 0.9157 ]
01263> [ 1.880, 1.0040 ]
01264> [ 2.577, 1.0923 ]
01265> [ -1, -1 ] (max twenty pts)
01266>
01267> *****
01268> * Remaining Hawthorne Industrial Park *
01269> *****
01270> * SUB-AREA No.1
01271>
01272> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01273> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01274> SCS curve number CN=[81],
01275> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01276> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01277> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
01278> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01279> RAINFALL=[ , , , ] (mm/hr), END=-1
01280> *
01281> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
01282> *
01283> * SUB-AREA No.2
01284>
01285> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01286> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01287> SCS curve number CN=[81],
01288> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01289> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01290> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
01291> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
01292> RAINFALL=[ , , , ] (mm/hr), END=-1
01293> *
01294> * SUB-AREA No.3
01295>
01296> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
01297> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01298> SCS curve number CN=[81],
01299> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01300> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01301> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
01302> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
01303> RAINFALL=[ , , , ] (mm/hr), END=-1
01304> *
01305> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01306> *
01307> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
01308> *
01309> * SUB-AREA No.4
01310>
01311> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
01312> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01313> SCS curve number CN=[81],
01314> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01315> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01316> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.7] (%),
01317> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01318> RAINFALL=[ , , , ] (mm/hr), END=-1
01319> *
01320> * SUB-AREA No.5
01321>
01322> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
01323> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
01324> RAINFALL=[ , , , ] (mm/hr), END=-1
01325> *
01326> * SUB-AREA No.6
01327>
01328> DESIGN NASHYD ID=[ 1 ], NHYD=["A3"], DT=[2.5] min, AREA=[2.7] (ha),
01329> DWF=[0] (cms), CN/C=[76], TP=[0.80] hrs,
01330> RAINFALL=[ , , , ] (mm/hr), END=-1
01331> *
01332> *
01333> *
01334> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[9+1]
01335> *
01336> *
01337> *
01338> *
01339> *
01340> *
01341> *
01342> *
01343> *
01344> *
01345> *
01346> *
01347> *
01348> *
01349> *
01350> *****1 600 mm culverts @ 84.5 + 2 600 mm culverts @ 85.25 10% Pond reduction*****

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00001>-----
00002>
00003> SSSSS W W M M H H Y Y M M O O 999 999 -----
00004> S W W M M H H Y Y M M O O 9 9 9 9
00005> SSSSS W W W M M M H H H H Y Y M M O O ## 9 9 9 9 Ver. 4.02
00006> S W W M M H H H Y Y M M O O 9999 9999 July 1999
00007> SSSSS W W M M H H H Y Y M M O O 9 9 9 9
00008> 9 9 9 9 # 418403
00009> StormWater Management HYdrologic Model 999 999 -----
00010>
00011> ***** SWHYMO-99 Ver/4.02 *****
00012> ***** A single event and continuous hydrologic simulation model *****
00013> ***** based on the principles of HMO and its successors *****
00014> ***** OTHMO-93 and OTHMO-89 *****
00015> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00016> ***** Ottawa, Ontario: (613) 727-5199 *****
00017> ***** Gatineau, Quebec: (819) 243-6858 *****
00018> ***** E-Mail: sumhymo@jfasa.com *****
00019> *****
00020> *****
00021> *****
00022> *****
00023> ***** Licensed user: J. L. Richards & Associates Limited *****
00024> ***** Ottawa SERIAL#418403 *****
00025> *****
00026> *****
00027> *****
00028> ***** PROGRAM ARRAY DIMENSIONS *****
00029> ***** Maximum # of ID numbers : 10 *****
00030> ***** Max. number of rainfall points: 15000 *****
00031> ***** Max. number of flow points : 15000 *****
00032> *****
00033> *****
00034> *****
00035> ***** DETAILED OUTPUT *****
00036> *****
00037> *****
00038> ***** DATE: 2009-02-09 TIME: 14:59:31 RUN COUNTER: 000154 *****
00039> *****
00040> ***** Input filename: V:\20983.DU\ENG\SWHYMO\PESTPH2.dat *****
00041> ***** Output filename: V:\20983.DU\ENG\SWHYMO\PESTPH2.out *****
00042> ***** Summary filename: V:\20983.DU\ENG\SWHYMO\PESTPH2.sum *****
00043> ***** User comments: *****
00044> *****
00045> *****
00046> *****
00047> *****
00048> *****
00049> *****
00050> 001:0001 *****
00051> *****
00052> ***** Project Name : Hawthorne Industrial Park Project Number: [20983] *****
00053> ***** Date : January, 2009 *****
00054> ***** Revisd : N/A *****
00055> ***** Developed by : Mark Buchanan, E.I.T. *****
00056> ***** Revisd by : Guy Forget, P.Eng. *****
00057> ***** Company : J.L. Richards & Associates Limited *****
00058> ***** License # : 4418403 *****
00059> *****
00060> *****
00061> *****
00062> *****
00063> ***** FILENAME: V:\20983.DU\ENG\SWHYMO\20983PST.DAT *****
00064> ***** FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *****
00065> ***** OF A FACILITY ASSOCIATED WITH THE OTHER COMPOSTING SITE *****
00066> *****
00067> *****
00068> *****
00069> ***** SWHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE *****
00070> ***** PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *****
00071> *****
00072> *****
00073> ***** HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *****
00074> ***** FOR DESIGN STORMS OF 1:2, 3, 10, 25, 50, AND 100 YR *****
00075> *****
00076> *****
00077> ***** POST-DEVELOPMENT UNCONTROLLED CONDITIONS *****
00078> *****
00079> *****
00080> ***** CALCULATION OF 4 HR 25 MM STORM EVENT *****
00081> *****
00082> *****
00083> | START | Project dir.: V:\20983.DU\ENG\SWHYMO\
00084> | Rainfall dir.: V:\20983.DU\ENG\SWHYMO\
00085> | TZERO = .00 hrs on
00086> | METOUT= 2 (output = METRIC)
00087> | NRUN = 001
00088> | NSTORM= 0
00089> *****
00090> 001:0002 *****
00091> *****
00092> | READ STORM | Filename: V:\20983.DU\ENG\SWHYMO\4HR25-15.STM
00093> | Ptotal= 25.00 mm | Comments: 4hr-15 min 25 MM STORM EVENT (CHICAGO DI
00094> *****
00095> *****
00096> *****
00097> *****
00098> *****
00099> *****
00100> *****
00101> *****
00102> *****
00103> 001:0003 *****
00104> *****
00105> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\SWHYMO\ORGA.VAL
00106> | ICASEdv = 1 (read and print data)
00107> | FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE -----
00108> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----
00109> *****
00110> ***** Horton's infiltration equation parameters: *****
00111> ***** [F0= 50.00 mm/hr] [F= 7.50 mm/hr] [ICAF= 2.00 /hr] [F= .00 mm]
00112> ***** Parameters for PERVIOUS surfaces in STANDHYD: *****
00113> ***** [IAper= 4.67 mm] [LGP=40.00 mm] [MNP= .250]
00114> ***** Parameters for IMPERVIOUS surfaces in STANDHYD: *****
00115> ***** [IAlmp= 1.57 mm] [CLI= 1.50] [MNI= .035]
00116> ***** Parameters used in RASBY: *****
00117> ***** [Ia= 4.67 mm] [N= 3.00]
00118> 001:0004 *****
00119> *****
00120> ***** ORGAWORLD FILE *****
00121> *****
00122> ***** SUB-AREA No.1 *****
00123> *****
00124> | CALIB STANDHYD | Area (ha)= 2.07
00125> | 01:010 | DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
00126> *****
00127> *****
00128> ***** IMPERVIOUS PERVIOUS (i)
00129> ***** Surface Area (ha)= 1.74 .33
00130> ***** Dep. Storage (mm)= 1.57 4.67
00131> ***** Average Slope (%)= .52 1.00
00132> ***** Length (m)= 204.72 20.00
00133> ***** Mannings n = .030 .250
00134> *****
00135> ***** Max. eff. Inten. (mm/hr)= 45.63 5.37
00136> ***** over (min)= 10.00 30.00

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00136> Storage Coeff. (min)= 10.80 (ii) 29.27 (ii)
00137> Unit Hyd. Tpeak (min)= 10.00 30.00
00138> Unit Hyd. peak (cms)= .11 .04
00139> *****
00140> *****
00141> ***** PEAK FLOW (cms)= .16 .00 *TOTALS*
00142> ***** TIME TO PEAK (hrs)= 1.29 1.75 1.158 (iii)
00143> ***** RUNOFF VOLUME (mm)= 23.43 5.17 20.508
00144> ***** TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00145> ***** RUNOFF COEFFICIENT = .94 .21 .820
00146> *****
00147> ***** (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00148> ***** CN* = 81.0 Ia = Dep. Storage (Above)
00149> ***** (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00150> ***** THAN THE STORAGE COEFFICIENT.
00151> ***** (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00152> *****
00153> *****
00154> *****
00155> ***** SUB-AREA No.2 *****
00156> *****
00157> | CALIB STANDHYD | Area (ha)= 1.54
00158> | 02:020 | DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00159> *****
00160> *****
00161> ***** IMPERVIOUS PERVIOUS (i)
00162> ***** Surface Area (ha)= 1.42 .12
00163> ***** Dep. Storage (mm)= 1.57 4.67
00164> ***** Average Slope (%)= .50 1.00
00165> ***** Length (m)= 244.34 5.00
00166> ***** Mannings n = .030 .030
00167> *****
00168> ***** Max. eff. Inten. (mm/hr)= 45.63 7.24
00169> ***** over (min)= 12.50 15.00
00170> ***** Storage Coeff. (min)= 12.15 (ii) 14.15 (ii)
00171> ***** Unit Hyd. Tpeak (min)= 12.50 15.00
00172> ***** Unit Hyd. peak (cms)= .09 .08
00173> *****
00174> ***** PEAK FLOW (cms)= .12 .00 *TOTALS*
00175> ***** TIME TO PEAK (hrs)= 1.33 1.46 1.333
00176> ***** RUNOFF VOLUME (mm)= 23.43 5.17 21.969
00177> ***** TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00178> ***** RUNOFF COEFFICIENT = .94 .21 .879
00179> *****
00180> ***** (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00181> ***** CN* = 81.0 Ia = Dep. Storage (Above)
00182> ***** (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00183> ***** THAN THE STORAGE COEFFICIENT.
00184> ***** (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00185> *****
00186> *****
00187> *****
00188> ***** SUB-AREA No.3 *****
00189> *****
00190> | CALIB STANDHYD | Area (ha)= 1.40
00191> | 03:030 | DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00192> *****
00193> *****
00194> ***** IMPERVIOUS PERVIOUS (i)
00195> ***** Surface Area (ha)= 1.36 .04
00196> ***** Dep. Storage (mm)= 1.57 4.67
00197> ***** Average Slope (%)= .51 1.00
00198> ***** Length (m)= 225.63 5.00
00199> ***** Mannings n = .030 .030
00200> *****
00201> ***** Max. eff. Inten. (mm/hr)= 45.63 7.97
00202> ***** over (min)= 12.50 12.50
00203> ***** Storage Coeff. (min)= 11.52 (ii) 13.44 (ii)
00204> ***** Unit Hyd. Tpeak (min)= 12.50 12.50
00205> ***** Unit Hyd. peak (cms)= .10 .09
00206> *****
00207> ***** PEAK FLOW (cms)= .12 .00 *TOTALS*
00208> ***** TIME TO PEAK (hrs)= 1.33 1.42 1.118 (iii)
00209> ***** RUNOFF VOLUME (mm)= 23.43 5.17 22.881
00210> ***** TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00211> ***** RUNOFF COEFFICIENT = .94 .21 .915
00212> *****
00213> ***** (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00214> ***** CN* = 81.0 Ia = Dep. Storage (Above)
00215> ***** (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00216> ***** THAN THE STORAGE COEFFICIENT.
00217> ***** (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00218> *****
00219> *****
00220> *****
00221> *****
00222> 001:0007 *****
00223> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00224> | (ha) (cms) (hrs) (mm) (cms)
00225> | ID1 01:010 | 2.07 .158 1.29 20.51 .000
00226> | +ID2 02:020 | 1.54 .121 1.33 21.97 .000
00227> |-----|
00228> | SUM 04:040 | 3.61 .278 1.33 21.13 .000
00229> *****
00230> ***** NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. *****
00231> *****
00232> *****
00233> *****
00234> *****
00235> *****
00236> *****
00237> *****
00238> *****
00239> *****
00240> *****
00241> *****
00242> *****
00243> 001:0008 *****
00244> *****
00245> ***** SUB-AREA No.4 *****
00246> *****
00247> | CALIB STANDHYD | Area (ha)= .89
00248> | 06:060 | DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00249> *****
00250> *****
00251> ***** IMPERVIOUS PERVIOUS (i)
00252> ***** Surface Area (ha)= .86 .03
00253> ***** Dep. Storage (mm)= 1.57 4.67
00254> ***** Average Slope (%)= .93 .70
00255> ***** Length (m)= 164.82 40.00
00256> ***** Mannings n = .030 .250
00257> *****
00258> ***** Max. eff. Inten. (mm/hr)= 45.63 4.42
00259> ***** over (min)= 7.50 42.50
00260> ***** Storage Coeff. (min)= 7.97 (ii) 41.62 (ii)
00261> ***** Unit Hyd. Tpeak (min)= 7.50 42.50
00262> ***** Unit Hyd. peak (cms)= .14 .03
00263> *****
00264> ***** PEAK FLOW (cms)= .09 .00 *TOTALS*
00265> ***** TIME TO PEAK (hrs)= 1.25 2.00 .089 (iii)
00266> ***** RUNOFF VOLUME (mm)= 23.43 5.17 22.882
00267> ***** TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00268> ***** RUNOFF COEFFICIENT = .94 .21 .915
00269> *****
00270> ***** (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00271> ***** CN* = 81.0 Ia = Dep. Storage (Above)

```

00271> (i) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 00272> THAN THE STORAGE COEFFICIENT.
 00273> (i.i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 00274>
 00275>
 00276> 001:001C
 00277> * SUB-AREA No.5
 00278>
 00279> | CALIB STANDHYD | Area (ha)= 2.66
 00280> | 07:07C DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
 00281>
 00282>
 00283>
 00284> IMPERVIOUS PERVIOUS (i)
 00285> Surface Area (ha)= 2.58 .08
 00286> Dep. Storage (mm)= 1.57 4.67
 00287> Average Slope (%)= .61 1.50
 00288> Length (m)= 207.25 20.00
 00289> Mannings n = .030 .250
 00290> Max. eff. Inten. (mm/hr)= 45.63 5.66
 00291> over (min)= 10.00 27.50
 00292> Storage Coeff. (min)= 10.37 (ii) 26.38 (ii)
 00293> Unit Hyd. Tpeak (min)= 10.00 27.50
 00294> Unit Hyd. peak (cms)= .11 .04
 00295>
 00296> PEAK FLOW (cms)= .24 .00 *TOTALS*
 00297> TIME TO PEAK (hrs)= 1.29 1.67 1.292
 00298> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
 00299> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
 00300> RUNOFF COEFFICIENT = .94 .35 .643
 00301>
 00302> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 00303> CN* = 81.0 Ia = Dep. Storage (Above)
 00304> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 00305> THAN THE STORAGE COEFFICIENT.
 00306> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 00307>
 00308>
 00309> 001:0011

00310> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 00311> | ID1 06:050 | .89 .089 1.25 22.88 .000
 00312> | +ID2 07:070 | 2.66 .237 1.29 22.88 .000
 00313> =====
 00314> SUM 08:080 3.55 .327 1.29 22.88 .000
 00315>
 00316> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 00317>
 00318>
 00319>
 00320>
 00321> 001:0012

00322> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 00323> | ID1 05:050 | 5.01 .396 1.33 21.62 .000
 00324> | +ID2 08:080 | 3.55 .327 1.29 22.88 .000
 00325> =====
 00326> SUM 09:090 8.56 .716 1.29 22.14 .000
 00327>
 00328> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 00329>
 00330>
 00331>
 00332>
 00333> 001:0013

00334> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
 00335> | IN>09: (090) |
 00336> | OUT<10: (POND) |
 00337>
 00338> =====
 00339> OUTFLOW STORAGE OUTFLOW STORAGE
 00340> (cms) (ha.m.) (cms) (mm) (ha.m.) (mm)
 00341> .000 .0000E+00 .593 .6251E+00
 00342> .008 .6560E-01 .654 .6631E+00
 00343> .017 .1311E+00 .797 .7391E+00
 00344> .093 .2831E+00 .950 .8274E+00
 00345> .233 .3971E+00 1.304 .9157E+00
 00346> .337 .4731E+00 1.880 .1004E+01
 00347> .465 .5491E+00 2.577 .1092E+01
 00348> .531 .5871E+00 .000 .0000E+00
 00349>
 00350> ROUTING RESULTS AREA QPEAK TPEAK R.V.
 00351> INFLOW >09: (090) (ha) (cms) (hrs) (mm) (cms)
 00352> OUTFLOW <10: (POND) 8.56 .716 1.29 22.143
 00353> 8.56 .032 3.875 22.141
 00354>
 00355> PEAK FLOW REDUCTION [Qout/Qin] (%) = 4.470
 00356> TIME SHIFT OF PEAK FLOW (min) = 155.00
 00357> MAXIMUM STORAGE USED (ha.m.) = .1611E+00
 00358>
 00359> 001:0014

00360> *****
 00361> * Remaining Hawthorne Industrial Park *
 00362> *****
 00363> *
 00364> * SUB-AREA No.1
 00365>
 00366> | CALIB STANDHYD | Area (ha)= 19.90
 00367> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 00368>
 00369>
 00370> IMPERVIOUS PERVIOUS (i)
 00371> Surface Area (ha)= 14.13 5.77
 00372> Dep. Storage (mm)= 1.57 4.67
 00373> Average Slope (%)= .60 1.50
 00374> Length (m)= 580.00 100.00
 00375> Mannings n = .030 .250
 00376> Max. eff. Inten. (mm/hr)= 34.39 11.90
 00377> over (min)= 22.50 52.50
 00378> Storage Coeff. (min)= 21.64 (ii) 52.88 (ii)
 00379> Unit Hyd. Tpeak (min)= 22.50 52.50
 00380> Unit Hyd. peak (cms)= .05 .02
 00381>
 00382> PEAK FLOW (cms)= .60 .11 .642 (iii)
 00383> TIME TO PEAK (hrs)= 1.50 2.13 1.542
 00384> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
 00385> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
 00386> RUNOFF COEFFICIENT = .94 .35 .643
 00387>
 00388> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 00389> CN* = 81.0 Ia = Dep. Storage (Above)
 00390> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 00391> THAN THE STORAGE COEFFICIENT.
 00392> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 00393>
 00394>
 00395> 001:0015

00396> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 00397> | ID1 10:POND | 8.56 .032 3.88 22.14 .000
 00398> | +ID2 01:HIP01 | 19.90 .642 1.54 16.08 .000
 00399> =====
 00400> SUM 02:HIP02 28.46 .655 1.54 17.91 .000
 00401>
 00402> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 00403>
 00404>
 00405>

00406>
 00407> 001:0016
 00408>
 00409> * SUB-AREA No.2
 00410>
 00411> | CALIB STANDHYD | Area (ha)= 17.00
 00412> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 00413>
 00414>
 00415> IMPERVIOUS PERVIOUS (i)
 00416> Surface Area (ha)= 12.07 4.93
 00417> Dep. Storage (mm)= 1.57 4.67
 00418> Average Slope (%)= .65 1.50
 00419> Length (m)= 450.00 100.00
 00420> Mannings n = .030 .250
 00421> Max. eff. Inten. (mm/hr)= 40.81 12.73
 00422> over (min)= 17.50 47.50
 00423> Storage Coeff. (min)= 16.94 (ii) 47.35 (ii)
 00424> Unit Hyd. Tpeak (min)= 17.50 47.50
 00425> Unit Hyd. peak (cms)= .07 .02
 00426>
 00427> PEAK FLOW (cms)= .60 .10 .625 (iii)
 00428> TIME TO PEAK (hrs)= 1.42 2.00 1.458
 00429> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
 00430> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
 00431> RUNOFF COEFFICIENT = .94 .35 .643
 00432>
 00433> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 00434> CN* = 81.0 Ia = Dep. Storage (Above)
 00435> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 00436> THAN THE STORAGE COEFFICIENT.
 00437> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 00438>
 00439>
 00440> 001:0017

00441> *
 00442> * SUB-AREA No.3
 00443>
 00444> | CALIB STANDHYD | Area (ha)= 15.60
 00445> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 00446>
 00447>
 00448> IMPERVIOUS PERVIOUS (i)
 00449> Surface Area (ha)= 11.08 4.52
 00450> Dep. Storage (mm)= 1.57 4.67
 00451> Average Slope (%)= .50 1.50
 00452> Length (m)= 600.00 100.00
 00453> Mannings n = .030 .250
 00454> Max. eff. Inten. (mm/hr)= 34.39 11.54
 00455> over (min)= 22.50 55.00
 00456> Storage Coeff. (min)= 23.33 (ii) 54.95 (ii)
 00457> Unit Hyd. Tpeak (min)= 22.50 55.00
 00458> Unit Hyd. peak (cms)= .05 .02
 00459>
 00460> PEAK FLOW (cms)= .45 .08 .484 (iii)
 00461> TIME TO PEAK (hrs)= 1.50 2.17 1.542
 00462> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
 00463> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
 00464> RUNOFF COEFFICIENT = .94 .35 .643
 00465>
 00466> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 00467> CN* = 81.0 Ia = Dep. Storage (Above)
 00468> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 00469> THAN THE STORAGE COEFFICIENT.
 00470> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 00471>
 00472>
 00473> 001:0018

00474> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 00475> | ID1 03:HIP03 | 17.00 .625 1.46 16.08 .000
 00476> | +ID2 04:HIP04 | 15.60 .484 1.54 16.08 .000
 00477> =====
 00478> SUM 05:HIP05 32.60 1.091 1.46 16.08 .000
 00479>
 00480> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 00481>
 00482>
 00483>
 00484>
 00485> 001:0019

00486> | ADD HYD (HIP06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 00487> | ID1 05:HIP05 | 32.60 1.091 1.46 16.08 .000
 00488> | +ID2 02:HIP02 | 28.46 .655 1.54 17.91 .000
 00489> =====
 00490> SUM 06:HIP06 61.06 1.740 1.50 16.93 .000
 00491>
 00492>
 00493> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 00494>
 00495>
 00496>
 00497> 001:0020

00498> *
 00499> * SUB-AREA No.4
 00500>
 00501> | CALIB STANDHYD | Area (ha)= 12.20
 00502> | 07:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 00503>
 00504>
 00505> IMPERVIOUS PERVIOUS (i)
 00506> Surface Area (ha)= 8.66 3.54
 00507> Dep. Storage (mm)= 1.57 4.67
 00508> Average Slope (%)= .70 1.50
 00509> Length (m)= 210.00 100.00
 00510> Mannings n = .030 .250
 00511> Max. eff. Inten. (mm/hr)= 45.63 14.15
 00512> over (min)= 10.00 40.00
 00513> Storage Coeff. (min)= 10.03 (ii) 39.18 (ii)
 00514> Unit Hyd. Tpeak (min)= 10.00 40.00
 00515> Unit Hyd. peak (cms)= .11 .03
 00516>
 00517> PEAK FLOW (cms)= .57 .08 .585 (iii)
 00518> TIME TO PEAK (hrs)= 1.29 1.88 1.292
 00519> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
 00520> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
 00521> RUNOFF COEFFICIENT = .94 .35 .643
 00522>
 00523> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 00524> CN* = 81.0 Ia = Dep. Storage (Above)
 00525> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 00526> THAN THE STORAGE COEFFICIENT.
 00527> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 00528>
 00529>
 00530> 001:0021

00531> *
 00532> * SUB-AREA No.5
 00533>
 00534> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
 00535> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
 00536> | U.H. Tp (hrs)= .170
 00537>
 00538> Unit Hyd Qpeak (cms)= .899
 00539>
 00540> PEAK FLOW (cms)= .077 (i)

```

00541> TIME TO PEAK (hrs)= 1.375
00542> RUNOFF VOLUME (mm)= 6.343
00543> TOTAL RAINFALL (mm)= 24.999
00544> RUNOFF COEFFICIENT = .254
00545>
00546> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00547>
00548> 001:0022-----
00550>
00551> | ADD HYD (HIPO8 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00552> | | (ha) (cms) (hrs) (mm) (cms)
00553> | ID1 06:HIPO8 61.06 1.740 1.50 16.93 .000
00554> | +ID2 07:HIPO7 12.20 .585 1.29 16.08 .000
00555> | +ID3 08:Pond-B 4.00 .077 1.38 6.34 .000
00556>
00557> SUM 09:HIPO8 77.26 2.227 1.46 16.25 .000
00558>
00559> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00560>
00561>-----
00562> 001:0023-----
00563> *
00564> * SUB-AREA No. 6
00565> *
00566>
00567> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
00568> | O1:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00569> | U.H. Tp (hrs)= .800
00570>
00571> Unit Hyd Qpeak (cms)= .129
00572>
00573> PEAK FLOW (cms)= .013 (i)
00574> TIME TO PEAK (hrs)= 2.292
00575> RUNOFF VOLUME (mm)= 4.110
00576> TOTAL RAINFALL (mm)= 24.999
00577> RUNOFF COEFFICIENT = .164
00578>
00579> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00580>
00581>-----
00582> 001:0024-----
00583>
00584> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00585> | | (ha) (cms) (hrs) (mm) (cms)
00586> | ID1 09:HIPO8 77.26 2.227 1.46 16.25 .000
00587> | +ID2 01:A3 2.70 .013 2.29 4.11 .000
00588>
00589> SUM 02:Ultima 79.96 2.231 1.46 15.84 .000
00590>
00591> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00592>
00593>-----
00594> 001:0025-----
00595> *****
00596> * CALCULATION OF 3HR - 1:2 YEAR STORM EVENT *
00597> *****
00598>
00599> | START | Project dir.: V:\20983.DU\ENG\SWM\HYM\
00600> | Rainfall dir.: V:\20983.DU\ENG\SWM\HYM\
00601> | TZERO = .00 hrs on 0
00602> | METOUT = 2 (output = METRIC)
00603> | NRUN = 01
00604> | NSTORM = 0
00605>
00606> 001:0002-----
00607>
00608> | CHICAGO STORM | IDF curve parameters: A= 732.951
00609> | Ptotal= 31.86 mm | B= 6.199
00610> | | C= .810
00611> | used in: INTENSITY = A / (t + B)^C
00612>
00613> | Duration of storm = 3.00 hrs
00614> | Storm time step = 10.00 min
00615> | Time to peak ratio = .33
00616>
00617> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00618> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00619> .17 2.815 | 1.00 76.805 | 1.83 5.095 | 2.57 2.684
00620> .33 3.498 | 1.17 24.079 | 2.00 4.291 | 2.83 2.463
00621> .50 4.687 | 1.33 12.364 | 2.17 3.718 | 3.00 2.279
00622> .67 7.305 | 1.50 8.324 | 2.33 3.288 |
00623> .83 18.209 | 1.67 6.303 | 2.50 2.953 |
00624>
00625>-----
00626> 001:0003-----
00627>
00628> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\SWM\HYM\ORGA.VAL
00629> | ICASEDv = 1 (read and print data)
00630> | FileTitle= ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE
00631> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----
00632>
00633> | Horton's infiltration equation parameters:
00634> | [F= 50.00 mm/hr] [P= 7.50 mm/hr] [ICAF= 2.00 /hr] [P= .00 mm]
00635> | Parameters for PERVIOUS surfaces in STANDHYD:
00636> | [IAper= 4.67 mm] [LGP=40.00 mm] [MNP= .250]
00637> | Parameters for IMPERVIOUS surfaces in STANDHYD:
00638> | [IAimp= 1.57 mm] [CLI= 1.50] [MNI= .035]
00639> | Parameters used in NASHYD:
00640> | [Ia= 4.67 mm] [N= 3.00]
00641>-----
00642> 001:0004-----
00643> *
00644> * ORGNORL FILE *
00645> *
00646> * SUB-AREA No.1
00647>
00648> | CALIB STANDHYD | Area (ha)= 2.07
00649> | O1:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
00650>
00651> IMPERVIOUS PERVIOUS (i)
00652> Surface Area (ha)= 1.74 .33
00653> Dep. Storage (mm)= 1.57 4.67
00654> Average Slope (%)= .52 1.00
00655> Length (m)= 204.72 20.00
00656> Mannings n = .030 .250
00657>
00658> Max. eff. Inten. (mm/hr)= 76.81 11.88
00659> over (min)= 10.00 22.50
00660> Storage Coeff. (min)= 8.77 (ii) 22.21 (ii)
00661> Unit Hyd. Tpeak (min)= 10.00 22.50
00662> Unit Hyd. peak (cms)= .12 .05
00663>
00664> *TOTALS*
00665> PEAK FLOW (cms)= .24 .01 .245 (iii)
00666> TIME TO PEAK (hrs)= 1.08 1.38 1.063
00667> RUNOFF VOLUME (mm)= 30.29 8.52 26.807
00668> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00669> RUNOFF COEFFICIENT = .95 .27 .841
00670>
00671> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00672> CN* = 81.0 Ia = Dep. Storage (Above)
00673> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00674> THAN THE STORAGE COEFFICIENT.
00675> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

00676> 001:0005-----
00677> *
00678> * SUB-AREA No.2
00679> *
00680> | CALIB STANDHYD | Area (ha)= 1.54
00681> | O2:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00682>
00683> IMPERVIOUS PERVIOUS (i)
00684> Surface Area (ha)= 1.42 .12
00685> Dep. Storage (mm)= 1.57 4.67
00686> Average Slope (%)= .50 1.00
00687> Length (m)= 244.34 5.00
00688> Mannings n = .030 .030
00689>
00690> Max. eff. Inten. (mm/hr)= 76.81 15.07
00691> over (min)= 10.00 12.50
00692> Storage Coeff. (min)= 9.87 (ii) 11.36 (ii)
00693> Unit Hyd. Tpeak (min)= 10.00 12.50
00694> Unit Hyd. peak (cms)= .11 .10
00695>
00696> *TOTALS*
00697> PEAK FLOW (cms)= .19 .00 .192 (iii)
00698> TIME TO PEAK (hrs)= 1.08 1.17 1.083
00699> RUNOFF VOLUME (mm)= 30.29 8.52 28.548
00700> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00701> RUNOFF COEFFICIENT = .95 .27 .896
00702>
00703> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00704> CN* = 81.0 Ia = Dep. Storage (Above)
00705> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00706> THAN THE STORAGE COEFFICIENT.
00707> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00708>-----
00709> 001:0006-----
00710> *
00711> * SUB-AREA No.3
00712>
00713> | CALIB STANDHYD | Area (ha)= 1.40
00714> | O3:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00715>
00716> IMPERVIOUS PERVIOUS (i)
00717> Surface Area (ha)= 1.36 .04
00718> Dep. Storage (mm)= 1.57 4.67
00719> Average Slope (%)= .51 1.00
00720> Length (m)= 225.63 5.00
00721> Mannings n = .030 .030
00722>
00723> Max. eff. Inten. (mm/hr)= 76.81 16.59
00724> over (min)= 10.00 10.00
00725> Storage Coeff. (min)= 9.35 (ii) 10.79 (ii)
00726> Unit Hyd. Tpeak (min)= 10.00 10.00
00727> Unit Hyd. peak (cms)= .12 .11
00728>
00729> *TOTALS*
00730> PEAK FLOW (cms)= .18 .00 .186 (iii)
00731> TIME TO PEAK (hrs)= 1.08 1.13 1.083
00732> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00733> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00734> RUNOFF COEFFICIENT = .95 .27 .930
00735>
00736> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00737> CN* = 81.0 Ia = Dep. Storage (Above)
00738> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00739> THAN THE STORAGE COEFFICIENT.
00740> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00741>-----
00742> 001:0007-----
00743>
00744> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00745> | | (ha) (cms) (hrs) (mm) (cms)
00746> | ID1 01:010 2.07 .245 1.08 26.81 .000
00747> | +ID2 02:020 1.54 .192 1.08 28.55 .000
00748>
00749> SUM 04:040 3.61 .436 1.08 27.55 .000
00750>
00751> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00752>-----
00753> 001:0008-----
00754> *
00755>
00756> | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00757> | | (ha) (cms) (hrs) (mm) (cms)
00758> | ID1 03:030 1.40 .186 1.08 29.64 .000
00759> | +ID2 04:040 3.61 .436 1.08 27.55 .000
00760>
00761> SUM 05:050 5.01 .623 1.08 28.13 .000
00762>
00763> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00764>-----
00765> 001:0009-----
00766> *
00767> *
00768> * SUB-AREA No.4
00769> *
00770> | CALIB STANDHYD | Area (ha)= .89
00771> | O6:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00772>
00773> IMPERVIOUS PERVIOUS (i)
00774> Surface Area (ha)= .86 .03
00775> Dep. Storage (mm)= 1.57 4.67
00776> Average Slope (%)= .93 .70
00777> Length (m)= 164.82 40.00
00778> Mannings n = .030 .250
00779>
00780> Max. eff. Inten. (mm/hr)= 76.81 10.24
00781> over (min)= 7.50 30.00
00782> Storage Coeff. (min)= 6.47 (ii) 30.53 (ii)
00783> Unit Hyd. Tpeak (min)= 7.50 30.00
00784> Unit Hyd. peak (cms)= .16 .04
00785>
00786> *TOTALS*
00787> PEAK FLOW (cms)= .14 .00 .139 (iii)
00788> TIME TO PEAK (hrs)= 1.04 1.54 1.042
00789> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00790> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00791> RUNOFF COEFFICIENT = .95 .27 .930
00792>
00793> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00794> CN* = 81.0 Ia = Dep. Storage (Above)
00795> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00796> THAN THE STORAGE COEFFICIENT.
00797> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00798>-----
00799> 001:0010-----
00800> *
00801> * SUB-AREA No.5
00802>
00803> | CALIB STANDHYD | Area (ha)= 2.66
00804> | O7:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00805>
00806> IMPERVIOUS PERVIOUS (i)
00807> Surface Area (ha)= 2.58 .08
00808> Dep. Storage (mm)= 1.57 4.67
00809> Average Slope (%)= .61 1.50
00810> Length (m)= 207.25 20.00

```

00811> Mannings n = .030 .250
00812> Max. eff. Inten. (mm/hr) = 76.81 12.71
00814> over (min) = 7.50 20.00
00815> Storage Coeff. (min) = 8.42 (ii) 20.00 (ii)
00816> Unit Hyd. Tpeak (min) = 7.50 20.00
00817> Unit Hyd. peak (cms) = .14 .06
00819> PEAK FLOW (cms) = .38 .00
00820> TIME TO PEAK (hrs) = 1.04 1.33
00821> RUNOFF VOLUME (mm) = 30.29 8.52
00822> TOTAL RAINFALL (mm) = 31.86 31.86
00823> RUNOFF COEFFICIENT = .95 .27
00825> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00826> CN* = 81.0 Ia = Dep. Storage (Above)
00827> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00828> THAN THE STORAGE COEFFICIENT.
00829> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

00832> 001:0011
00833> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00834> (ha) (cms) (hrs) (mm) (cms)
00835> ID1 06:060 .89 .139 1.04 29.64 .000
00836> +ID2 07:070 2.66 .379 1.04 29.64 .000
00837> -----
00838> SUM 08:080 3.55 .518 1.04 29.64 .000
00841> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00844> 001:0012
00845> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00846> (ha) (cms) (hrs) (mm) (cms)
00847> ID1 05:050 5.01 .623 1.08 28.13 .000
00848> +ID2 08:080 3.55 .518 1.04 29.64 .000
00849> -----
00850> SUM 09:090 8.56 1.141 1.08 28.76 .000
00852> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00856> 001:0013
00857> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00859> | IN>09 (090) |
00860> | OUT<10 (POND) |
00861> ===== OUTFLOW STORAGE TABLE =====
00862> OUTFLOW STORAGE OUTFLOW STORAGE
00863> (cms) (ha.m.) (cms) (ha.m.)
00864> .000 .0000E+00 .593 .6251E+00
00865> .008 .6560E-01 .654 .6631E+00
00866> .017 .1311E+00 .797 .7391E+00
00867> .093 .2831E+00 .950 .8274E+00
00868> .233 .3971E+00 1.304 .9157E+00
00869> .337 .4731E+00 1.880 .1004E+01
00870> .465 .5491E+00 2.577 .1092E+01
00871> .531 .5871E+00 .000 .0000E+00
00872> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00873> (ha) (cms) (hrs) (mm)
00874> INFLOW<09 (090) 8.56 1.118 1.08 28.7675
00875> OUTFLOW<10 (POND) 8.56 .056 3.000 28.754
00877> PEAK FLOW REDUCTION (Qout/Qin) (%) = 5.000
00878> TIME SHIFT OF PEAK FLOW (min) = 115.00
00879> MAXIMUM STORAGE USED (ha.m.) = .2095E+00
00881> *****
00882> * Remaining Hawthorne Industrial Park
00884> *****

00884> * Remaining Hawthorne Industrial Park
00885> *****
00886> *****
00887> * SUB-AREA No.1
00888> CALIB STANDHYD Area (ha) = 19.90
00889> 01:H1P01 DT= 2.50 Total Imp(%) = 71.00 Dir. Conn. (%) = 50.00
00891>
00892> Surface Area (ha) IMPERVIOUS PERVIOUS (i)
00893> 14.13 5.77
00894> Dep. Storage (mm) = 1.57 4.67
00895> Average slope (%) = .60 1.50
00896> Length (m) = 580.00 100.00
00897> Mannings n = .030 .250
00899> Max. eff. Inten. (mm/hr) = 54.21 23.06
00900> over (min) = 17.50 42.50
00901> Storage Coeff. (min) = 18.04 (ii) 42.02 (ii)
00902> Unit Hyd. Tpeak (min) = 17.50 42.50
00903> Unit Hyd. peak (cms) = .06 .03
00905> PEAK FLOW (cms) = .95 .21
00906> TIME TO PEAK (hrs) = 1.21 1.71
00907> RUNOFF VOLUME (mm) = 30.29 13.34
00908> TOTAL RAINFALL (mm) = 31.86 31.86
00909> RUNOFF COEFFICIENT = .95 .42
00911> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00912> CN* = 81.0 Ia = Dep. Storage (Above)
00913> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00914> THAN THE STORAGE COEFFICIENT.
00915> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00916>
00917>
00918> 001:0015
00919>
00920> | ADD HYD (H1P02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00921> (ha) (cms) (hrs) (mm) (cms)
00922> ID1 10:POND 8.56 .056 3.00 28.75 .000
00923> +ID2 01:H1P01 19.90 1.020 1.25 21.81 .000
00924> -----
00925> SUM 02:H1P02 28.46 1.039 1.25 23.90 .000
00926>
00927> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00928>
00929>
00930> 001:0016
00931> *
00932> * SUB-AREA No.2
00933> CALIB STANDHYD Area (ha) = 17.00
00934> 03:H1P03 DT= 2.50 Total Imp(%) = 71.00 Dir. Conn. (%) = 50.00
00936>
00937> Surface Area (ha) IMPERVIOUS PERVIOUS (i)
00938> 12.07 4.93
00939> Dep. Storage (mm) = 1.57 4.67
00940> Average slope (%) = .60 1.50
00941> Length (m) = 450.00 100.00
00942> Mannings n = .030 .250
00943> Max. eff. Inten. (mm/hr) = 59.23 25.04
00944> over (min) = 15.00 37.50

00946> Storage Coeff. (min) = 14.60 (ii) 37.80 (ii)
00947> Unit Hyd. Tpeak (min) = 15.00 37.50
00948> Unit Hyd. peak (cms) = .08 .03
00949> *TOTALS*
00950> PEAK FLOW (cms) = .91 .19 978 (iii)
00951> TIME TO PEAK (hrs) = 1.17 1.63 1.167
00952> RUNOFF VOLUME (mm) = 30.29 13.34 21.814
00953> TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00954> RUNOFF COEFFICIENT = .95 .42 685
00955>
00956> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00957> CN* = 81.0 Ia = Dep. Storage (Above)
00958> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00959> THAN THE STORAGE COEFFICIENT.
00960> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00961>
00962>
00963> 001:0017
00964> *
00965> * SUB-AREA No.3
00966> CALIB STANDHYD Area (ha) = 15.60
00967> 04:H1P04 DT= 2.50 Total Imp(%) = 71.00 Dir. Conn. (%) = 50.00
00969>
00970> Surface Area (ha) IMPERVIOUS PERVIOUS (i)
00971> 11.08 4.52
00972> Dep. Storage (mm) = 1.57 4.67
00973> Average slope (%) = .50 1.50
00974> Length (m) = 600.00 100.00
00975> Mannings n = .030 .250
00977> Max. eff. Inten. (mm/hr) = 50.44 22.17
00978> over (min) = 20.00 45.00
00979> Storage Coeff. (min) = 20.01 (ii) 44.37 (ii)
00980> Unit Hyd. Tpeak (min) = 20.00 45.00
00981> Unit Hyd. peak (cms) = .06 .03
00982> *TOTALS*
00983> PEAK FLOW (cms) = .69 .16 753 (iii)
00984> TIME TO PEAK (hrs) = 1.25 1.79 1.292
00985> RUNOFF VOLUME (mm) = 30.29 13.34 21.814
00986> TOTAL RAINFALL (mm) = 31.86 31.86 31.860
00987> RUNOFF COEFFICIENT = .95 .42 685
00988>
00989> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00990> CN* = 81.0 Ia = Dep. Storage (Above)
00991> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00992> THAN THE STORAGE COEFFICIENT.
00993> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00994>
00995>
00996> 001:0018
00997>
00998> | ADD HYD (H1P05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00999> (ha) (cms) (hrs) (mm) (cms)
01000> ID1 03:H1P03 17.00 .978 1.17 21.81 .000
01001> +ID2 04:H1P04 15.60 .753 1.29 21.81 .000
01002> -----
01003> SUM 05:H1P05 32.60 1.698 1.21 21.81 .000
01004>
01005> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01006>
01007>
01008> 001:0019
01009>
01010> | ADD HYD (H1P06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01011> (ha) (cms) (hrs) (mm) (cms)
01012> ID1 05:H1P05 32.60 1.698 1.21 21.81 .000
01013> +ID2 02:H1P02 28.46 1.039 1.25 23.90 .000
01014> -----
01015> SUM 06:H1P06 61.06 2.733 1.21 22.79 .000
01016>
01017> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01018>
01019>
01020> 001:0020
01021> *
01022> * SUB-AREA No.4
01023> CALIB STANDHYD Area (ha) = 12.20
01024> 07:H1P07 DT= 2.50 Total Imp(%) = 71.00 Dir. Conn. (%) = 50.00
01026>
01027> Surface Area (ha) IMPERVIOUS PERVIOUS (i)
01028> 8.66 3.54
01029> Dep. Storage (mm) = 1.57 4.67
01030> Average slope (%) = .70 1.50
01031> Length (m) = 210.00 100.00
01032> Mannings n = .030 .250
01033>
01034> Max. eff. Inten. (mm/hr) = 76.81 29.02
01035> over (min) = 7.50 30.00
01036> Storage Coeff. (min) = 8.15 (ii) 30.01 (ii)
01037> Unit Hyd. Tpeak (min) = 7.50 30.00
01038> Unit Hyd. peak (cms) = .14 .04
01039> *TOTALS*
01040> PEAK FLOW (cms) = .91 .16 912 (iii)
01041> TIME TO PEAK (hrs) = 1.04 1.50 1.042
01042> RUNOFF VOLUME (mm) = 30.29 13.34 21.814
01043> TOTAL RAINFALL (mm) = 31.86 31.86 31.860
01044> RUNOFF COEFFICIENT = .95 .42 685
01045>
01046> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01047> CN* = 81.0 Ia = Dep. Storage (Above)
01048> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01049> THAN THE STORAGE COEFFICIENT.
01050> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01051>
01052>
01053> 001:0021
01054>
01055> * SUB-AREA No.5
01056> DESIGN NASHYD Area (ha) = 4.00 Curve Number (CN) = 85.00
01057> 08:Pond-B DT= 2.50 Ia (mm) = 4.670 # of Linear Res. (N) = 3.00
01058> U.H. Tp (hrs) = 1.70
01059>
01060> Unit Hyd Qpeak (cms) = .899
01061>
01062> PEAK FLOW (cms) = .145 (i)
01063> TIME TO PEAK (hrs) = 1.167
01064> RUNOFF VOLUME (mm) = 10.266
01065> TOTAL RAINFALL (mm) = 31.860
01066> RUNOFF COEFFICIENT = .322
01067>
01068> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01069>
01070>
01071>
01072> 001:0022
01073>
01074> | ADD HYD (H1P08) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01075> (ha) (cms) (hrs) (mm) (cms)
01076> ID1 06:H1P06 61.06 2.733 1.21 22.79 .000
01077> +ID2 07:H1P07 12.20 .941 1.04 21.81 .000
01078> +ID3 08:Pond-B 4.00 .145 1.17 10.27 .000
01079> -----
01080> SUM 09:H1P08 77.26 3.542 1.21 21.98 .000

01081> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01082>
01083>
01084>
01085> 001:0023
01086> *
01087> *SUB-AREA No. 6
01088> *
01089> *
01090> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
01091> | 01:A3 DT= 2.50 | Ia = 4.670 # of Linear Res. (N)= 3.00
01092> | U.H. Tp(hrs)= .800
01093>
01094> Unit Hyd. Tpeak (cms)= .129
01095>
01096> PEPAK FLOW (cms)= .024 (i)
01097> TIME TO PEAK (hrs)= 2.083
01098> RUNOFF VOLUME (mm)= 6.883
01099> TOTAL RAINFALL (mm)= 31.860
01100> RUNOFF COEFFICIENT = .216
01101>
01102> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01103>
01104>
01105> 001:0024
01106>
01107> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01108> | ID1 09:H1P08 | (ha) (cms) (hrs) (mm) (cms)
01109> | ID2 01:A3 | 2.70 .024 2.08 6.88 .000
01110> | ID3 02:Ultima | 79.96 3.548 1.21 21.47 .000
01111>
01112> SUM 02:Ultima 79.96 3.548 1.21 21.47 .000
01113>
01114> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01115>
01116>
01117> 001:0025
01118> *****
01119> * CALCULATION OF 3HR - 1.5 YEAR STORM EVENT
01120> *****
01121>
01122> | START | Rainfall dir.: V:\20983.DU\ENG\SWM\HYMO\
01123> | TZERO = .00 hrs on Rainfall dir.: V:\20983.DU\ENG\SWM\HYMO\
01124> | METOUT= 2 (output= METRIC)
01125> | NRUN = 001
01126> | NSTORM= 0
01127>
01128> 001:0002
01129>
01130>
01131> | CHICAGO STORM | IDF curve parameters: A= 998.071
01132> | Ptotal= 42.51 mm | B= 6.053
01133> | C= .814
01134> used in: INTENSITY = A / (t + B)^C
01135>
01136> Duration of storm = 3.00 hrs
01137> Storm time step = 10.00 min
01138> Time to peak ratio = .33
01139>
01140> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01141> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01142> 17 3.682 | 1.00 104.193 | 1.83 6.689 | 2.67 3.510
01143> 33 4.582 | 1.17 32.037 | 2.00 5.628 | 2.83 3.220
01144> 50 6.151 | 1.33 16.337 | 2.17 4.872 | 3.00 2.978
01145> 67 9.614 | 1.50 10.965 | 2.33 4.305 |
01146> 83 24.170 | 1.67 8.287 | 2.50 3.864 |
01147>
01148> 001:0003
01149>
01150>
01151> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\SWM\HYMO\ORGA.VAL
01152> | ICASEdv = 1 (read and print data)
01153> | ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
01154> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 ---
01155> | Horton's infiltration equation parameters:
01156> | [F0= 50.00 mm/hr] [F1= 7.50 mm/hr] [DCAY= 2.00 /hr] [F2= .00 mm]
01157> | Parameters for PERVIOUS surfaces in STANDHYD:
01158> | [LPaper= 4.67 mm] [LGP=40.00 m] [MNF= .250]
01159> | Parameters for IMPERVIOUS surfaces in STANDHYD:
01160> | [IAimp= 1.57 mm] [CLI= 1.50] [MNI= .035]
01161> | Parameters used in NASHYD:
01162> | [Ia= 4.67 mm] [N= 3.00]
01163>
01164> 001:0004
01165> *****
01166> * ORGAWORLD FILE
01167> *****
01168> * SUB-AREA No.1
01169> *
01170> | CALIB STANDHYD | Area (ha)= 2.07
01171> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
01172>
01173>
01174> | IMPERVIOUS PERVIOUS (i)
01175> Surface Area (ha)= 1.74 .33
01176> Dep. Storage (mm)= 1.57 4.67
01177> Average Slope (%)= .52 1.00
01178> Length (m)= 204.72 20.00
01179> Mannings n = .030 .250
01180>
01181> Max. eff. Inten. (mm/hr)= 104.19 24.26
01182> over (min)= 7.50 17.50
01183> Storage Coeff. (min)= 7.76 (ii) 17.86 (ii)
01184> Unit Hyd. Tpeak (min)= 7.50 17.50
01185> Unit Hyd. peak (cms)= .15 .06
01186> *TOTALS*
01187> PEAK FLOW (cms)= .36 .01 .362 (iii)
01188> TIME TO PEAK (hrs)= 1.04 1.25 1.042
01189> RUNOFF VOLUME (mm)= 40.94 14.70 36.745
01190> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01191> RUNOFF COEFFICIENT = .96 .35 .964
01192>
01193> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01194> CN* = 81.0 Ia = Dep. Storage (Above)
01195> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01196> THAN THE STORAGE COEFFICIENT.
01197> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01198>
01199> 001:0005
01200> *
01201> * SUB-AREA No.2
01202> *
01203> | CALIB STANDHYD | Area (ha)= 1.54
01204> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
01205>
01206> | IMPERVIOUS PERVIOUS (i)
01207> Surface Area (ha)= 1.42 .12
01208> Dep. Storage (mm)= 1.57 4.67
01209> Average Slope (%)= .50 1.00
01210> Length (m)= 244.34 5.00
01211> Mannings n = .030 .030
01212>
01213> Max. eff. Inten. (mm/hr)= 104.19 31.02
01214> over (min)= 7.50 10.00
01215> Storage Coeff. (min)= 6.73 (ii) 9.85 (ii)

01216> Unit Hyd. Tpeak (min)= 7.50 10.00
01217> Unit Hyd. peak (cms)= .14 .11
01218> *TOTALS*
01219> PEAK FLOW (cms)= .28 .01 .283 (iii)
01220> TIME TO PEAK (hrs)= 1.04 1.13 1.042
01221> RUNOFF VOLUME (mm)= 40.94 14.70 36.845
01222> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01223> RUNOFF COEFFICIENT = .96 .35 .914
01224>
01225> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01226> CN* = 81.0 Ia = Dep. Storage (Above)
01227> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01228> THAN THE STORAGE COEFFICIENT.
01229> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01230>
01231>
01232> 001:0006
01233> *
01234> * SUB-AREA No.3
01235> *
01236> | CALIB STANDHYD | Area (ha)= 1.40
01237> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01238>
01239> | IMPERVIOUS PERVIOUS (i)
01240> Surface Area (ha)= 1.36 .04
01241> Dep. Storage (mm)= 1.57 4.67
01242> Average Slope (%)= .51 1.00
01243> Length (m)= 225.63 5.00
01244> Mannings n = .030 .030
01245>
01246> Max. eff. Inten. (mm/hr)= 104.19 31.02
01247> over (min)= 7.50 10.00
01248> Storage Coeff. (min)= 8.28 (ii) 9.39 (ii)
01249> Unit Hyd. Tpeak (min)= 7.50 10.00
01250> Unit Hyd. peak (cms)= .14 .12
01251> *TOTALS*
01252> PEAK FLOW (cms)= .27 .00 .274 (iii)
01253> TIME TO PEAK (hrs)= 1.04 1.13 1.042
01254> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01255> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01256> RUNOFF COEFFICIENT = .96 .35 .945
01257>
01258> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01259> CN* = 81.0 Ia = Dep. Storage (Above)
01260> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01261> THAN THE STORAGE COEFFICIENT.
01262> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01263>
01264>
01265> 001:0007
01266>
01267> | ADD HYD (040) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01268> | ID1 01:010 | (ha) (cms) (hrs) (mm) (cms)
01269> | ID2 02:020 | 2.07 .362 1.04 36.75 .000
01270> | ID3 04:040 | 1.54 .283 1.04 38.84 .000
01271> | ID4 04:040 | 3.61 .645 1.04 37.64 .000
01272> | ID5 04:040 | 3.61 .645 1.04 37.64 .000
01273> SUM 04:040 3.61 .645 1.04 37.64 .000
01274>
01275> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01276>
01277> 001:0008
01278>
01279> | ADD HYD (050) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01280> | ID1 03:030 | (ha) (cms) (hrs) (mm) (cms)
01281> | ID2 04:040 | 1.40 .274 1.04 40.16 .000
01282> | ID3 04:040 | 3.61 .645 1.04 37.64 .000
01283> | ID4 04:040 | 5.01 .918 1.04 38.34 .000
01284> SUM 05:050 5.01 .918 1.04 38.34 .000
01285>
01286> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01287>
01288>
01289> 001:0009
01290> *
01291> * SUB-AREA No.4
01292> *
01293> | CALIB STANDHYD | Area (ha)= .89
01294> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01295>
01296> | IMPERVIOUS PERVIOUS (i)
01297> Surface Area (ha)= .86 .03
01298> Dep. Storage (mm)= 1.57 4.67
01299> Average Slope (%)= .52 .70
01300> Length (m)= 164.82 40.00
01301> Mannings n = .030 .250
01302>
01303> Max. eff. Inten. (mm/hr)= 104.19 20.32
01304> over (min)= 5.00 25.00
01305> Storage Coeff. (min)= 5.72 (ii) 24.02 (ii)
01306> Unit Hyd. Tpeak (min)= 5.00 25.00
01307> Unit Hyd. peak (cms)= .20 .05
01308> *TOTALS*
01309> PEAK FLOW (cms)= .20 .00 .205 (iii)
01310> TIME TO PEAK (hrs)= 1.00 1.39 1.000
01311> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01312> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01313> RUNOFF COEFFICIENT = .96 .35 .945
01314>
01315> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01316> CN* = 81.0 Ia = Dep. Storage (Above)
01317> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01318> THAN THE STORAGE COEFFICIENT.
01319> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01320>
01321>
01322> 001:0010
01323> *
01324> * SUB-AREA No.5
01325> *
01326> | CALIB STANDHYD | Area (ha)= 2.66
01327> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01328>
01329> | IMPERVIOUS PERVIOUS (i)
01330> Surface Area (ha)= 2.58 .08
01331> Dep. Storage (mm)= 1.57 4.67
01332> Average Slope (%)= .61 1.50
01333> Length (m)= 207.25 20.00
01334> Mannings n = .030 .250
01335>
01336> Max. eff. Inten. (mm/hr)= 104.19 24.26
01337> over (min)= 7.50 17.50
01338> Storage Coeff. (min)= 7.45 (ii) 16.40 (ii)
01339> Unit Hyd. Tpeak (min)= 7.50 17.50
01340> Unit Hyd. peak (cms)= .15 .07
01341> *TOTALS*
01342> PEAK FLOW (cms)= .54 .00 .538 (iii)
01343> TIME TO PEAK (hrs)= 1.04 1.25 1.042
01344> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01345> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01346> RUNOFF COEFFICIENT = .96 .35 .945
01347>
01348> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01349> CN* = 81.0 Ia = Dep. Storage (Above)
01350> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

01351> THAN THE STORAGE COEFFICIENT.
01352> (i.ii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01354> 001:0011-
01355> | ADD H'XD (00) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01356> | | | (ha) (cms) (hrs) (mm) (cms)
01357> ID1 06:060 .89 .205 1.00 40.16 .000
01358> +ID2 07:070 2.66 .538 1.04 40.16 .000
01359> =====
01360> SUM 08:080 3.55 .733 1.04 40.16 .000

01362> NOTE : PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01366> 001:0012-
01367> | ADD H'XD (00) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01368> | | | (ha) (cms) (hrs) (mm) (cms)
01369> ID1 05:050 5.01 .918 1.04 38.34 .000
01370> +ID2 08:080 3.55 .733 1.04 40.16 .000
01371> =====
01372> SUM 09:090 8.56 1.651 1.04 39.10 .000

01376> NOTE : PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01379> 001:0013-
01380> ROUTE RESERVOIR Requested routing time step = 1.0 min.
01381> IN+O9: (09)
01382> OUT+I0: (POND)

OUTFLOW STORAGE (cms)	OUTFLOW STORAGE (ha.m.)	OUTFLOW STORAGE (cms)	OUTFLOW STORAGE (ha.m.)
.000	.0000E+00	.593	.625E+00
.008	.6560E-01	.654	.663E+00
.017	.131E+00	.797	.739E+00
.093	.283E+00	.950	.827E+00
.233	.397E+00	1.304	.915E+00
.337	.473E+00	1.880	1.004E+01
.463	.549E+00	2.577	1.092E+01
.531	.587E+00	.000	.000E+00

01394> ROUTING RESULTS AREA OPEAK TPEAK R.V.
01395> (ha) (cms) (hrs) (mm)
01396> INFLOW+09: (09) 8.56 1.651 1.042 39.096
01397> OUTFLOW+10: (POND) 8.56 .089 2.625 39.093

01400> PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.413
01401> TIME SHIFT OF PEAK FLOW (min) = 95.00
01402> MAXIMUM STORAGE USED (ha.m.) = .2758E+00

01405> 001:0014-
01406> ***** Remaining Hawthorne Industrial Park *****
01407> *
01408> *
01409> *
01410> * SUB-AREA No.1

01412> | CALIB STANDHYD | Area (ha)= 19.90
01413> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

Surface Area (ha)	IMPERVIOUS	PERVIOUS (i)
14.13	14.13	5.77
1.57	1.57	4.67
1.50	1.50	1.50
580.00	580.00	100.00
.030	.030	.250

01422> Max. eff. Inten. (mm/hr) = 80.14 42.65
01423> over (min) = 15.00 35.00
01424> Storage Coeff. (min) = 15.43 (ii) 31.18 (ii)
01425> Unit Hyd. Tpeak (min) = 15.00 35.00
01426> Unit Hyd. peak (cms) = .07 .03

01427> *TOTALS*
01428> PEAK FLOW (cms) = 1.41 .40 1.572 (iii)
01429> TIME TO PEAK (hrs) = 1.17 1.54 1.208
01430> RUNOFF VOLUME (mm) = 40.94 21.31 31.126
01431> TOTAL RAINFALL (mm) = 42.51 42.51 42.514
01432> RUNOFF COEFFICIENT = .96 .50 .732

01434> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01435> CN* = 81.0 Ia = Dep. Storage (Above)
01436> (i.i) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01437> THAN THE STORAGE COEFFICIENT.
01438> (i.ii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01441> 001:0015-
01442> | ADD HYD (HIP02) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01443> | | | (ha) (cms) (hrs) (mm) (cms)
01444> ID1 10:POND 8.56 .089 2.63 39.09 .000
01445> +ID2 01:HIP01 19.90 1.572 1.21 31.13 .000
01446> =====
01447> SUM 02:HIP02 28.46 1.615 1.21 33.52 .000

01450> NOTE : PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01452> 001:0016-
01453> * SUB-AREA No.2

01457> | CALIB STANDHYD | Area (ha)= 17.00
01458> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

Surface Area (ha)	IMPERVIOUS	PERVIOUS (i)
12.07	12.07	4.93
1.57	1.57	4.67
.65	.65	1.50
450.00	450.00	100.00
.030	.030	.250

01467> Max. eff. Inten. (mm/hr) = 89.76 47.48
01468> over (min) = 12.50 30.00
01469> Storage Coeff. (min) = 12.36 (ii) 30.32 (ii)
01470> Unit Hyd. Tpeak (min) = 12.50 30.00
01471> Unit Hyd. peak (cms) = .09 .04

01472> *TOTALS*
01473> PEAK FLOW (cms) = 1.36 .37 1.504 (iii)
01474> TIME TO PEAK (hrs) = 1.13 1.46 1.167
01475> RUNOFF VOLUME (mm) = 40.94 21.31 31.126
01476> TOTAL RAINFALL (mm) = 42.51 42.51 42.514
01477> RUNOFF COEFFICIENT = .96 .50 .732

01478> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01479> CN* = 81.0 Ia = Dep. Storage (Above)
01480> (i.i) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01481> THAN THE STORAGE COEFFICIENT.
01482> (i.ii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01486> 001:0017-
01487> * SUB-AREA No.3

01490> | CALIB STANDHYD | Area (ha)= 15.60
01491> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

Surface Area (ha)	IMPERVIOUS	PERVIOUS (i)
11.08	11.08	4.52
1.57	1.57	4.67
.50	.50	1.50
600.00	600.00	100.00
.030	.030	.250

01497> Max. eff. Inten. (mm/hr) = 73.27 42.65
01498> over (min) = 17.50 35.00
01499> Storage Coeff. (min) = 17.24 (ii) 35.98 (ii)
01500> Unit Hyd. Tpeak (min) = 17.50 35.00
01501> Unit Hyd. peak (cms) = .07 .03

01506> PEAK FLOW (cms) = 1.03 .30 *TOTALS* 1.176 (iii)
01507> TIME TO PEAK (hrs) = 1.21 1.54 1.250
01508> RUNOFF VOLUME (mm) = 40.94 21.31 31.126
01509> TOTAL RAINFALL (mm) = 42.51 42.51 42.514
01510> RUNOFF COEFFICIENT = .96 .50 .732

01512> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01513> CN* = 81.0 Ia = Dep. Storage (Above)
01514> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01515> THAN THE STORAGE COEFFICIENT.
01516> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01520> 001:0018-
01521> | ADD HYD (HIP05) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01522> | | | (ha) (cms) (hrs) (mm) (cms)
01523> ID1 03:HIP03 17.00 1.504 1.17 31.13 .000
01524> +ID2 04:HIP04 15.60 1.176 1.25 31.13 .000
01525> =====
01526> SUM 05:HIP05 32.60 2.621 1.17 31.13 .000

01527> NOTE : PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01531> 001:0019-
01532> | ADD HYD (HIP06) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01533> | | | (ha) (cms) (hrs) (mm) (cms)
01534> ID1 05:HIP05 32.60 1.615 1.21 33.52 .000
01535> +ID2 02:HIP02 28.46 1.615 1.21 33.52 .000
01536> =====
01537> SUM 06:HIP06 61.06 4.222 1.17 32.24 .000

01540> NOTE : PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01543> 001:0020-
01544> * SUB-AREA No.4

01547> | CALIB STANDHYD | Area (ha)= 12.20
01548> | 07:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

Surface Area (ha)	IMPERVIOUS	PERVIOUS (i)
8.66	8.66	3.54
1.57	1.57	4.67
.70	.70	1.50
210.00	210.00	100.00
.030	.030	.250

01557> Max. eff. Inten. (mm/hr) = 104.19 52.96
01558> over (min) = 7.50 25.00
01559> Storage Coeff. (min) = 7.21 (ii) 24.40 (ii)
01560> Unit Hyd. Tpeak (min) = 7.50 25.00
01561> Unit Hyd. peak (cms) = .15 .05

01562> *TOTALS*
01563> PEAK FLOW (cms) = 1.28 .31 1.375 (iii)
01564> TIME TO PEAK (hrs) = 1.04 1.38 1.042
01565> RUNOFF VOLUME (mm) = 40.94 21.31 31.126
01566> TOTAL RAINFALL (mm) = 42.51 42.51 42.514
01567> RUNOFF COEFFICIENT = .96 .50 .732

01568> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01569> CN* = 81.0 Ia = Dep. Storage (Above)
01570> (i.i) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01571> THAN THE STORAGE COEFFICIENT.
01572> (i.ii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01575> 001:0021-
01576> * SUB-AREA No.5

01580> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
01581> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01582> U.H. Tp(hrs)= .170

01584> Unit Hyd Qpeak (cms) = .899
01585> PEAK FLOW (cms) = .260 (i)
01586> TIME TO PEAK (hrs) = 1.167
01587> RUNOFF VOLUME (mm) = 17.325
01588> TOTAL RAINFALL (mm) = 42.514
01589> RUNOFF COEFFICIENT = .408

01592> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01595> 001:0022-
01596> | ADD HYD (HIP08) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01597> | | | (ha) (cms) (hrs) (mm) (cms)
01598> ID1 06:HIP06 61.06 4.222 1.17 32.24 .000
01599> +ID2 07:HIP07 12.20 1.375 1.04 31.13 .000
01600> +ID3 08:Pond-B 4.00 .260 1.17 17.32 .000
01601> =====
01602> SUM 09:HIP08 77.26 5.545 1.17 31.29 .000

01606> NOTE : PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01608> 001:0023-
01609> * SUB-AREA No. 6

01613> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
01614> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01615> U.H. Tp(hrs)= .800

01617> Unit Hyd Qpeak (cms) = .129
01618> PEAK FLOW (cms) = .044 (i)
01619> TIME TO PEAK (hrs) = 2.042

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01621> RUNOFF VOLUME (mm) = 12.131
01622> TOTAL RAINFALL (mm) = 42.514
01623> RUNOFF COEFFICIENT = .285
01624>
01625> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01626>
01627>
01628> 001:002 4-----
01629>
01630> | ADD HYD (Ultima) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01631> | Ptotal= 45.50 mm | (ha) (cms) (hrs) (mm) (cms)
01632> | ID1 09:HIP08 77.26 5.545 1.17 31.29 .000
01633> | +ID2 01:A3 2.70 .044 2.04 12.13 .000
01634>
01635> SUM 02:Ultima 79.96 5.554 1.17 30.65 .000
01636>
01637> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01638>
01639>
01640> 001:002 5-----
01641> *****
01642> * CALCULATION OF 3HR - 1:10 YEAR STORM EVENT *
01643> *****
01644>
01645> | START | Project dir.: V:\20983.DU\ENG\SWHYMO\
01646> | Rainfall dir.: V:\20983.DU\ENG\SWHYMO\
01647>
01648> TZERO = .00 hrs on 0
01649> METCUT = 2 (output = METRIC)
01650> NRUN = 001
01651> NSTCRW = 0
01652>
01653> 001:000 3-----
01654> | CHICAGO STORM | IDF curve parameters: A=1174.184
01655> | Ptotal= 45.50 mm | B= 6.014
01656> | C= .816
01657> used in: INTENSITY = A / (t + B)^C
01658>
01659> Duration of storm = 3.00 hrs
01660> Storm time step = 10.00 min
01661> Time to peak ratio = .33
01662>
01663> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01664> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01665> .17 4.248 | 1.00 122.142 | 1.83 7.733 | 2.67 4.019
01666> .33 5.290 | 1.17 37.285 | 2.00 6.502 | 2.83 3.714
01667> .50 7.108 | 1.33 18.954 | 2.17 5.625 | 3.00 3.434
01668> .67 11.130 | 1.50 12.700 | 2.33 4.969 |
01669> .83 28.100 | 1.67 9.588 | 2.50 4.458 |
01670>
01671>
01672> 001:000 3-----
01673>
01674> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\SWHYMO\ORGA.VAL
01675> | ICRSEV = 1 (read and print data)
01676> FileTitle = ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE -----
01677> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----|
01678> Horton's infiltration equation parameters:
01679> [F0= 50.00 mm/hr] [F1= 7.50 mm/hr] [FCAY= 2.00 /hr] [F = .00 mm]
01680> Parameters for PERVIOUS surfaces in STANDHYD:
01681> [LAIp= 4.67 mm] [LGP=40.00 mm] [MNP= .250]
01682> Parameters for IMPERVIOUS surfaces in STANDHYD:
01683> [LAImp= 1.57 mm] [CLI= 1.50] [MNI= .035]
01684> Parameters used in WASHYD:
01685> [Lash= 4.67 mm] [N= 3.00]
01686>
01687> 001:000 4-----
01688> *****
01689> * ORGAWORLD FILE *****
01690> *****
01691> * SUB-AREA No.1 *****
01692>
01693> | CALIB STANDHYD | Area (ha)= 2.07 Dir. Conn.(%)= 84.00
01694> | 01:010 DT= 2.50 | Total Imp(%)= 84.00
01695>
01696> IMPERVIOUS PERVIOUS (i)
01697> Surface Area (ha)= 1.74 .33
01698> Dep. Storage (mm)= 1.57 4.67
01699> Average Slope (%)= .52 1.00
01700> Length (m)= 204.72 20.00
01701> Mannings n = .030 .250
01702>
01703> Max. eff. Inten. (mm/hr)= 122.14 34.69
01704> over (min)= 7.50 15.00
01705> Storage Coeff. (min)= 7.28 (ii) 15.04 (ii)
01706> Unit Hyd. Tpeak (min)= 7.50 15.00
01707> Unit Hyd. peak (cms)= .15 .07
01708>
01709> *TOTALS*
01710> PEAK FLOW (cms)= .43 .02 1.437 (iii)
01711> TIME TO PEAK (hrs)= 1.04 1.21 1.042
01712> RUNOFF VOLUME (mm)= 47.93 19.25 43.345
01713> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01714> RUNOFF COEFFICIENT = .97 .39 .876
01715>
01716> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01717> CN* = 81.0 Ia = Dep. Storage (Above)
01718> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01719> THAN THE STORAGE COEFFICIENT.
01720> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01721>
01722> 001:000 5-----
01723> *
01724> | SUB-AREA No.2 *****
01725> *****
01726> | CALIB STANDHYD | Area (ha)= 1.54 Dir. Conn.(%)= 92.00
01727> | 02:020 DT= 2.50 | Total Imp(%)= 92.00
01728>
01729> IMPERVIOUS PERVIOUS (i)
01730> Surface Area (ha)= 1.42 .12
01731> Dep. Storage (mm)= 1.57 4.67
01732> Average Slope (%)= .50 1.00
01733> Length (m)= 244.34 5.00
01734> Mannings n = .030 .030
01735>
01736> Max. eff. Inten. (mm/hr)= 122.14 42.32
01737> over (min)= 7.50 10.00
01738> Storage Coeff. (min)= 8.20 (ii) 9.18 (ii)
01739> Unit Hyd. Tpeak (min)= 7.50 10.00
01740> Unit Hyd. peak (cms)= .14 .12
01741>
01742> *TOTALS*
01743> PEAK FLOW (cms)= .33 .01 .341 (iii)
01744> TIME TO PEAK (hrs)= 1.04 1.13 1.042
01745> RUNOFF VOLUME (mm)= 47.93 19.25 45.640
01746> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01747> RUNOFF COEFFICIENT = .97 .39 .922
01748>
01749> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01750> CN* = 81.0 Ia = Dep. Storage (Above)
01751> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01752> THAN THE STORAGE COEFFICIENT.
01753> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01754>
01755> 001:000 6-----

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01756> *
01757> * SUB-AREA No.3 *****
01758> *****
01759> | CALIB STANDHYD | Area (ha)= 1.40 Dir. Conn.(%)= 97.00
01760> | 03:030 DT= 2.50 | Total Imp(%)= 97.00
01761>
01762> IMPERVIOUS PERVIOUS (i)
01763> Surface Area (ha)= 1.36 .04
01764> Dep. Storage (mm)= 1.57 4.67
01765> Average Slope (%)= .51 1.00
01766> Length (m)= 225.63 5.00
01767> Mannings n = .030 .030
01768>
01769> Max. eff. Inten. (mm/hr)= 122.14 48.18
01770> over (min)= 7.50 7.50
01771> Storage Coeff. (min)= 7.77 (ii) 8.70 (ii)
01772> Unit Hyd. Tpeak (min)= 7.50 7.50
01773> Unit Hyd. peak (cms)= .15 .14
01774>
01775> *TOTALS*
01776> PEAK FLOW (cms)= .33 .00 1.042 (iii)
01777> TIME TO PEAK (hrs)= 1.04 1.08 1.042
01778> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01779> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01780> RUNOFF COEFFICIENT = .97 .39 .951
01781>
01782> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01783> CN* = 81.0 Ia = Dep. Storage (Above)
01784> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01785> THAN THE STORAGE COEFFICIENT.
01786> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01787>
01788> 001:000 7-----
01789>
01790> | ADD HYD (040) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01791> | (ha) (cms) (hrs) (mm) (cms)
01792> | ID1 01:010 2.07 .437 1.04 43.35 .000
01793> | +ID2 02:020 1.54 .341 1.04 45.64 .000
01794>
01795> SUM 04:040 3.61 .778 1.04 44.32 .000
01796>
01797> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01798>
01799>
01800> 001:000 8-----
01801>
01802> | ADD HYD (050) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01803> | (ha) (cms) (hrs) (mm) (cms)
01804> | ID1 03:030 1.40 .329 1.04 47.07 .000
01805> | +ID2 04:040 3.61 .778 1.04 44.32 .000
01806>
01807> SUM 05:050 5.01 1.107 1.04 45.09 .000
01808>
01809> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01810>
01811>
01812> 001:000 9-----
01813> *
01814> * SUB-AREA No.4 *****
01815> *****
01816> | CALIB STANDHYD | Area (ha)= .89 Dir. Conn.(%)= 97.00
01817> | 06:060 DT= 2.50 | Total Imp(%)= 97.00
01818>
01819> IMPERVIOUS PERVIOUS (i)
01820> Surface Area (ha)= .86 .03
01821> Dep. Storage (mm)= 1.57 4.67
01822> Average Slope (%)= .93 .70
01823> Length (m)= 164.82 40.00
01824> Mannings n = .030 .250
01825>
01826> Max. eff. Inten. (mm/hr)= 122.14 31.19
01827> over (min)= 5.00 20.00
01828> Storage Coeff. (min)= 5.37 (ii) 20.78 (ii)
01829> Unit Hyd. Tpeak (min)= 5.00 20.00
01830> Unit Hyd. peak (cms)= .21 .06
01831>
01832> *TOTALS*
01833> PEAK FLOW (cms)= .24 .00 1.245 (iii)
01834> TIME TO PEAK (hrs)= 1.00 1.29 1.000
01835> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01836> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01837> RUNOFF COEFFICIENT = .97 .39 .951
01838>
01839> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01840> CN* = 81.0 Ia = Dep. Storage (Above)
01841> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01842> THAN THE STORAGE COEFFICIENT.
01843> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01844>
01845> 001:001 0-----
01846>
01847> * SUB-AREA No.5 *****
01848> *****
01849> | CALIB STANDHYD | Area (ha)= 2.66 Dir. Conn.(%)= 97.00
01850> | 07:070 DT= 2.50 | Total Imp(%)= 97.00
01851>
01852> IMPERVIOUS PERVIOUS (i)
01853> Surface Area (ha)= 2.58 .08
01854> Dep. Storage (mm)= 1.57 4.67
01855> Average Slope (%)= .61 1.50
01856> Length (m)= 207.25 20.00
01857> Mannings n = .030 .250
01858>
01859> Max. eff. Inten. (mm/hr)= 122.14 34.69
01860> over (min)= 7.50 15.00
01861> Storage Coeff. (min)= 7.00 (ii) 14.75 (ii)
01862> Unit Hyd. Tpeak (min)= 7.50 15.00
01863> Unit Hyd. peak (cms)= .16 .08
01864>
01865> *TOTALS*
01866> PEAK FLOW (cms)= .64 .00 .645 (iii)
01867> TIME TO PEAK (hrs)= 1.04 1.21 1.042
01868> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01869> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01870> RUNOFF COEFFICIENT = .97 .39 .951
01871>
01872> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01873> CN* = 81.0 Ia = Dep. Storage (Above)
01874> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01875> THAN THE STORAGE COEFFICIENT.
01876> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01877>
01878> 001:001 1-----
01879>
01880> | ADD HYD (080) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01881> | (ha) (cms) (hrs) (mm) (cms)
01882> | ID1 06:060 .89 .645 1.04 47.07 .000
01883> | +ID2 07:070 2.66 .645 1.04 47.07 .000
01884>
01885> SUM 08:080 3.55 .976 1.04 47.07 .000
01886>
01887> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01888>
01889>
01890> 001:001 2-----

```

01891> | ADD HYD (090) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01892> | | | (ha) (cms) (hrs) (mm) (cms)
01893> | ID1 05:050 | 5.01 1.107 1.04 45.09 .000
01894> | +ID2 08:080 | 3.55 .876 1.04 47.07 .000
01895> | | | | | | | | | | |
01896> | | | | | | | | | | |
01897> | SUM 09:090 | 8.56 1.984 1.04 45.91 .000
01898> | | | | | | | | | | |
01899> | | | | | | | | | | |
01900> | | | | | | | | | | |
01901> | | | | | | | | | | |
01902> | 001:001.3 | | | | | | | | | | |
01903> | | | | | | | | | | |
01904> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01905> | IN>09: (090) | | | | | | | | | | |
01906> | OUT<10: (POND) | | | | | | | | | | |
01907> | | | | | | | | | | |
01908> | | | | | | | | | | |
01909> | | | | | | | | | | |
01910> | | | | | | | | | | |
01911> | | | | | | | | | | |
01912> | | | | | | | | | | |
01913> | | | | | | | | | | |
01914> | | | | | | | | | | |
01915> | | | | | | | | | | |
01916> | | | | | | | | | | |
01917> | | | | | | | | | | |
01918> | ROUTING RESULTS | AREA OPEAK TPEAK R.V.
01919> | | | | | | | | | | |
01920> | INFLOW >09: (090) | 8.56 1.984 1.04 45.914
01921> | OUTFLOW <10: (POND) | 8.56 .132 2.278 45.912
01922> | | | | | | | | | | |
01923> | PEAK FLOW REDUCTION [Qout/qin] (%) = 6.640
01924> | TIME SHIFT OF PEAK FLOW (min) = 74.17
01925> | MAXIMUM STORAGE USED (ha.m.) = 3146E+00
01926> | | | | | | | | | | |
01927> | | | | | | | | | | |
01928> | 001:001.4 | | | | | | | | | | |
01929> | | | | | | | | | | |
01930> | * Remaining Hawthorne Industrial Park *
01931> | | | | | | | | | | |
01932> | | | | | | | | | | |
01933> | * SUB-AREA No.1 | | | | | | | | | | |
01934> | | | | | | | | | | |
01935> | CALIB STANDHYD | Area (ha) = 19.90
01936> | 01:H1P01 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00
01937> | | | | | | | | | | |
01938> | | | | | | | | | | |
01939> | Surface Area (ha) = 14.13 5.77
01940> | Dep. Storage (mm) = 1.57 4.67
01941> | Average Slope (%) = .60 1.50
01942> | Length (m) = 580.00 100.00
01943> | Mannings n = .030 .250
01944> | | | | | | | | | | |
01945> | Max. eff. Inten. (mm/hr) = 93.86 60.56
01946> | over (min) = 15.00 30.00
01947> | Storage Coeff. (min) = 14.48 (ii) 30.78 (iii)
01948> | Unit Hyd. Tpeak (min) = 15.00 30.00
01949> | Unit Hyd. peak (cms) = .08 .04
01950> | | | | | | | | | | |
01951> | PEAK FLOW (cms) = 1.70 .55 *TOTALS*
01952> | TIME TO PEAK (hrs) = 1.17 1.46 1.208
01953> | RUNOFF VOLUME (mm) = 47.93 26.92 37.426
01954> | TOTAL RAINFALL (mm) = 49.50 49.50 49.505
01955> | RUNOFF COEFFICIENT = .97 .54 .756
01956> | | | | | | | | | | |
01957> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01958> | CN* = 81.0 Ia = Dep. Storage (Above)
01959> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01960> | THAN THE STORAGE COEFFICIENT.
01961> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01962> | | | | | | | | | | |
01963> | | | | | | | | | | |
01964> | 001:001.5 | | | | | | | | | | |
01965> | | | | | | | | | | |
01966> | ADD HYD (HIP02) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01967> | | | | | | | | | | |
01968> | ID1 10:POND | 8.56 .132 2.28 45.91 .000
01969> | +ID2 01:H1P01 | 19.90 1.993 1.21 37.43 .000
01970> | | | | | | | | | | |
01971> | SUM 02:H1P02 | 28.46 2.044 1.21 39.98 .000
01972> | | | | | | | | | | |
01973> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01974> | | | | | | | | | | |
01975> | | | | | | | | | | |
01976> | 001:001.6 | | | | | | | | | | |
01977> | * SUB-AREA No.2 | | | | | | | | | | |
01978> | | | | | | | | | | |
01979> | CALIB STANDHYD | Area (ha) = 17.00
01980> | 03:H1P03 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00
01981> | | | | | | | | | | |
01982> | | | | | | | | | | |
01983> | | | | | | | | | | |
01984> | Surface Area (ha) = 12.07 4.93
01985> | Dep. Storage (mm) = 1.57 4.67
01986> | Average Slope (%) = .65 1.50
01987> | Length (m) = 450.00 100.00
01988> | Mannings n = .030 .250
01989> | | | | | | | | | | |
01990> | Max. eff. Inten. (mm/hr) = 105.17 63.81
01991> | over (min) = 12.50 27.50
01992> | Storage Coeff. (min) = 11.60 (ii) 27.56 (ii)
01993> | Unit Hyd. Tpeak (min) = 12.50 27.50
01994> | Unit Hyd. peak (cms) = .09 .04
01995> | | | | | | | | | | |
01996> | PEAK FLOW (cms) = 1.63 .51 *TOTALS*
01997> | TIME TO PEAK (hrs) = 1.13 1.42 1.167
01998> | RUNOFF VOLUME (mm) = 47.93 26.92 37.426
01999> | TOTAL RAINFALL (mm) = 49.50 49.50 49.505
02000> | RUNOFF COEFFICIENT = .97 .54 .756
02001> | | | | | | | | | | |
02002> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02003> | CN* = 81.0 Ia = Dep. Storage (Above)
02004> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02005> | THAN THE STORAGE COEFFICIENT.
02006> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02007> | | | | | | | | | | |
02008> | | | | | | | | | | |
02009> | 001:001.7 | | | | | | | | | | |
02010> | * SUB-AREA No.3 | | | | | | | | | | |
02011> | | | | | | | | | | |
02012> | CALIB STANDHYD | Area (ha) = 15.60
02013> | 04:H1P04 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00
02014> | | | | | | | | | | |
02015> | | | | | | | | | | |
02016> | | | | | | | | | | |
02017> | Surface Area (ha) = 11.08 4.52
02018> | Dep. Storage (mm) = 1.57 4.67
02019> | Average Slope (%) = .50 1.50
02020> | Length (m) = 600.00 100.00
02021> | Mannings n = .030 .250
02022> | | | | | | | | | | |
02023> | Max. eff. Inten. (mm/hr) = 93.86 57.19
02024> | over (min) = 15.00 32.50
02025> | Storage Coeff. (min) = 15.61 (ii) 32.28 (ii)

02026> Unit Hyd. Tpeak (min) = 15.00 32.50
02027> Unit Hyd. peak (cms) = .07 .03
02028> | | | | | | | | | | |
02029> | | | | | | | | | | |
02030> | | | | | | | | | | |
02031> PEAK FLOW (cms) = 1.29 .42 *TOTALS*
02032> TIME TO PEAK (hrs) = 1.17 1.50 1.286 (iii)
02033> RUNOFF VOLUME (mm) = 47.93 26.92 37.426
02034> TOTAL RAINFALL (mm) = 49.50 49.50 49.505
02035> RUNOFF COEFFICIENT = .97 .54 .756
02036> | | | | | | | | | | |
02037> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02038> CN* = 81.0 Ia = Dep. Storage (Above)
02039> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02040> THAN THE STORAGE COEFFICIENT.
02041> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02042> | | | | | | | | | | |
02043> | 001:001.8 | | | | | | | | | | |
02044> | | | | | | | | | | |
02045> | ADD HYD (HIP05) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02046> | | | | | | | | | | |
02047> | ID1 03:H1P03 | 17.00 1.865 1.17 37.43 .000
02048> | +ID2 04:H1P04 | 15.60 1.485 1.21 37.43 .000
02049> | | | | | | | | | | |
02050> | SUM 05:H1P05 | 32.60 3.336 1.17 37.43 .000
02051> | | | | | | | | | | |
02052> | | | | | | | | | | |
02053> | | | | | | | | | | |
02054> | | | | | | | | | | |
02055> | | | | | | | | | | |
02056> | ADD HYD (HIP06) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02057> | | | | | | | | | | |
02058> | ID1 05:H1P05 | 32.60 3.336 1.17 37.43 .000
02059> | +ID2 02:H1P02 | 28.46 2.044 1.21 39.98 .000
02060> | | | | | | | | | | |
02061> | SUM 06:H1P06 | 61.06 5.358 1.17 38.61 .000
02062> | | | | | | | | | | |
02063> | | | | | | | | | | |
02064> | | | | | | | | | | |
02065> | | | | | | | | | | |
02066> | 001:002.0 | | | | | | | | | | |
02067> | * SUB-AREA No.4 | | | | | | | | | | |
02068> | | | | | | | | | | |
02069> | CALIB STANDHYD | Area (ha) = 12.20
02070> | 07:H1P07 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00
02071> | | | | | | | | | | |
02072> | | | | | | | | | | |
02073> | | | | | | | | | | |
02074> | Surface Area (ha) = 8.66 3.84
02075> | Dep. Storage (mm) = 1.57 4.67
02076> | Average Slope (%) = .70 1.50
02077> | Length (m) = 210.00 100.00
02078> | Mannings n = .030 .250
02079> | | | | | | | | | | |
02080> | Max. eff. Inten. (mm/hr) = 122.14 72.53
02081> | over (min) = 7.50 22.50
02082> | Storage Coeff. (min) = 6.77 (ii) 21.93 (ii)
02083> | Unit Hyd. Tpeak (min) = 7.50 22.50
02084> | Unit Hyd. peak (cms) = .16 .05
02085> | | | | | | | | | | |
02086> | PEAK FLOW (cms) = 1.54 .42 *TOTALS*
02087> | TIME TO PEAK (hrs) = 1.04 1.33 1.687 (iii)
02088> | RUNOFF VOLUME (mm) = 47.93 26.92 37.426
02089> | TOTAL RAINFALL (mm) = 49.50 49.50 49.505
02090> | RUNOFF COEFFICIENT = .97 .54 .756
02091> | | | | | | | | | | |
02092> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02093> | CN* = 81.0 Ia = Dep. Storage (Above)
02094> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02095> | THAN THE STORAGE COEFFICIENT.
02096> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02097> | | | | | | | | | | |
02098> | | | | | | | | | | |
02099> | 001:002.1 | | | | | | | | | | |
02100> | * SUB-AREA No.5 | | | | | | | | | | |
02101> | | | | | | | | | | |
02102> | DESIGN NASHYD | Area (ha) = 4.00 Curve Number (CN)=85.00
02103> | 08:Pond-B DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N) = 3.00
02104> | U.H. Tp(hrs) = .170
02105> | | | | | | | | | | |
02106> | | | | | | | | | | |
02107> | Unit Hyd Tpeak (cms) = .899
02108> | | | | | | | | | | |
02109> | PEAK FLOW (cms) = .345 (i)
02110> | TIME TO PEAK (hrs) = 1.167
02111> | RUNOFF VOLUME (mm) = 22.420
02112> | TOTAL RAINFALL (mm) = 49.505
02113> | RUNOFF COEFFICIENT = .453
02114> | | | | | | | | | | |
02115> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02116> | | | | | | | | | | |
02117> | | | | | | | | | | |
02118> | 001:002.2 | | | | | | | | | | |
02119> | | | | | | | | | | |
02120> | ADD HYD (HIP08) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02121> | | | | | | | | | | |
02122> | ID1 06:H1P06 | 61.06 5.358 1.17 38.61 .000
02123> | +ID2 07:H1P07 | 12.20 1.687 1.04 37.43 .000
02124> | +ID3 08:Pond-B | 4.00 .345 1.17 22.42 .000
02125> | | | | | | | | | | |
02126> | SUM 09:H1P08 | 77.26 7.016 1.17 37.59 .000
02127> | | | | | | | | | | |
02128> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02129> | | | | | | | | | | |
02130> | | | | | | | | | | |
02131> | 001:002.3 | | | | | | | | | | |
02132> | * SUB-AREA No.6 | | | | | | | | | | |
02133> | | | | | | | | | | |
02134> | DESIGN NASHYD | Area (ha) = 2.70 Curve Number (CN)=76.00
02135> | 01:A3 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N) = 3.00
02136> | U.H. Tp(hrs) = .800
02137> | | | | | | | | | | |
02138> | | | | | | | | | | |
02139> | | | | | | | | | | |
02140> | | | | | | | | | | |
02141> | Unit Hyd Tpeak (cms) = .129
02142> | | | | | | | | | | |
02143> | PEAK FLOW (cms) = .059 (i)
02144> | TIME TO PEAK (hrs) = 2.000
02145> | RUNOFF VOLUME (mm) = 16.075
02146> | TOTAL RAINFALL (mm) = 49.505
02147> | RUNOFF COEFFICIENT = .325
02148> | | | | | | | | | | |
02149> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02150> | | | | | | | | | | |
02151> | 001:002.4 | | | | | | | | | | |
02152> | | | | | | | | | | |
02153> | ADD HYD (Ultima) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02154> | | | | | | | | | | |
02155> | ID1 09:H1P08 | 77.26 7.016 1.17 37.59 .000
02156> | +ID2 01:A3 | 2.70 .059 2.00 16.08 .000
02157> | | | | | | | | | | |
02158> | SUM 02:Ultima | 79.96 7.029 1.17 36.86 .000
02159> | | | | | | | | | | |
02160> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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02161>
02162>
02163> 001:0025-----
02164> *****
02165> * CALCULATION OF 3HR - 125 YEAR STORM EVENT *
02166> *****
02167>
02168> | START | Project dir.: V:\20983.DU\ENG\SWMHYMO\
02169> | Rainfall dir.: V:\20983.DU\ENG\SWMHYMO\
02170> | TPEAK = .00 hrs on 0
02171> | METOUT = 2 (output = METRIC)
02172> | NRUN = 001
02173> | NSTCRM = 0
02174>
02175> 001:0002-----
02176>
02177> | CHICAGO STORM | IDF curve parameters: A=1402.884
02178> | Ptotal = 58.23 mm | B = 6.018
02179> | | C = .819
02180> | used in: INTENSITY = A / (t + B)^C
02181>
02182> | Duration of storm = 3.00 hrs
02183> | Storm time step = 10.00 min
02184> | Time to peak ratio = .33
02185>
02186> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02187> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02188> | .17 4.934 | 1.00 144.693 | 1.83 9.014 | 2.67 4.701
02189> | .33 6.152 | 1.17 43.904 | 2.00 7.571 | 2.83 4.310
02190> | .50 8.282 | 1.33 22.224 | 2.17 6.544 | 3.00 3.983
02191> | .67 13.006 | 1.50 14.852 | 2.33 5.776 |
02192> | .83 33.041 | 1.67 11.192 | 2.50 5.179 |
02193>
02195> 001:0003-----
02196>
02197> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\SWMHYMO\ORGA.VAL
02198> | ICASBdv = 1 (read and print data)
02199> | FileTitle =
02200> | ***** PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 *****
02201> | Horton's infiltration equation parameters:
02202> | [P= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [E= .00 mm]
02203> | Parameters for PERVIOUS surfaces in STANHYD:
02204> | [Ia= 4.67 mm] [LCS= 4.00 m] [PNI= .250]
02205> | Parameters for IMPVIOUS surface in STANHYD:
02206> | [Ia= 1.57 mm] [CLI= 1.50] [PNI= .035]
02207> | Parameters used in NASHYD:
02208> | [Ia = 4.67 mm] [N= 3.00]
02209>
02210> 001:0004-----
02211> *****
02212> * ORGAWORLD FILE *
02213> *****
02214> * SUB-AREA No.1
02215>
02216> | CALIB STANHYD | Area (ha) = 2.07
02217> | 01:010 DT= 2.50 | Total Imp(%) = 84.00 Dir. Conn.(%) = 84.00
02218>
02219> | IMPVIOUS PERVIOUS (i)
02220> | Surface Area (ha) = 1.74 .33
02221> | Dep. Storage (mm) = 1.57 4.67
02222> | Average Slope (%) = .52 1.00
02223> | Length (m) = 204.72 20.00
02224> | Mannings n = .030 .250
02225>
02226> | Max. eff. Inten. (mm/hr) = 144.69 47.07
02227> | over (min) = 7.50 15.00
02228> | Storage Coeff. (min) = 6.81 (ii) 14.56 (ii)
02229> | Unit Hyd. Tpeak (min) = 7.50 15.00
02230> | Unit Hyd. peak (cms) = .16 .08
02231>
02232> | PEAK FLOW (cms) = .52 .03 *TOTALS*
02233> | TIME TO PEAK (hrs) = 1.04 1.21 1.042
02234> | RUNOFF VOLUME (mm) = 56.66 25.35 51.647
02235> | TOTAL RAINFALL (mm) = 58.23 58.23 58.226
02236> | RUNOFF COEFFICIENT = .97 .44 887
02237>
02238> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02239> | CN* = 81.0 Ia = Dep. Storage (Above)
02240> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02241> | THAN THE STORAGE COEFFICIENT.
02242> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02243>
02244>
02245> 001:0005-----
02246> *
02247> * SUB-AREA No.2
02248>
02249> | CALIB STANHYD | Area (ha) = 1.54
02250> | 02:020 DT= 2.50 | Total Imp(%) = 92.00 Dir. Conn.(%) = 92.00
02251>
02252> | IMPVIOUS PERVIOUS (i)
02253> | Surface Area (ha) = 1.42 .12
02254> | Dep. Storage (mm) = 1.57 4.67
02255> | Average Slope (%) = .50 1.00
02256> | Length (m) = 244.34 5.00
02257> | Mannings n = .030 .030
02258>
02259> | Max. eff. Inten. (mm/hr) = 144.69 65.19
02260> | over (min) = 7.50 7.50
02261> | Storage Coeff. (min) = 7.66 (ii) 8.49 (ii)
02262> | Unit Hyd. Tpeak (min) = 7.50 7.50
02263> | Unit Hyd. peak (cms) = .15 .14
02264>
02265> | PEAK FLOW (cms) = .40 .01 *TOTALS*
02266> | TIME TO PEAK (hrs) = 1.04 1.08 1.042
02267> | RUNOFF VOLUME (mm) = 56.66 25.35 54.152
02268> | TOTAL RAINFALL (mm) = 58.23 58.23 58.226
02269> | RUNOFF COEFFICIENT = .97 .44 930
02270>
02271> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02272> | CN* = 81.0 Ia = Dep. Storage (Above)
02273> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02274> | THAN THE STORAGE COEFFICIENT.
02275> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02276>
02277>
02278> 001:0006-----
02279>
02280> * SUB-AREA No.3
02281>
02282> | CALIB STANHYD | Area (ha) = 1.40
02283> | 03:030 DT= 2.50 | Total Imp(%) = 97.00 Dir. Conn.(%) = 97.00
02284>
02285> | IMPVIOUS PERVIOUS (i)
02286> | Surface Area (ha) = 1.36 .04
02287> | Dep. Storage (mm) = 1.57 4.67
02288> | Average Slope (%) = .51 1.00
02289> | Length (m) = 225.63 5.00
02290> | Mannings n = .030 .030
02291>
02292> | Max. eff. Inten. (mm/hr) = 144.69 65.19
02293> | over (min) = 7.50 7.50
02294> | Storage Coeff. (min) = 7.26 (ii) 8.09 (ii)
02295> | Unit Hyd. Tpeak (min) = 7.50 7.50

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02296> Unit Hyd. peak (cms) = .15 .14
02297>
02298> PEAK FLOW (cms) = .40 .00 *TOTALS*
02299> TIME TO PEAK (hrs) = 1.04 1.08 1.042
02300> RUNOFF VOLUME (mm) = 56.66 25.35 55.717
02301> TOTAL RAINFALL (mm) = 58.23 58.23 58.226
02302> RUNOFF COEFFICIENT = .97 .44 .957
02303>
02304> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02305> | CN* = 81.0 Ia = Dep. Storage (Above)
02306> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02307> | THAN THE STORAGE COEFFICIENT.
02308> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02309>
02310>
02311> 001:0007-----
02312>
02313> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02314> | (ha) (cms) (hrs) (mm) (cms)
02315> | ID1 01:010 2.07 .532 1.04 51.65 .000
02316> | +ID2 02:020 1.54 418 1.04 54.15 .000
02317> |
02318> | SUM 04:040 3.61 .950 1.04 52.72 .000
02319>
02320> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02321>
02322>
02323> 001:0008-----
02324>
02325> | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02326> | (ha) (cms) (hrs) (mm) (cms)
02327> | ID1 03:030 1.40 .400 1.04 55.72 .000
02328> | +ID2 04:040 3.61 .950 1.04 52.72 .000
02329> |
02330> | SUM 05:050 5.01 1.350 1.04 53.55 .000
02331>
02332> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02333>
02334>
02335> 001:0009-----
02336> *
02337> * SUB-AREA No.4
02338>
02339> | CALIB STANHYD | Area (ha) = .89
02340> | 06:060 DT= 2.50 | Total Imp(%) = 97.00 Dir. Conn.(%) = 97.00
02341>
02342> | IMPVIOUS PERVIOUS (i)
02343> | Surface Area (ha) = .86 .03
02344> | Dep. Storage (mm) = 1.57 4.67
02345> | Average Slope (%) = .53 .70
02346> | Length (m) = 164.82 40.00
02347> | Mannings n = .030 .250
02348>
02349> | Max. eff. Inten. (mm/hr) = 144.69 44.12
02350> | over (min) = 5.00 17.50
02351> | Storage Coeff. (min) = 5.02 (ii) 18.44 (ii)
02352> | Unit Hyd. Tpeak (min) = 5.00 17.50
02353> | Unit Hyd. peak (cms) = .22 .06
02354>
02355> | PEAK FLOW (cms) = .30 .00 *TOTALS*
02356> | TIME TO PEAK (hrs) = 1.00 1.25 1.000
02357> | RUNOFF VOLUME (mm) = 56.66 25.35 55.717
02358> | TOTAL RAINFALL (mm) = 58.23 58.23 58.226
02359> | RUNOFF COEFFICIENT = .97 .44 .957
02360>
02361> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02362> | CN* = 81.0 Ia = Dep. Storage (Above)
02363> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02364> | THAN THE STORAGE COEFFICIENT.
02365> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02366>
02367>
02368> 001:0010-----
02369>
02370> * SUB-AREA No.5
02371>
02372> | CALIB STANHYD | Area (ha) = 2.66
02373> | 07:070 DT= 2.50 | Total Imp(%) = 97.00 Dir. Conn.(%) = 97.00
02374>
02375> | IMPVIOUS PERVIOUS (i)
02376> | Surface Area (ha) = 2.58 .08
02377> | Dep. Storage (mm) = 1.57 4.67
02378> | Average Slope (%) = .61 1.50
02379> | Length (m) = 207.25 20.00
02380> | Mannings n = .030 .250
02381>
02382> | Max. eff. Inten. (mm/hr) = 144.69 51.33
02383> | over (min) = 7.50 12.50
02384> | Storage Coeff. (min) = 6.54 (ii) 13.16 (ii)
02385> | Unit Hyd. Tpeak (min) = 7.50 12.50
02386> | Unit Hyd. peak (cms) = .16 .09
02387>
02388> | PEAK FLOW (cms) = .78 .01 *TOTALS*
02389> | TIME TO PEAK (hrs) = 1.04 1.17 .783 (iii)
02390> | RUNOFF VOLUME (mm) = 56.66 25.35 55.717
02391> | TOTAL RAINFALL (mm) = 58.23 58.23 58.226
02392> | RUNOFF COEFFICIENT = .97 .44 .957
02393>
02394> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02395> | CN* = 81.0 Ia = Dep. Storage (Above)
02396> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02397> | THAN THE STORAGE COEFFICIENT.
02398> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02399>
02400>
02401> 001:0011-----
02402>
02403> | ADD HYD (080 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02404> | (ha) (cms) (hrs) (mm) (cms)
02405> | ID1 06:060 .89 .296 1.00 55.72 .000
02406> | +ID2 07:070 2.66 .783 1.04 55.72 .000
02407> |
02408> | SUM 08:080 3.55 1.060 1.04 55.72 .000
02409>
02410> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02411>
02412>
02413> 001:0012-----
02414>
02415> | ADD HYD (090 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02416> | (ha) (cms) (hrs) (mm) (cms)
02417> | ID1 05:050 5.01 1.350 1.04 53.55 .000
02418> | +ID2 08:080 3.55 1.060 1.04 55.72 .000
02419> |
02420> | SUM 09:090 8.56 2.410 1.04 54.45 .000
02421>
02422> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02423>
02424>
02425> 001:0013-----
02426>
02427> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02428> | IN>09: (090 ) |
02429> | OUT<10: (POND ) | ***** OUTFLOW STORAGE TABLE *****
02430> | OUTFLOW STORAGE | OUTFLOW STORAGE

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02431> (cms) (ha.m.) | (cms) (ha.m.)
02432> .000 .0000E+00 | .593 .6251E+00
02433> .008 .6560E-01 | .654 .6631E+00
02434> .017 .1311E+00 | .797 .7391E+00
02435> .093 .2831E+00 | .950 .8274E+00
02436> .233 .3971E+00 | 1.304 .9157E+00
02437> .337 .4731E+00 | 1.880 .1004E+01
02438> .465 .5491E+00 | 2.577 .1092E+01
02439> .531 .5871E+00 | .000 .0000E+00

02440> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02441> (ha) (cms) (hrs) (mm)
02442> INFLOW>09: (090) 8.56 2.410 1.042 54.451
02443> OUTFLOW>10: (POND) 8.56 .189 2.056 54.449

02445> PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.838
02447> TIME SHIFT OF PEAK FLOW (min) = 60.83
02448> MAXIMUM STORAGE USED (ha.m.) = .3612E+00

02450>-----
02451> 001:0014
02452> * Remaining Hawthorne Industrial Park *
02453> *-----
02454> * SUB-AREA No.1
02455> *-----
02456> | CALIB STANDHYD | Area (ha)= 19.90
02457> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

02460> IMPERVIOUS PERVIOUS (i)
02462> Surface Area (ha)= 14.13 5.77
02463> Dep. Storage (mm)= 1.57 4.67
02464> Average Slope (%)= .60 1.50
02465> Length (m)= 580.00 100.00
02466> Mannings n = .030 .250

02468> Max. eff. Inten. (mm/hr)= 124.54 81.98
02469> over (min) 12.50 27.50
02470> Storage Coeff. (min)= 12.93 (ii) 27.37 (ii)
02471> Unit Hyd. Tpeak (min)= 12.50 27.50
02472> Unit Hyd. peak (cms)= .09 .04

02473> *TOTALS*
02474> PEAK FLOW (cms)= 2.16 .77 2.540 (iii)
02475> TIME TO PEAK (hrs)= 1.13 1.42 1.167
02476> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02477> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02478> RUNOFF COEFFICIENT = .97 .59 .780

02480> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02481> CN* = 81.0 Ia = Dep. Storage (Above)
02482> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02483> THAN THE STORAGE COEFFICIENT.
02484> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02485>-----
02486> 001:0015
02487> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02488> |-----
02489> | ID1 10:POND 8.56 1.89 2.06 54.45 .000
02490> | +ID2 01:HIP01 19.80 2.58 1.17 45.44 .000
02491> |-----
02492> | SUM 02:HIP02 28.46 2.622 1.17 48.15 .000

02495> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

02496>-----
02497> 001:0016
02498> * SUB-AREA No.2
02499> *-----
02500> | CALIB STANDHYD | Area (ha)= 17.00
02501> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

02506> IMPERVIOUS PERVIOUS (i)
02507> Surface Area (ha)= 12.07 4.93
02508> Dep. Storage (mm)= 1.57 4.67
02509> Average Slope (%)= .65 1.50
02510> Length (m)= 450.00 100.00
02511> Mannings n = .030 .250

02513> Max. eff. Inten. (mm/hr)= 144.69 87.13
02514> over (min) 10.00 25.00
02515> Storage Coeff. (min)= 10.21 (ii) 24.30 (ii)
02516> Unit Hyd. Tpeak (min)= 10.00 25.00
02517> Unit Hyd. peak (cms)= .11 .05

02518> *TOTALS*
02519> PEAK FLOW (cms)= 2.10 .71 2.398 (iii)
02520> TIME TO PEAK (hrs)= 1.08 1.38 1.125
02521> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02522> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02523> RUNOFF COEFFICIENT = .97 .59 .780

02525> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02526> CN* = 81.0 Ia = Dep. Storage (Above)
02527> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02528> THAN THE STORAGE COEFFICIENT.
02529> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02530>-----
02531> 001:0017
02532> * SUB-AREA No.3
02533> *-----
02534> | CALIB STANDHYD | Area (ha)= 15.60
02535> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

02539> IMPERVIOUS PERVIOUS (i)
02540> Surface Area (ha)= 11.08 4.52
02541> Dep. Storage (mm)= 1.57 4.67
02542> Average Slope (%)= .50 1.50
02543> Length (m)= 600.00 100.00
02544> Mannings n = .030 .250

02546> Max. eff. Inten. (mm/hr)= 111.10 77.71
02547> over (min) 15.00 30.00
02548> Storage Coeff. (min)= 14.59 (ii) 29.34 (ii)
02549> Unit Hyd. Tpeak (min)= 15.00 30.00
02550> Unit Hyd. peak (cms)= .08 .04

02551> *TOTALS*
02552> PEAK FLOW (cms)= 1.57 .57 1.879 (iii)
02553> TIME TO PEAK (hrs)= 1.17 1.46 1.208
02554> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02555> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02556> RUNOFF COEFFICIENT = .97 .59 .780

02558> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02559> CN* = 81.0 Ia = Dep. Storage (Above)
02560> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02561> THAN THE STORAGE COEFFICIENT.
02562> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02563>-----
02564> 001:0018

02565>-----
02566> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02567> |-----
02568> | ID1 03:HIP03 17.00 2.398 1.13 45.44 .000
02569> | +ID2 04:HIP04 15.60 1.879 1.21 45.44 .000
02570> |-----
02571> | SUM 05:HIP05 32.60 4.157 1.13 45.44 .000

02573> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

02574>-----
02575> 001:0019
02576> * SUB-AREA No.4
02577> *-----
02578> | CALIB STANDHYD | Area (ha)= 12.20
02579> | 07:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00

02582> IMPERVIOUS PERVIOUS (i)
02583> Surface Area (ha)= 8.66 3.54
02584> Dep. Storage (mm)= 1.57 4.67
02585> Average Slope (%)= .70 1.50
02586> Length (m)= 210.00 100.00
02587> Mannings n = .030 .250

02589> Max. eff. Inten. (mm/hr)= 144.69 101.36
02590> over (min) 7.50 20.00
02591> Storage Coeff. (min)= 6.32 (ii) 19.58 (ii)
02592> Unit Hyd. Tpeak (min)= 7.50 20.00
02593> Unit Hyd. peak (cms)= .17 .06

02594> *TOTALS*
02595> PEAK FLOW (cms)= 1.86 .59 2.109 (iii)
02596> TIME TO PEAK (hrs)= 1.04 1.29 1.042
02597> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02598> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02599> RUNOFF COEFFICIENT = .97 .59 .780

02601> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02602> CN* = 81.0 Ia = Dep. Storage (Above)
02603> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02604> THAN THE STORAGE COEFFICIENT.
02605> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02606>-----
02607> 001:0021
02608> * SUB-AREA No.5
02609> *-----
02610> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
02611> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02612> | U.H. Tp (hrs)= .170
02613> |-----
02614> | Unit Hyd Qpeak (cms)= .899
02615> | PEAK FLOW (cms)= .459 (i)
02616> | TIME TO PEAK (hrs)= 1.167
02617> | RUNOFF VOLUME (mm)= 29.155
02618> | TOTAL RAINFALL (mm)= 58.226
02619> | RUNOFF COEFFICIENT = .501

02621> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02622>-----
02623> 001:0022
02624> | ADD HYD (HIP08) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02625> |-----
02626> | ID1 06:HIP06 61.06 6.741 1.17 46.70 .000
02627> | +ID2 07:HIP07 12.20 2.109 1.04 45.44 .000
02628> | +ID3 08:Pond-B 4.00 .459 1.17 29.15 .000
02629> |-----
02630> | SUM 09:HIP08 77.26 8.998 1.13 45.59 .000

02632> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

02633>-----
02634> 001:0023
02635> * SUB-AREA No. 6
02636> *-----
02637> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
02638> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02639> | U.H. Tp (hrs)= .800
02640> |-----
02641> | Unit Hyd Qpeak (cms)= .129
02642> | PEAK FLOW (cms)= .079 (i)
02643> | TIME TO PEAK (hrs)= 2.000
02644> | RUNOFF VOLUME (mm)= 21.442
02645> | TOTAL RAINFALL (mm)= 58.226
02646> | RUNOFF COEFFICIENT = .368

02648> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02649>-----
02650> 001:0024
02651> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02652> |-----
02653> | ID1 09:HIP08 77.26 8.998 1.13 45.59 .000
02654> | +ID2 01:A3 2.70 .079 2.00 21.44 .000
02655> |-----
02656> | SUM 02:Ultima 79.96 9.013 1.13 44.78 .000

02658> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

02659>-----
02660> 001:0025
02661> *-----
02662> | CALCULATION OF 3HR - 1:50 YEAR STORM EVENT *
02663> *-----
02664> | START | Project dir.: V:\20983.DU\ENG\SWMHYMO
02665> | TZERO = .00 hrs on Rainfall dir.: V:\20983.DU\ENG\SWMHYMO
02666> | METOUT= 2 (output = METRIC)
02667> | NRUN = 001
02668> | NSTORM= 0

02669>-----
02670> 001:0002
02671> | CHICAGO STORM | IDF curve parameters: A=1569.580

02701> | Ptotal = 64.81 mm | B= 6.014
02702> | CASEV = 1 (read and print data) C= .820
02703> | used in: INTENSITY = A / (t + B)^C
02704>
02705> | Duration of storm = 3.00 hrs
02706> | Storm time step = 10.00 min
02707> | Time to peak ratio = .33
02708>
02709> |
02710> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02711> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02712> | .17 5.467 | 1.00 161.471 | 1.83 10.000 | 2.67 5.209
02713> | .33 6.820 | 1.17 48.876 | 2.00 8.397 | 2.83 4.774
02714> | .50 9.187 | 1.33 24.704 | 2.17 7.256 | 3.00 4.412
02715> | .67 14.441 | 1.50 16.495 | 2.33 6.403 |
02716> | .83 36.764 | 1.67 12.422 | 2.50 5.740 |
02717>
02718> 001:0003
02719> |
02720> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\SWHYMD\ORGA.VAL
02721> | CASEV = 1 (read and print data)
02722> | Filetitle = ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE
02723> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60
02724> | Horton's infiltration equation parameters:
02725> | [F= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F= .00 mm]
02726> | Parameters for PERVIOUS surfaces in STANDHYD:
02727> | [I.Aper= 4.67 mm] [LGP=40.00 mm] [MNI= .250]
02728> | Parameters for IMPERVIOUS surfaces in STANDHYD:
02729> | [I.Aimp= 1.57 mm] [CLI= 1.50] [MNI= .035]
02730> | Parameters used in NASHYD:
02731> | [I.a= 4.67 mm] [N= 3.00]
02732> |
02733> 001:0004
02734> |
02735> * ORGAWORLD FILE
02736> *****
02737> * SUB-AREA No.1
02738> |
02739> | CALIB STANDHYD | Area (ha)= 2.07
02740> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
02741> |
02742> | IMPERVIOUS PERVIOUS (i)
02743> | Surface Area (ha)= 1.74 .33
02744> | Dep. Storage (mm)= 1.57 4.67
02745> | Average Slope (%)= .52 1.00
02746> | Length (m)= 204.72 20.00
02747> | Mannings n = .030 .250
02748> |
02749> | Max. eff. Inten. (mm/hr)= 161.47 62.27
02750> | over (min)= 7.50 12.50
02751> | Storage Coeff. (min)= 6.51 (ii) 13.44 (ii)
02752> | Unit Hyd. Tpeak (min)= 7.50 12.50
02753> | Unit Hyd. peak (cms)= .16 .09
02754> |
02755> | PEAK FLOW (cms)= .59 .03 *TOTALS*
02756> | TIME TO PEAK (hrs)= 1.04 1.17 1.609 (iii)
02757> | RUNOFF VOLUME (mm)= 63.24 30.21 57.952
02758> | TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02759> | RUNOFF COEFFICIENT = .98 .47 .894
02760> |
02761> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02762> | CN* = 81.0 Ia = Dep. Storage (Above)
02763> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02764> | THAN THE STORAGE COEFFICIENT.
02765> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02766> |
02767> |
02768> 001:0005
02769> * SUB-AREA No.2
02770> |
02771> | CALIB STANDHYD | Area (ha)= 1.54
02772> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
02773> |
02774> | IMPERVIOUS PERVIOUS (i)
02775> | Surface Area (ha)= 1.42 .12
02776> | Dep. Storage (mm)= 1.57 4.67
02777> | Average Slope (%)= .50 1.00
02778> | Length (m)= 244.34 5.00
02779> | Mannings n = .030 .030
02780> |
02781> | Max. eff. Inten. (mm/hr)= 161.47 78.73
02782> | over (min)= 7.50 7.50
02783> | Storage Coeff. (min)= 7.33 (ii) 8.10 (ii)
02784> | Unit Hyd. Tpeak (min)= 7.50 7.50
02785> | Unit Hyd. peak (cms)= .15 .14
02786> |
02787> | PEAK FLOW (cms)= .46 .02 *TOTALS*
02788> | TIME TO PEAK (hrs)= 1.04 1.08 1.475 (iii)
02789> | RUNOFF VOLUME (mm)= 63.24 30.21 60.594
02790> | TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02791> | RUNOFF COEFFICIENT = .98 .47 .935
02792> |
02793> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02794> | CN* = 81.0 Ia = Dep. Storage (Above)
02795> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02796> | THAN THE STORAGE COEFFICIENT.
02797> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02798> |
02799> |
02800> 001:0006
02801> * SUB-AREA No.3
02802> |
02803> | CALIB STANDHYD | Area (ha)= 1.40
02804> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02805> |
02806> | IMPERVIOUS PERVIOUS (i)
02807> | Surface Area (ha)= 1.36 .04
02808> | Dep. Storage (mm)= 1.57 4.67
02809> | Average Slope (%)= .51 1.00
02810> | Length (m)= 225.83 5.00
02811> | Mannings n = .030 .030
02812> |
02813> | Max. eff. Inten. (mm/hr)= 161.47 78.73
02814> | over (min)= 7.50 7.50
02815> | Storage Coeff. (min)= 6.55 (ii) 7.72 (ii)
02816> | Unit Hyd. Tpeak (min)= 7.50 7.50
02817> | Unit Hyd. peak (cms)= .16 .15
02818> |
02819> | PEAK FLOW (cms)= .45 .01 *TOTALS*
02820> | TIME TO PEAK (hrs)= 1.04 1.08 1.454 (iii)
02821> | RUNOFF VOLUME (mm)= 63.24 30.21 62.245
02822> | TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02823> | RUNOFF COEFFICIENT = .98 .47 .960
02824> |
02825> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02826> | CN* = 81.0 Ia = Dep. Storage (Above)
02827> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02828> | THAN THE STORAGE COEFFICIENT.
02829> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02830> |
02831> |
02832> |
02833> |
02834> 001:0007
02835> |

02835> | ADD HYD (040) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02836> | (ha) (cms) (hrs) (mm) (cms)
02837> | ID1 01:010 2.07 .609 1.04 57.95 .000
02838> | +ID2 02:020 1.54 .475 1.04 60.59 .000
02839> |
02840> | SUM 04:040 3.61 1.084 1.04 59.08 .000
02841> |
02842> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02843> |
02844> |
02845> 001:0008
02846> |
02847> | ADD HYD (050) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02848> | (ha) (cms) (hrs) (mm) (cms)
02849> | ID1 03:030 1.40 .454 1.04 62.25 .000
02850> | +ID2 04:040 3.61 1.084 1.04 59.08 .000
02851> |
02852> | SUM 05:050 5.01 1.538 1.04 59.96 .000
02853> |
02854> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02855> |
02856> |
02857> 001:0009
02858> * SUB-AREA No.4
02859> |
02860> | CALIB STANDHYD | Area (ha)= .89
02861> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02862> |
02863> | IMPERVIOUS PERVIOUS (i)
02864> | Surface Area (ha)= .86 .03
02865> | Dep. Storage (mm)= 1.57 4.67
02866> | Average Slope (%)= .93 .70
02867> | Length (m)= 164.82 40.00
02868> | Mannings n = .030 .250
02869> |
02870> | Max. eff. Inten. (mm/hr)= 161.47 53.28
02871> | over (min)= 5.00 17.50
02872> | Storage Coeff. (min)= 4.80 (ii) 17.24 (ii)
02873> | Unit Hyd. Tpeak (min)= 5.00 17.50
02874> | Unit Hyd. peak (cms)= .23 .07
02875> |
02876> | PEAK FLOW (cms)= .33 .00 *TOTALS*
02877> | TIME TO PEAK (hrs)= 1.00 1.25 .335 (iii)
02878> | RUNOFF VOLUME (mm)= 63.24 30.21 1.000
02879> | TOTAL RAINFALL (mm)= 64.81 64.81 62.245
02880> | RUNOFF COEFFICIENT = .98 .47 64.806
02881> |
02882> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02883> | CN* = 81.0 Ia = Dep. Storage (Above)
02884> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02885> | THAN THE STORAGE COEFFICIENT.
02886> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02887> |
02888> |
02889> 001:0010
02890> * SUB-AREA No.5
02891> |
02892> | CALIB STANDHYD | Area (ha)= 2.66
02893> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02894> |
02895> | IMPERVIOUS PERVIOUS (i)
02896> | Surface Area (ha)= 2.58 .08
02897> | Dep. Storage (mm)= 1.57 4.67
02898> | Average Slope (%)= .61 1.50
02899> | Length (m)= 207.25 20.00
02900> | Mannings n = .030 .250
02901> |
02902> | Max. eff. Inten. (mm/hr)= 161.47 62.27
02903> | over (min)= 7.50 12.50
02904> | Storage Coeff. (min)= 6.26 (ii) 12.39 (ii)
02905> | Unit Hyd. Tpeak (min)= 7.50 12.50
02906> | Unit Hyd. peak (cms)= .17 .09
02907> |
02908> | PEAK FLOW (cms)= .88 .01 *TOTALS*
02909> | TIME TO PEAK (hrs)= 1.04 1.17 .886 (iii)
02910> | RUNOFF VOLUME (mm)= 63.24 30.21 62.245
02911> | TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02912> | RUNOFF COEFFICIENT = .98 .47 .960
02913> |
02914> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02915> | CN* = 81.0 Ia = Dep. Storage (Above)
02916> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02917> | THAN THE STORAGE COEFFICIENT.
02918> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02919> |
02920> |
02921> 001:0011
02922> |
02923> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02924> | (ha) (cms) (hrs) (mm) (cms)
02925> | ID1 06:060 .89 .335 1.00 62.25 .000
02926> | +ID2 07:070 2.66 .886 1.04 62.25 .000
02927> |
02928> | SUM 08:080 3.55 1.197 1.04 62.25 .000
02929> |
02930> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02931> |
02932> |
02933> 001:0012
02934> |
02935> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02936> | (ha) (cms) (hrs) (mm) (cms)
02937> | ID1 05:050 5.01 1.538 1.04 59.96 .000
02938> | +ID2 08:080 3.55 1.197 1.04 62.25 .000
02939> |
02940> | SUM 09:090 8.56 2.735 1.04 60.91 .000
02941> |
02942> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02943> |
02944> |
02945> 001:0013
02946> |
02947> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02948> | IN>09: (090) |
02949> | OUT<10: (POND) |
02950> |
02951> |
02952> |
02953> |
02954> |
02955> |
02956> |
02957> |
02958> |
02959> |
02960> |
02961> |
02962> |
02963> |
02964> | ROUTING RESULTS AREA QPEAK TPEAK R.V.
02965> | (ha) (cms) (hrs) (mm)
02966> | INFLOW >09: (090) 8.56 2.735 1.04 60.910
02967> | OUTFLOW <10: (POND) 8.56 .233 1.944 60.908
02968> |
02969> | PEAK FLOW REDUCTION [Out/In] (%)= 8.503
02970> | TIME SHIFT OF PEAK FLOW (min)= 54.17

02971> MAXIMUM STORAGE USED (ha.m.)=.3967E+00
 02972>
 02973>-----
 02974> 001:001-4-----
 02975> *****
 02976> * Remaining Hawthorne Industrial Park *
 02977> *****
 02978> *
 02979> * SUB-AREA No. 1
 02980>-----
 02981> | CALIB STANDHYD | Area (ha)= 19.90
 02982> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 02983>-----
 02984> IMPERVIOUS PERVIOUS (i)
 02985> Surface Area (ha)= 14.13 5.77
 02986> Dep. Storage (mm)= 1.57 4.67
 02987> Average Slope (%)= .60 1.50
 02988> Length (m)= 580.00 100.00
 02989> Mannings n = .030 .250
 02990>-----
 02991> Max. eff. Inten. (mm/hr)= 138.95 102.13
 02992> over (min) 12.50 25.00
 02993> Storage Coeff. (min)= 12.38 (ii) 25.60 (ii)
 02994> Unit Hyd. Tpeak (min)= 12.50 25.00
 02995> Unit Hyd. peak (cms)= .09 .04
 02996>-----
 02997> PEAK FLOW (cms)= 2.46 .95 *TOTALS*
 02998> TIME TO PEAK (hrs)= 1.13 1.38 1.167 3.001 (iii)
 02999> RUNOFF VOLUME (mm)= 63.24 39.90 51.566
 03000> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
 03001> RUNOFF COEFFICIENT = .98 .62 .796
 03002>-----
 03003> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03004> CN* = 81.0 Ia = Dep. Storage (Above)
 03005> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03006> THAN THE STORAGE COEFFICIENT.
 03007> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03008>-----
 03009> 001:0015-----
 03010>-----
 03011> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03012> (ha) (cms) (hrs) (mm) (cms)
 03013>-----
 03014> ID1 10:POND 8.56 .233 1.94 60.91 .000
 03015> +ID2 01:HIP01 19.90 3.001 1.17 51.57 .000
 03016>-----
 03017> SUM 02:HIP02 28.46 3.092 1.17 54.37 .000
 03018>-----
 03019> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03020>-----
 03021> 001:0016-----
 03022> * SUB-AREA No. 2
 03023>-----
 03024> | CALIB STANDHYD | Area (ha)= 17.00
 03025> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 03026>-----
 03027> IMPERVIOUS PERVIOUS (i)
 03028> Surface Area (ha)= 12.07 4.93
 03029> Dep. Storage (mm)= 1.57 4.67
 03030> Average Slope (%)= .65 1.50
 03031> Length (m)= 450.00 100.00
 03032> Mannings n = .030 .250
 03033>-----
 03034> Max. eff. Inten. (mm/hr)= 161.47 109.61
 03035> over (min) 10.00 22.50
 03036> Storage Coeff. (min)= 9.77 (ii) 22.63 (ii)
 03037> Unit Hyd. Tpeak (min)= 10.00 22.50
 03038> Unit Hyd. peak (cms)= .11 .05
 03039>-----
 03040> PEAK FLOW (cms)= 2.38 .88 *TOTALS*
 03041> TIME TO PEAK (hrs)= 1.08 1.33 1.125 2.819 (iii)
 03042> RUNOFF VOLUME (mm)= 63.24 39.90 51.566
 03043> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
 03044> RUNOFF COEFFICIENT = .98 .62 .796
 03045>-----
 03046> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03047> CN* = 81.0 Ia = Dep. Storage (Above)
 03048> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03049> THAN THE STORAGE COEFFICIENT.
 03050> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03051>-----
 03052> 001:0017-----
 03053> * SUB-AREA No. 3
 03054>-----
 03055> | CALIB STANDHYD | Area (ha)= 15.60
 03056> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 03057>-----
 03058> IMPERVIOUS PERVIOUS (i)
 03059> Surface Area (ha)= 11.08 4.52
 03060> Dep. Storage (mm)= 1.57 4.67
 03061> Average Slope (%)= .50 1.50
 03062> Length (m)= 600.00 100.00
 03063> Mannings n = .030 .250
 03064>-----
 03065> Max. eff. Inten. (mm/hr)= 138.95 96.02
 03066> over (min) 12.50 27.50
 03067> Storage Coeff. (min)= 13.24 (ii) 26.90 (ii)
 03068> Unit Hyd. Tpeak (min)= 12.50 27.50
 03069> Unit Hyd. peak (cms)= .09 .04
 03070>-----
 03071> PEAK FLOW (cms)= 1.86 .72 *TOTALS*
 03072> TIME TO PEAK (hrs)= 1.13 1.42 1.167 2.237 (iii)
 03073> RUNOFF VOLUME (mm)= 63.24 39.90 51.566
 03074> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
 03075> RUNOFF COEFFICIENT = .98 .62 .796
 03076>-----
 03077> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03078> CN* = 81.0 Ia = Dep. Storage (Above)
 03079> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03080> THAN THE STORAGE COEFFICIENT.
 03081> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03082>-----
 03083> 001:0018-----
 03084>-----
 03085> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03086> (ha) (cms) (hrs) (mm) (cms)
 03087>-----
 03088> ID1 03:HIP03 17.00 2.819 1.13 51.57 .000
 03089> +ID2 04:HIP04 15.60 2.237 1.17 51.57 .000
 03090>-----
 03091> SUM 05:HIP05 32.60 5.019 1.13 51.57 .000
 03092>-----
 03093> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03094>-----
 03095> 001:0019-----
 03096>-----
 03097> | ADD HYD (HIP06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03098> (ha) (cms) (hrs) (mm) (cms)
 03099>-----
 03100> ID1 05:HIP05 32.60 5.019 1.13 51.57 .000
 03101> +ID2 02:HIP02 28.46 3.092 1.17 54.37 .000
 03102>-----
 03103> SUM 06:HIP06 61.06 8.054 1.13 52.87 .000
 03104>-----
 03105> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

03106>-----
 03107> SUM 06:HIP06 61.06 8.054 1.13 52.87 .000
 03108>-----
 03109> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03110>-----
 03111> 001:0020-----
 03112> * SUB-AREA No. 4
 03113>-----
 03114> | CALIB STANDHYD | Area (ha)= 12.20
 03115> | 07:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 03116>-----
 03117> IMPERVIOUS PERVIOUS (i)
 03118> Surface Area (ha)= 8.66 3.54
 03119> Dep. Storage (mm)= 1.57 4.67
 03120> Average Slope (%)= .70 1.50
 03121> Length (m)= 210.00 100.00
 03122> Mannings n = .030 .250
 03123>-----
 03124> Max. eff. Inten. (mm/hr)= 161.47 126.32
 03125> over (min) 5.00 17.50
 03126> Storage Coeff. (min)= 6.05 (ii) 18.19 (ii)
 03127> Unit Hyd. Tpeak (min)= 5.00 17.50
 03128> Unit Hyd. peak (cms)= .20 .06
 03129>-----
 03130> PEAK FLOW (cms)= 2.19 .73 *TOTALS*
 03131> TIME TO PEAK (hrs)= 1.00 1.25 1.042 2.470 (iii)
 03132> RUNOFF VOLUME (mm)= 63.24 39.90 51.566
 03133> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
 03134> RUNOFF COEFFICIENT = .98 .62 .796
 03135>-----
 03136> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03137> CN* = 81.0 Ia = Dep. Storage (Above)
 03138> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03139> THAN THE STORAGE COEFFICIENT.
 03140> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03141>-----
 03142> 001:0021-----
 03143> * SUB-AREA No. 5
 03144>-----
 03145> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
 03146> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
 03147> U.H. Tp (hrs)= .170
 03148>-----
 03149> Unit Hyd. Qpeak (cms)= .899
 03150>-----
 03151> PEAK FLOW (cms)= .551 (i)
 03152> TIME TO PEAK (hrs)= 1.125
 03153> RUNOFF VOLUME (mm)= 34.455
 03154> TOTAL RAINFALL (mm)= 64.806
 03155> RUNOFF COEFFICIENT = .532
 03156>-----
 03157> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03158>-----
 03159> 001:0022-----
 03160>-----
 03161> | ADD HYD (HIP08) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03162> (ha) (cms) (hrs) (mm) (cms)
 03163>-----
 03164> ID1 06:HIP06 61.06 8.054 1.13 52.87 .000
 03165> +ID2 07:HIP07 12.20 2.470 1.04 51.57 .000
 03166> +ID3 08:Pond-B 4.00 .551 1.13 34.45 .000
 03167>-----
 03168> SUM 09:HIP08 77.26 10.570 1.13 51.71 .000
 03169>-----
 03170> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03171>-----
 03172> 001:0023-----
 03173> * SUB-AREA No. 6
 03174>-----
 03175> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
 03176> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
 03177> U.H. Tp (hrs)= .800
 03178>-----
 03179> Unit Hyd. Qpeak (cms)= .129
 03180>-----
 03181> PEAK FLOW (cms)= .096 (i)
 03182> TIME TO PEAK (hrs)= 1.958
 03183> RUNOFF VOLUME (mm)= 25.767
 03184> TOTAL RAINFALL (mm)= 64.806
 03185> RUNOFF COEFFICIENT = .398
 03186>-----
 03187> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03188>-----
 03189> 001:0024-----
 03190>-----
 03191> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03192> (ha) (cms) (hrs) (mm) (cms)
 03193>-----
 03194> ID1 09:HIP08 77.26 10.570 1.13 51.71 .000
 03195> +ID2 01:A3 2.70 .096 1.96 25.77 .000
 03196>-----
 03197> SUM 02:Ultima 79.96 10.588 1.13 50.84 .000
 03198>-----
 03199> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03200>-----
 03201> 001:0025-----
 03202> *****
 03203> * CALCULATION OF SHR - 1:100 YEAR STORM EVENT *
 03204> *****
 03205>-----
 03206> | START | Project dir.: V:\20983.DU\BNG\SWHYMO\
 03207> | TZERO = .00 hrs on 0
 03208> | METOP = 2 (output = METRIC)
 03209> | NRUN = 001
 03210> | NSTORM = 0
 03211>-----
 03212> 001:0002-----
 03213>-----
 03214> | CHICAGO STORM | IDF curve parameters: A=1735.688
 03215> | Ptotal= 71.66 mm | B= 6.014
 03216> C= .820
 03217>-----
 03218> used in: INTENSITY = A / (t + B)^C
 03219>-----
 03220> Duration of storm = 3.00 hrs
 03221> Storm time step = 10.00 min
 03222> Time to peak ratio = .33
 03223>-----
 03224> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
 03225> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
 03226>-----
 03227> .17 6.046 | 1.00 178.559 | 1.83 11.059 | 2.67 5.760
 03228> .33 7.542 | 1.17 54.049 | 2.00 9.285 | 2.83 5.280
 03229> .50 10.159 | 1.33 27.319 | 2.17 8.024 | 3.00 4.879
 03230> .67 15.969 | 1.50 18.240 | 2.33 7.080
 03231> .83 40.655 | 1.67 13.737 | 2.50 6.347
 03232>-----
 03233>-----
 03234>-----
 03235>-----
 03236>-----
 03237>-----
 03238>-----
 03239>-----
 03240>-----

```

03241> 001:0003-----
03242>
03243> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\SWHYMO\ORGA.VAL
03244> |-----| ICASEdy = 1 (read and print data)
03245> |-----| ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
03246> |-----| PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 ----
03247> Horton's infiltration equation parameters:
03248> [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F= .00 mm]
03249> Parameters for PERVIOUS surfaces in STANDHYD:
03250> [LAgpe= 4.67 mm] [Lcgr=0.00 mm] [MNP= .250]
03251> Parameters for IMPERVIOUS surfaces in STANDHYD:
03252> [LALM= 1.57 mm] [CLL= 1.50] [MNI= .035]
03253> Parameters used in NASHYD:
03254> [La= 4.67 mm] [N= 3.00]
03255>
03256> 001:0004-----
03257> *****
03258> * ORGAWORLD FILE *
03259> *****
03260> * SUB-AREA No.1
03261>
03262> | CALIB STANDHYD | Area (ha)= 2.07
03263> | 01:01O DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
03264>
03265> IMPERVIOUS PERVIOUS (i)
03266> Surface Area (ha)= 1.74 7.33
03267> Dep. Storage (mm)= 1.57 4.67
03268> Average Slope (%)= .52 1.00
03269> Length (m)= 204.72 20.00
03270> Mannings n = .030 .250
03271>
03272> Max.eff.Inten.(mm/hr)= 178.56 74.05
03273> over (min) 7.50 12.50
03274> Storage Coeff. (min)= 6.26 (ii) 12.72 (ii)
03275> Unit Hyd. Tpeak (min)= 7.50 12.50
03276> Unit Hyd. peak (cms)= .17 .09
03277>
03278> PEAK FLOW (cms)= .66 .04 *TOTALS*
03279> TIME TO PEAK (hrs)= 1.04 1.17 1.042
03280> RUNOFF VOLUME (mm)= 70.09 35.46 64.553
03281> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03282> RUNOFF COEFFICIENT = .98 .49 .901
03283>
03284> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03285> CN* = 81.0 Ia = Dep. Storage (Above)
03286> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03287> THAN THE STORAGE COEFFICIENT.
03288> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03289>
03290>
03291> 001:0005-----
03292> * SUB-AREA No.2
03293>
03294> | CALIB STANDHYD | Area (ha)= 1.54
03295> | 02:02O DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
03296>
03297> IMPERVIOUS PERVIOUS (i)
03298> Surface Area (ha)= 1.42 .12
03299> Dep. Storage (mm)= 1.57 4.67
03300> Average Slope (%)= 1.50 1.00
03301> Length (m)= 244.34 5.00
03302> Mannings n = .030 .030
03303>
03304> Max.eff.Inten.(mm/hr)= 178.56 93.23
03305> over (min) 7.50 7.50
03306> Storage Coeff. (min)= 7.04 (ii) 7.76 (ii)
03307> Unit Hyd. Tpeak (min)= 7.50 7.50
03308> Unit Hyd. peak (cms)= .16 .15
03309>
03310> PEAK FLOW (cms)= .51 .02 *TOTALS*
03311> TIME TO PEAK (hrs)= 1.04 1.08 1.042
03312> RUNOFF VOLUME (mm)= 70.09 35.46 67.324
03313> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03314> RUNOFF COEFFICIENT = .98 .49 .939
03315>
03316>
03317> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03318> CN* = 81.0 Ia = Dep. Storage (Above)
03319> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03320> THAN THE STORAGE COEFFICIENT.
03321> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03322>
03323>
03324> 001:0006-----
03325> * SUB-AREA No.3
03326>
03327> | CALIB STANDHYD | Area (ha)= 1.40
03328> | 03:03O DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03329>
03330> IMPERVIOUS PERVIOUS (i)
03331> Surface Area (ha)= 1.36 .04
03332> Dep. Storage (mm)= 1.57 4.67
03333> Average Slope (%)= .51 1.00
03334> Length (m)= 225.63 5.00
03335> Mannings n = .030 .030
03336>
03337> Max.eff.Inten.(mm/hr)= 178.56 93.23
03338> over (min) 7.50 7.50
03339> Storage Coeff. (min)= 6.67 (ii) 7.39 (ii)
03340> Unit Hyd. Tpeak (min)= 7.50 7.50
03341> Unit Hyd. peak (cms)= .16 .15
03342>
03343> PEAK FLOW (cms)= .50 .01 *TOTALS*
03344> TIME TO PEAK (hrs)= 1.04 1.08 1.042
03345> RUNOFF VOLUME (mm)= 70.09 35.46 69.056
03346> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03347> RUNOFF COEFFICIENT = .98 .49 .964
03348>
03349>
03350> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03351> CN* = 81.0 Ia = Dep. Storage (Above)
03352> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03353> THAN THE STORAGE COEFFICIENT.
03354> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03355>
03356>
03357> 001:0007-----
03358>
03359> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03360> (ha) (cms) (hrs) (mm) (cms)
03361> ID1 01:010 2.07 .685 1.04 64.55 .000
03362> +ID2 02:020 1.54 .534 1.04 67.32 .000
03363>
03364> SUM 04:040 3.61 1.220 1.04 65.74 .000
03365>
03366> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03367>
03368>
03369> 001:0008-----
03370>
03371> | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03372> (ha) (cms) (hrs) (mm) (cms)
03373> ID1 03:030 1.40 .509 1.04 69.06 .000
03374> +ID2 04:040 3.61 1.220 1.04 65.74 .000
03375>

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03376> SUM 05:050 5.01 1.729 1.04 66.66 .000
03377>
03378> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03379>
03380>
03381> 001:0009-----
03382> * SUB-AREA No.4
03383>
03384> | CALIB STANDHYD | Area (ha)= .89
03385> | 06:06O DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03386>
03387> IMPERVIOUS PERVIOUS (i)
03388> Surface Area (ha)= .86 .03
03389> Dep. Storage (mm)= 1.57 4.67
03390> Average Slope (%)= .93 70
03391> Length (m)= 164.82 40.00
03392> Mannings n = .030 .250
03393>
03394> Max.eff.Inten.(mm/hr)= 178.56 67.61
03395> over (min) 5.00 15.00
03396> Storage Coeff. (min)= 4.62 (ii) 15.92 (ii)
03397> Unit Hyd. Tpeak (min)= 5.00 15.00
03398> Unit Hyd. peak (cms)= .24 .07
03399>
03400> PEAK FLOW (cms)= .37 .00 *TOTALS*
03401> TIME TO PEAK (hrs)= 1.00 1.21 1.000
03402> RUNOFF VOLUME (mm)= 70.09 35.46 69.055
03403> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03404> RUNOFF COEFFICIENT = .98 .49 .964
03405>
03406>
03407> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03408> CN* = 81.0 Ia = Dep. Storage (Above)
03409> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03410> THAN THE STORAGE COEFFICIENT.
03411> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03412>
03413>
03414> 001:0010-----
03415> * SUB-AREA No.5
03416>
03417> | CALIB STANDHYD | Area (ha)= 2.66
03418> | 07:07O DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03419>
03420> IMPERVIOUS PERVIOUS (i)
03421> Surface Area (ha)= 2.58 .08
03422> Dep. Storage (mm)= 1.57 4.67
03423> Average Slope (%)= .61 1.50
03424> Length (m)= 207.25 20.00
03425> Mannings n = .030 .250
03426>
03427> Max.eff.Inten.(mm/hr)= 178.56 74.05
03428> over (min) 5.00 12.50
03429> Storage Coeff. (min)= 6.01 (ii) 11.73 (ii)
03430> Unit Hyd. Tpeak (min)= 5.00 12.50
03431> Unit Hyd. peak (cms)= .20 .09
03432>
03433> PEAK FLOW (cms)= 1.03 .01 *TOTALS*
03434> TIME TO PEAK (hrs)= 1.00 1.17 1.000
03435> RUNOFF VOLUME (mm)= 70.09 35.46 69.056
03436> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03437> RUNOFF COEFFICIENT = .98 .49 .964
03438>
03439>
03440> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03441> CN* = 81.0 Ia = Dep. Storage (Above)
03442> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03443> THAN THE STORAGE COEFFICIENT.
03444> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03445>
03446>
03447> 001:0011-----
03448>
03449> | ADD HYD (080 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03450> (ha) (cms) (hrs) (mm) (cms)
03451> ID1 06:060 .89 .374 1.00 69.06 .000
03452> +ID2 07:070 2.66 1.034 1.00 69.06 .000
03453>
03454> SUM 08:080 3.55 1.408 1.00 69.06 .000
03455>
03456> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03457>
03458>
03459> 001:0012-----
03460>
03461> | ADD HYD (090 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03462> (ha) (cms) (hrs) (mm) (cms)
03463> ID1 05:050 5.01 1.729 1.04 66.66 .000
03464> +ID2 08:080 3.55 1.408 1.00 69.06 .000
03465>
03466> SUM 09:090 8.56 3.067 1.04 67.66 .000
03467>
03468> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03469>
03470>
03471> 001:0013-----
03472>
03473> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03474> | IN>09:(090 ) |
03475> | OUT<10:(POND ) |
03476>
03477> ===== OUTFLOW STORAGE TABLE =====
03478> OUTFLOW STORAGE | OUTFLOW STORAGE
03479> (cms) (ha.m.) | (cms) (ha.m.)
03480> .000 .0000E+00 | .593 .6251E+00
03481> .008 .6560E-01 | .654 .6631E+00
03482> .017 .1311E+00 | .797 .7391E+00
03483> .093 .2831E+00 | .950 .8274E+00
03484> .233 .3971E+00 | 1.304 .9157E+00
03485> .337 .4731E+00 | 1.880 .1004E+01
03486> .465 .5491E+00 | 2.577 .1092E+01
03487> .531 .5871E+00 | .000 .0000E+00
03488>
03489> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03490> (ha) (cms) (hrs) (mm)
03491> INFLOW >09:(090 ) 8.56 3.067 1.042 67.655
03492> OUTFLOW <10:(POND ) 8.56 .283 1.861 67.653
03493>
03494> PEAK FLOW REDUCTION (Qout/Qin) (%) = 9.214
03495> TIME SHIFT OF PEAK FLOW (min) = 49.17
03496> MAXIMUM STORAGE USED (ha.m.) = .4333E+00
03497>
03498> 001:0014-----
03499> * Remaining Hawthorne Industrial Park *
03500> *****
03501> *
03502> * SUB-AREA No.1
03503>
03504> | CALIB STANDHYD | Area (ha)= 19.90
03505> | 01:HIF01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
03506>
03507> IMPERVIOUS PERVIOUS (i)
03508> Surface Area (ha)= 14.13 5.77
03509> Dep. Storage (mm)= 1.57 4.67
03510> Average Slope (%)= .60 1.50

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03511> Length (m) = 580.00 100.00
 03512> Mannings n = .030 .250
 03513>
 03514> Max. eff. Inten. (mm/hr) = 153.66 117.89
 03515> over (min) = 12.50 25.00
 03516> Storage Coeff. (min) = 11.89 (ii) 24.37 (ii)
 03517> Unit Hyd. Tpeak (min) = 12.50 25.00
 03518> Unit Hyd. peak (cms) = .09 .05
 03519>
 03520> PEAK FLOW (cms) = 2.77 1.13 3.419 (iii)
 03521> TIME TO PEAK (hrs) = 1.13 1.38 1.167
 03522> RUNOFF VOLUME (mm) = 70.09 45.94 58.015
 03523> TOTAL RAINFALL (mm) = 71.66 71.66 71.665
 03524> RUNOFF COEFFICIENT = .98 .64 .810
 03525>
 03526> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03527> CN* = 81.0 Ia = Dep. Storage (Above)
 03528> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03529> THAN THE STORAGE COEFFICIENT.
 03530> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03531>

03532> 001:0015
 03533> *
 03534> ADD HYD (HIPO2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03535> (ha) (cms) (hrs) (mm) (cms)
 03537> ID1 10:POND 8.56 .283 1.86 67.65 .000
 03538> +ID2 01:HIP01 19.90 3.419 1.17 58.02 .000
 03539> =====
 03540> SUM 02:HIPO2 28.46 3.554 1.17 60.91 .000
 03541>
 03542> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03543>
 03544>
 03545> 001:0016
 03546> *
 03547> * SUB-AREA No.2

03548> CALIB STANDHYD | Area (ha) = 17.00
 03549> | 03:HIP03 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00
 03550>
 03551>
 03552> IMPERVIOUS PERVIOUS (i)
 03553> Surface Area (ha) = 12.07 4.93
 03554> Dep. Storage (mm) = 1.57 4.67
 03555> Average Slope (%) = .65 1.50
 03556> Length (m) = 450.00 100.00
 03557> Mannings n = .030 .250
 03558>
 03559> Max. eff. Inten. (mm/hr) = 178.56 126.60
 03560> over (min) = 10.00 22.50
 03561> Storage Coeff. (min) = 9.39 (ii) 21.52 (ii)
 03562> Unit Hyd. Tpeak (min) = 10.00 22.50
 03563> Unit Hyd. peak (cms) = .12 .05
 03564>
 03565> PEAK FLOW (cms) = 2.68 1.05 3.203 (iii)
 03566> TIME TO PEAK (hrs) = 1.08 1.33 1.125
 03567> RUNOFF VOLUME (mm) = 70.09 45.94 58.015
 03568> TOTAL RAINFALL (mm) = 71.66 71.66 71.665
 03569> RUNOFF COEFFICIENT = .98 .64 .810
 03570>
 03571> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03572> CN* = 81.0 Ia = Dep. Storage (Above)
 03573> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03574> THAN THE STORAGE COEFFICIENT.
 03575> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03576>
 03577>
 03578> 001:0017
 03579> *
 03580> * SUB-AREA No.3

03581> CALIB STANDHYD | Area (ha) = 15.60
 03582> | 04:HIP04 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00
 03583>
 03584>
 03585> IMPERVIOUS PERVIOUS (i)
 03586> Surface Area (ha) = 11.08 4.52
 03587> Dep. Storage (mm) = 1.57 4.67
 03588> Average Slope (%) = .50 1.50
 03589> Length (m) = 600.00 100.00
 03590> Mannings n = .030 .250
 03591>
 03592> Max. eff. Inten. (mm/hr) = 153.66 117.89
 03593> over (min) = 12.50 25.00
 03594> Storage Coeff. (min) = 12.82 (ii) 25.30 (ii)
 03595> Unit Hyd. Tpeak (min) = 12.50 25.00
 03596> Unit Hyd. peak (cms) = .09 .04
 03597>
 03598> PEAK FLOW (cms) = 2.10 .87 2.612 (iii)
 03599> TIME TO PEAK (hrs) = 1.13 1.38 1.167
 03600> RUNOFF VOLUME (mm) = 70.09 45.94 58.015
 03601> TOTAL RAINFALL (mm) = 71.66 71.66 71.665
 03602> RUNOFF COEFFICIENT = .98 .64 .810
 03603>
 03604> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03605> CN* = 81.0 Ia = Dep. Storage (Above)
 03606> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03607> THAN THE STORAGE COEFFICIENT.
 03608> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03609>
 03610>
 03611> 001:0018

03612> ADD HYD (HIPO5) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03613> (ha) (cms) (hrs) (mm) (cms)
 03615> ID1 03:HIP03 17.00 3.203 1.13 58.02 .000
 03616> +ID2 04:HIP04 15.60 2.612 1.17 58.02 .000
 03617> =====
 03618> SUM 05:HIPO5 32.60 5.767 1.13 58.02 .000
 03619>
 03620> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03621>
 03622>
 03623> 001:0019
 03624> *
 03625> ADD HYD (HIPO6) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03626> (ha) (cms) (hrs) (mm) (cms)
 03627> ID1 05:HIPO5 32.60 5.767 1.13 58.02 .000
 03628> +ID2 02:HIP02 28.46 3.554 1.17 60.91 .000
 03629> =====
 03630> SUM 06:HIPO6 61.06 9.239 1.13 59.36 .000
 03631>
 03632> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03633>
 03634>
 03635> 001:0020
 03636> *
 03637> * SUB-AREA No.4

03638> CALIB STANDHYD | Area (ha) = 12.20
 03639> | 07:HIP07 DT= 2.50 | Total Imp(%) = 71.00 Dir. Conn.(%) = 50.00
 03640>
 03641>
 03642> IMPERVIOUS PERVIOUS (i)
 03643> Surface Area (ha) = 8.66 3.54
 03644> Dep. Storage (mm) = 1.57 4.67
 03645> Average Slope (%) = .70 1.50

03646> Length (m) = 210.00 100.00
 03647> Mannings n = .030 .250
 03648>
 03649> Max. eff. Inten. (mm/hr) = 178.56 146.17
 03650> over (min) = 5.00 17.50
 03651> Storage Coeff. (min) = 5.81 (ii) 17.27 (ii)
 03652> Unit Hyd. Tpeak (min) = 5.00 17.50
 03653> Unit Hyd. peak (cms) = .20 .07
 03654>
 03655> PEAK FLOW (cms) = 2.46 .87 2.793 (iii)
 03656> TIME TO PEAK (hrs) = 1.00 1.25 1.042
 03657> RUNOFF VOLUME (mm) = 70.09 45.94 58.015
 03658> TOTAL RAINFALL (mm) = 71.66 71.66 71.665
 03659> RUNOFF COEFFICIENT = .98 .64 .810
 03660>
 03661> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03662> CN* = 81.0 Ia = Dep. Storage (Above)
 03663> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03664> THAN THE STORAGE COEFFICIENT.
 03665> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03666>
 03667>
 03668> 001:0021
 03669> *
 03670> *SUB-AREA No.5

03671> DESIGN NASHYD | Area (ha) = 4.00 Curve Number (CN)=85.00
 03672> | 08:Pond-B DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
 03673> U.H. Tp (hrs) = .170
 03674>
 03675> Unit Hyd Qpeak (cms) = .899
 03676>
 03677> PEAK FLOW (cms) = .649 (i)
 03678> TIME TO PEAK (hrs) = 1.125
 03680> RUNOFF VOLUME (mm) = 40.139
 03681> TOTAL RAINFALL (mm) = 71.665
 03682> RUNOFF COEFFICIENT = .560
 03683>
 03684> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03685>
 03686>
 03687> 001:0022

03688> ADD HYD (HIPO8) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03689> (ha) (cms) (hrs) (mm) (cms)
 03691> ID1 06:HIP06 61.06 9.239 1.13 59.36 .000
 03692> +ID2 07:HIP07 12.20 2.793 1.04 58.02 .000
 03693> +ID3 08:Pond-B 4.00 .649 1.13 40.14 .000
 03694> =====
 03695> SUM 09:HIPO8 77.26 12.109 1.13 58.16 .000
 03696>
 03697> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03698>
 03699>
 03700> 001:0023
 03701> *
 03702> *SUB-AREA No. 6

03703> DESIGN NASHYD | Area (ha) = 2.70 Curve Number (CN)=76.00
 03704> | 01:A3 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
 03705> U.H. Tp (hrs) = .800
 03706>
 03707> Unit Hyd Qpeak (cms) = .129
 03708>
 03709> PEAK FLOW (cms) = .114 (i)
 03710> TIME TO PEAK (hrs) = 1.958
 03711> RUNOFF VOLUME (mm) = 30.490
 03712> TOTAL RAINFALL (mm) = 71.665
 03713> RUNOFF COEFFICIENT = .425
 03714>
 03715> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03716>
 03717>
 03718>
 03719> 001:0024

03720> ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03721> (ha) (cms) (hrs) (mm) (cms)
 03722> ID1 09:HIP08 77.26 12.109 1.13 58.16 .000
 03723> +ID2 01:A3 2.70 .114 1.96 30.49 .000
 03724> =====
 03725> SUM 02:Ultima 79.96 12.132 1.13 57.22 .000
 03726>
 03727> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03728>
 03729>
 03730>
 03731> 001:0025
 03732> FINISH
 03733>
 03734>
 03735> *****
 03736> WARNINGS / ERRORS / NOTES
 03737>
 03738> Simulation ended on 2009-02-09 at 14:59:34
 03739>
 03740>
 03741>
 03742>

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		
					AREA m ²	VOLUME m ³	VOLUME ha-m
	SWMHYMO DATA						
Invert Elevation (m):	82.90	84.80	86.15		0	0	0.0000
Dia. or Width (mm):	150	600	6000		3093	574	0.0574
# of restrictors/weirs:	1	2	1		11192	2434	0.2434
Discharge Coeff. (C _d):	0.61	0.61	1.87		16913	5834	0.5834
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)**

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00001> 2 Metric units
00002> *****
00003> *# Project Name : Hawthorne Industrial Park Project Number: [2098] *
00004> *# Date : January, 2009
00005> *# Revisd : N/A
00006> *# Developed by : Mark Buchanan, E.I.T.
00007> *# Revisd by : Guy Forget, P.Eng.
00008> *# Company : J.L. Richards & Associates Limited
00009> *# License # : 4418403
00010> *****
00011> *
00012> *
00013> *****
00014> *# FILENAME: V:\20983.DU\ENG\SWMHYMO\20983PST.DAT
00015> *# FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
00016> *# OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE *
00017> *****
00018> *
00019> *****
00020> *# SWHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE
00021> *# PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00022> *****
00023> *
00024> *****
00025> *# HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *
00026> *# FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
00027> *****
00028> *
00029> *****
00030> *# POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00031> *****
00032> *
00033> *****
00034> *# CALCULATION OF 4 HR 25 MM STORM EVENT
00035> *****
00036> *
00037> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00038> * [ ] <-storm filename, one per line for NSTORM time
00039> READ STORM STORM_FILENAME="4HR25-15.STM"
00040> *-----
00041> *# DEFAULT VALUES ICASDef=[1], read and print values
00042> *# DEFVAL_FILENAME=(V:\22973.DU\ENG\SWMHYMO\ORGA.VAL)
00043> *-----
00044> *
00045> *****
00046> *# ORGAWORLD FILE *
00047> *
00048> *
00049> * SUB-AREA No.1
00050> *
00051> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00052> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00053> SCS curve number CN=[81],
00054> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00055> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (mi)
00056> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00057> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
00058> RAINFALL=[ , , , ] (mm/hr), END=-1
00059> *-----
00060> *
00061> * SUB-AREA No.2
00062> *
00063> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00064> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00065> SCS curve number CN=[81],
00066> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00067> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00068> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00069> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
00070> RAINFALL=[ , , , ] (mm/hr), END=-1
00071> *-----
00072> *
00073> * SUB-AREA No.3
00074> *
00075> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00076> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00077> SCS curve number CN=[81],
00078> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00079> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00080> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.51] (%),
00081> LGI=[225.63] (m), MNI=[0.03], SCI=[0.0] (min)
00082> RAINFALL=[ , , , ] (mm/hr), END=-1
00083> *-----
00084> *# ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00085> *#
00086> *# ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00087> *#
00088> *
00089> * SUB-AREA No.4
00090> *
00091> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00092> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00093> SCS curve number CN=[81],
00094> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
00095> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00096> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.93] (%),
00097> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
00098> RAINFALL=[ , , , ] (mm/hr), END=-1
00099> *-----
00100> *
00101> * SUB-AREA No.5
00102> *
00103> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00104> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00105> SCS curve number CN=[81],
00106> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00107> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00108> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00109> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
00110> RAINFALL=[ , , , ] (mm/hr), END=-1
00111> *-----
00112> *# ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00113> *#
00114> *# ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00115> *#
00116> *
00117> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00118> RDT=[1.0] (min),
00119> *# TABLE of ( OUTFLOW-STORAGE ) values
00120> *# (cms) (ha-m)
00121> [ 0.000, 0.0000]
00122> [ 0.008, 0.0656]
00123> [ 0.017, 0.1311]
00124> [ 0.093, 0.2831]
00125> [ 0.233, 0.3971]
00126> [ 0.337, 0.4731]
00127> [ 0.465, 0.5491]
00128> [ 0.531, 0.5871]
00129> [ 0.593, 0.6251]
00130> [ 0.654, 0.6631]
00131> [ 0.797, 0.7391]
00132> [ 0.950, 0.8274]
00133> [ 1.304, 0.9157]
00134> [ 1.880, 1.0040]
00135> [ 2.577, 1.0923]

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00136> [ -1, -1 ] (max twenty pts)
00137> *****
00138> *****
00139> *# Remaining Hawthorne Industrial Park *
00140> *****
00141> *
00142> * SUB-AREA No.1
00143> *
00144> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00145> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00146> SCS curve number CN=[81],
00147> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00148> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00149> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00150> LGI=[560] (m), MNI=[0.03], SCI=[0.0] (min)
00151> RAINFALL=[ , , , ] (mm/hr), END=-1
00152> *-----
00153> *# ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00154> *#
00155> *
00156> * SUB-AREA No.2
00157> *
00158> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00159> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00160> SCS curve number CN=[81],
00161> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00162> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00163> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.65] (%),
00164> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00165> RAINFALL=[ , , , ] (mm/hr), END=-1
00166> *-----
00167> *
00168> * SUB-AREA No.3
00169> *
00170> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00171> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00172> SCS curve number CN=[81],
00173> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00174> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00175> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00176> LGI=[500] (m), MNI=[0.03], SCI=[0.0] (min)
00177> RAINFALL=[ , , , ] (mm/hr), END=-1
00178> *-----
00179> *# ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00180> *#
00181> *
00182> * SUB-AREA No.4
00183> *
00184> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5] (min), AREA=[4.0] (ha),
00185> DWF=[0] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00186> RAINFALL=[ , , , ] (mm/hr), END=-1
00187> *-----
00188> *
00189> *
00190> *# ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00191> *#
00192> *
00193> ROUTE RESERVOIR IDout=[ 8 ], NHYD=["HIP-POND"], IDin=[ 7 ],
00194> RDT=[1.0] (min),
00195> *# TABLE of ( OUTFLOW-STORAGE ) values
00196> *# (cms) (ha-m)
00197> [ 0.0, 0.0 ]
00198> [ 0.048, 0.0574 ]
00199> [ 0.054, 0.2434 ]
00200> [ 0.059, 0.583 ]
00201> [ 0.062, 0.8400 ]
00202> [ 0.064, 1.1024 ]
00203> [ 0.147, 1.3705 ]
00204> [ 0.280, 1.6444 ]
00205> [ 0.472, 1.9242 ]
00206> [ 0.724, 2.2997 ]
00207> [ 0.937, 2.5010 ]
00208> [ 1.262, 2.7981 ]
00209> [ 1.404, 3.1009 ]
00210> [ 1.532, 3.4096 ]
00211> [ 1.650, 3.7240 ]
00212> [ 2.409, 4.0442 ]
00213> [ 3.689, 4.3702 ]
00214> [ -1, -1 ] (max twenty pts)
00215> *-----
00216> *
00217> *#
00218> *
00219> * SUB-AREA No. 5
00220> *
00221> DESIGN NASHYD ID = [9], NHYD=["A2"], DT=[2.5] (min), AREA=[6.8] (ha),
00222> DWF=[0] (cms), CN/C=[76], TP=[0.37] hrs,
00223> RAINFALL=[ , , , ] (mm/hr), END=-1
00224> *-----
00225> *
00226> * SUB-AREA No. 6
00227> *
00228> DESIGN NASHYD ID = [10], NHYD=["A3"], DT=[2.5] (min), AREA=[5.3] (ha),
00229> DWF=[0] (cms), CN/C=[76], TP=[0.804] hrs,
00230> RAINFALL=[ , , , ] (mm/hr), END=-1
00231> *-----
00232> *# ADD HYD IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
00233> *#
00234> *
00235> *
00236> *****
00237> *# CALCULATION OF 3HR - 1:2 YEAR STORM EVENT *
00238> *****
00239> *
00240> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00241> * [ ] <-storm filename, one per line for NSTORM time
00242> *# CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDS=[10.0] (min)
00243> *# ICASScs=[1], A=[732.951], B=[6.199], and C=[0.810],
00244> *#
00245> *#
00246> *# DEFAULT VALUES ICASDef=[1], read and print values
00247> *# DEFVAL_FILENAME=(V:\22973.DU\ENG\SWMHYMO\ORGA.VAL)
00248> *#
00249> *#
00250> *
00251> *****
00252> *# ORGAWORLD FILE *
00253> *
00254> *
00255> * SUB-AREA No.1
00256> *
00257> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00258> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00259> SCS curve number CN=[81],
00260> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00261> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (mi)
00262> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00263> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
00264> RAINFALL=[ , , , ] (mm/hr), END=-1
00265> *-----
00266> *
00267> * SUB-AREA No.2
00268> *
00269> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00270> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],

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00271> SCS curve number CN=[81],
00272> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.0] (%),
00273> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00274> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.50] (%),
00275> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00276> RAINFALL=[ , , , ] (mm/hr), END=-1
00277> *
00278> * SUB-AREA No. 3
00280>
00281> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00282> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00283> SCS curve number CN=[81],
00284> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.0] (%),
00285> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00286> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.51] (%),
00287> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0]
00288> RAINFALL=[ , , , ] (mm/hr), END=-1
00289> *
00290> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00291> *
00292> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00293> *
00294> *
00295> * SUB-AREA No. 4
00296>
00297> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00298> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00299> SCS curve number CN=[81],
00300> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[0.7] (%),
00301> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00302> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.93] (%),
00303> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
00304> RAINFALL=[ , , , ] (mm/hr), END=-1
00305> *
00306> *
00307> * SUB-AREA No. 5
00308>
00309> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00310> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00311> SCS curve number CN=[81],
00312> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.5] (%),
00313> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
00314> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.61] (%),
00315> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0]
00316> RAINFALL=[ , , , ] (mm/hr), END=-1
00317> *
00318> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00319> *
00320> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00321> *
00322>
00323> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00324> RDT=[1.0] (min),
00325> TABLE of ( OUTFLOW-STORAGE ) values
00326> (cms) - (ha-m)
00327> [ 0.000, 0.0000]
00328> [ 0.008, 0.0656]
00329> [ 0.017, 0.1311]
00330> [ 0.093, 0.2831]
00331> [ 0.233, 0.3971]
00332> [ 0.337, 0.4731]
00333> [ 0.465, 0.5491]
00334> [ 0.531, 0.5871]
00335> [ 0.593, 0.6251]
00336> [ 0.654, 0.6631]
00337> [ 0.797, 0.7391]
00338> [ 0.950, 0.8274]
00339> [ 1.304, 0.9157]
00340> [ 1.880, 1.0040]
00341> [ 2.577, 1.0923]
00342> [ -1, -1 ] (max twenty pts)
00343> *
00344> * Remaining Hawthorne Industrial Park *
00345> *
00346> *
00347> *
00348> * SUB-AREA No. 1
00349>
00350> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00351> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00352> SCS curve number CN=[81],
00353> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.5] (%),
00354> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00355> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.61] (%),
00356> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00357> RAINFALL=[ , , , ] (mm/hr), END=-1
00358> *
00359> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00360> *
00361> *
00362> * SUB-AREA No. 2
00363>
00364> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00365> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00366> SCS curve number CN=[81],
00367> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.5] (%),
00368> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00369> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.65] (%),
00370> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00371> RAINFALL=[ , , , ] (mm/hr), END=-1
00372> *
00373> *
00374> * SUB-AREA No. 3
00375>
00376> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00377> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00378> SCS curve number CN=[81],
00379> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.5] (%),
00380> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00381> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.5] (%),
00382> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00383> RAINFALL=[ , , , ] (mm/hr), END=-1
00384> *
00385> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00386> *
00387> *
00388> * SUB-AREA No. 4
00389>
00390> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00391> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00392> RAINFALL=[ , , , ] (mm/hr), END=-1
00393> *
00394> *
00395>
00396> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00397> *
00398>
00399> ROUTE RESERVOIR IDout=[ 8 ], NHYD=["HIP-POND"], IDin=[ 7 ],
00400> RDT=[1.0] (min),
00401> TABLE of ( OUTFLOW-STORAGE ) values
00402> (cms) - (ha-m)
00403> [ 0.0, 0.0 ]
00404> [ 0.048, 0.0574 ]
00405> [ 0.054, 0.2434 ]

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00406> [ 0.059, 0.5834 ]
00407> [ 0.062, 0.8400 ]
00408> [ 0.064, 1.1024 ]
00409> [ 0.147, 1.3705 ]
00410> [ 0.280, 1.6444 ]
00411> [ 0.472, 1.9242 ]
00412> [ 0.724, 2.2097 ]
00413> [ 0.937, 2.5010 ]
00414> [ 1.262, 2.7981 ]
00415> [ 1.404, 3.1009 ]
00416> [ 1.532, 3.4096 ]
00417> [ 1.650, 3.7240 ]
00418> [ 2.409, 4.0442 ]
00419> [ 3.689, 4.3702 ]
00420> [ -1, -1 ] (max twenty pts)
00421> *
00422> *
00423> *
00424> * SUB-AREA No. 5
00425>
00426> DESIGN NASHYD ID = [9], NHYD=["A2"], DT=[2.5] min, AREA=[6.8] (ha),
00427> DWF=[0] (cms), CN=[76], TP=[0.37] hrs,
00428> RAINFALL=[ , , , ] (mm/hr), END=-1
00429> *
00430> *
00431> * SUB-AREA No. 6
00432> *
00433> DESIGN NASHYD ID = [10], NHYD=["A3"], DT=[2.5] min, AREA=[5.3] (ha),
00434> DWF=[0] (cms), CN=[76], TP=[0.804] hrs,
00435> RAINFALL=[ , , , ] (mm/hr), END=-1
00436> *
00437> ADD HYD IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
00438> *
00439> *
00440> *
00441> *****
00442> * CALCULATION OF 3HR - 1:5 YEAR STORM EVENT *
00443> *****
00444>
00445> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00446> [ ] <- storm filename, one per line for NSTORM time
00447> *
00448> CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TFRAT=[0.333], CSDT=[10.0] (min)
00449> ICASEcs=[1],
00450> R=[998.071], B=[6.053], and C=[0.814],
00451> *
00452> DEFAULT VALUES ICASDef=[1], read and print values
00453> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
00454> *
00455> *
00456> *****
00457> * ORGAWORLD FILE *
00458> *****
00459> *
00460> * SUB-AREA No. 1
00461>
00462> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00463> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00464> SCS curve number CN=[81],
00465> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.0] (%),
00466> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (min)
00467> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.52] (%),
00468> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00469> RAINFALL=[ , , , ] (mm/hr), END=-1
00470> *
00471> *
00472> * SUB-AREA No. 2
00473>
00474> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00475> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00476> SCS curve number CN=[81],
00477> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.0] (%),
00478> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00479> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.50] (%),
00480> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00481> RAINFALL=[ , , , ] (mm/hr), END=-1
00482> *
00483> *
00484> * SUB-AREA No. 3
00485>
00486> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00487> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00488> SCS curve number CN=[81],
00489> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.0] (%),
00490> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00491> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.5] (%),
00492> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
00493> RAINFALL=[ , , , ] (mm/hr), END=-1
00494> *
00495> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00496> *
00497> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00498> *
00499> *
00500> * SUB-AREA No. 4
00501>
00502> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00503> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00504> SCS curve number CN=[81],
00505> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[0.7] (%),
00506> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
00507> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.93] (%),
00508> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
00509> RAINFALL=[ , , , ] (mm/hr), END=-1
00510> *
00511> *
00512> * SUB-AREA No. 5
00513>
00514> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00515> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00516> SCS curve number CN=[81],
00517> Pervious surfaces: IAPer=[4.67] (mm), SLPp=[1.5] (%),
00518> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
00519> Impervious surfaces: IAImp=[1.57] (mm), SLPi=[0.61] (%),
00520> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0]
00521> RAINFALL=[ , , , ] (mm/hr), END=-1
00522> *
00523> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00524> *
00525> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00526> *
00527> *
00528> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00529> RDT=[1.0] (min),
00530> TABLE of ( OUTFLOW-STORAGE ) values
00531> (cms) - (ha-m)
00532> [ 0.000, 0.0000]
00533> [ 0.008, 0.0656]
00534> [ 0.017, 0.1311]
00535> [ 0.093, 0.2831]
00536> [ 0.233, 0.3971]
00537> [ 0.337, 0.4731]
00538> [ 0.465, 0.5491]
00539> [ 0.531, 0.5871]
00540> [ 0.593, 0.6251]

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00541> [ 0.654, 0.6631]
00542> [ 0.797, 0.7391]
00543> [ 0.950, 0.8274]
00544> [ 1.304, 0.8157]
00545> [ 1.880, 1.0040]
00546> [ 2.577, 1.0923]
00547> [ -1, -1 ] (max twenty pts)
00548>
00549> *****
00550> * Remaining Hawthorne Industrial Park *
00551> *****
00552> *
00553> * SUB-AREA No.1
00554>
00555> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00556> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00557> SCS curve number CN=[81],
00558> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.5] (%),
00559> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00560> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.6] (%),
00561> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00562> RAINFALL=[ , , , ] (mm/hr), END=-1
00563> *%-----|
00564> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00565> *%-----|
00566> *
00567> * SUB-AREA No.2
00568>
00569> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00570> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00571> SCS curve number CN=[81],
00572> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.5] (%),
00573> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00574> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.6] (%),
00575> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00576> RAINFALL=[ , , , ] (mm/hr), END=-1
00577> *%-----|
00578> *
00579> * SUB-AREA No.3
00580>
00581> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00582> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00583> SCS curve number CN=[81],
00584> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.5] (%),
00585> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00586> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.5] (%),
00587> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00588> RAINFALL=[ , , , ] (mm/hr), END=-1
00589> *%-----|
00590> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00591> *%-----|
00592> *
00593> * SUB-AREA No.4
00594>
00595> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00596> DWF=[0] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00597> RAINFALL=[ , , , ] (mm/hr), END=-1
00598> *%-----|
00599> *
00600>
00601> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00602> *%-----|
00603> *
00604> ROUTE RESERVOIR IDout=[ 8 ], NHYD=["HIP-POND"], IDin=[ 7 ],
00605> RDT=[1.0] (min),
00606> TABLE of ( OUTFLOW-STORAGE ) values
00607> (cms) - (ha-m)
00608> [ 0.0, 0.0 ]
00609> [ 0.049, 0.0574 ]
00610> [ 0.054, 0.2434 ]
00611> [ 0.059, 0.5834 ]
00612> [ 0.062, 0.8400 ]
00613> [ 0.064, 1.1024 ]
00614> [ 0.147, 1.3705 ]
00615> [ 0.280, 1.6444 ]
00616> [ 0.472, 1.9242 ]
00617> [ 0.724, 2.2097 ]
00618> [ 0.937, 2.5010 ]
00619> [ 1.262, 2.7981 ]
00620> [ 1.409, 3.1009 ]
00621> [ 1.532, 3.4096 ]
00622> [ 1.650, 3.7240 ]
00623> [ 2.409, 4.0442 ]
00624> [ 3.689, 4.3702 ]
00625> [ -1, -1 ] (max twenty pts)
00626> *%-----|
00627> *
00628> *
00629> * SUB-AREA No.5
00630>
00631> DESIGN NASHYD ID = [ 9 ], NHYD=["A2"], DT=[2.5] min, AREA=[6.8] (ha),
00632> DWF=[0] (cms), CNC=[76], TP=[0.37] hrs,
00633> RAINFALL=[ , , , ] (mm/hr), END=-1
00634> *%-----|
00635> *
00636> * SUB-AREA No.6
00637> *
00638> DESIGN NASHYD ID = [ 10 ], NHYD=["A3"], DT=[2.5] min, AREA=[5.3] (ha),
00639> DWF=[0] (cms), CNC=[76], TP=[0.804] hrs,
00640> RAINFALL=[ , , , ] (mm/hr), END=-1
00641> *%-----|
00642> ADD HYD IDsum=[ 1 ], NHYD=["Interim"], IDs to add=[8+9+10]
00643> *%-----|
00644> *
00645> *****
00646> * CALCULATION OF 3HR - 1:10 YEAR STORM EVENT *
00647> *****
00648>
00649> START TZZero=[0.0], NETOUT=[2], NSTORM=[0], NRUM=[0]
00650> [ ] <- storm filename, one per line for NSTORM time
00651> *%-----|
00652> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00653> ICAScs=[1],
00654> A=[1174.184], B=[6.014], and C=[0.816],
00655> *%-----|
00656> DEFAULT VALUES ICASdef=[1], read and print values
00657> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
00658> *%-----|
00659> *
00660> *****
00661> * ORGAWORLD FILE *
00662> *****
00663> *
00664> * SUB-AREA No.1
00665>
00666> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00667> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00668> SCS curve number CN=[81],
00669> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.0] (%),
00670> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (m)
00671> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.52] (%),
00672> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
00673> RAINFALL=[ , , , ] (mm/hr), END=-1
00674> *%-----|
00675> *

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00676> * SUB-AREA No.2
00677>
00678> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00679> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00680> SCS curve number CN=[81],
00681> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.0] (%),
00682> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00683> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.50] (%),
00684> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
00685> RAINFALL=[ , , , ] (mm/hr), END=-1
00686> *%-----|
00687> *
00688> * SUB-AREA No.3
00689>
00690> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00691> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00692> SCS curve number CN=[81],
00693> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.0] (%),
00694> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00695> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.51] (%),
00696> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0] (min)
00697> RAINFALL=[ , , , ] (mm/hr), END=-1
00698> *%-----|
00699> ADD HYD IDsum=[ 4 ], NHYD=["040"], IDs to add=[1+2]
00700> *%-----|
00701> ADD HYD IDsum=[ 5 ], NHYD=["050"], IDs to add=[3+4]
00702> *%-----|
00703> *
00704> * SUB-AREA No.4
00705>
00706> CALIB STANDHYD ID=[ 6 ], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00707> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00708> SCS curve number CN=[81],
00709> Pervious surfaces: IApex=[4.67] (mm), SLPP=[0.7] (%),
00710> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00711> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.93] (%),
00712> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
00713> RAINFALL=[ , , , ] (mm/hr), END=-1
00714> *%-----|
00715> *
00716> * SUB-AREA No.5
00717>
00718> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00719> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00720> SCS curve number CN=[81],
00721> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.5] (%),
00722> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (m)
00723> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.61] (%),
00724> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
00725> RAINFALL=[ , , , ] (mm/hr), END=-1
00726> *%-----|
00727> ADD HYD IDsum=[ 8 ], NHYD=["080"], IDs to add=[6+7]
00728> *%-----|
00729> ADD HYD IDsum=[ 9 ], NHYD=["090"], IDs to add=[5+8]
00730> *%-----|
00731> *
00732> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00733> RDT=[1.0] (min),
00734> TABLE of ( OUTFLOW-STORAGE ) values
00735> (cms) - (ha-m)
00736> [ 0.000, 0.0000 ]
00737> [ 0.008, 0.0656 ]
00738> [ 0.017, 0.1311 ]
00739> [ 0.093, 0.2831 ]
00740> [ 0.233, 0.3971 ]
00741> [ 0.337, 0.4731 ]
00742> [ 0.465, 0.5491 ]
00743> [ 0.531, 0.5871 ]
00744> [ 0.593, 0.6251 ]
00745> [ 0.654, 0.6631 ]
00746> [ 0.797, 0.7391 ]
00747> [ 0.950, 0.8274 ]
00748> [ 1.304, 0.9157 ]
00749> [ 1.880, 1.0040 ]
00750> [ 2.577, 1.0923 ]
00751> [ -1, -1 ] (max twenty pts)
00752> *%-----|
00753> *****
00754> * Remaining Hawthorne Industrial Park *
00755> *****
00756> *
00757> * SUB-AREA No.1
00758>
00759> CALIB STANDHYD ID=[ 2 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00760> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00761> SCS curve number CN=[81],
00762> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.5] (%),
00763> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00764> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.6] (%),
00765> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00766> RAINFALL=[ , , , ] (mm/hr), END=-1
00767> *%-----|
00768> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00769> *%-----|
00770> *
00771> * SUB-AREA No.2
00772>
00773> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00774> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00775> SCS curve number CN=[81],
00776> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.5] (%),
00777> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00778> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.6] (%),
00779> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00780> RAINFALL=[ , , , ] (mm/hr), END=-1
00781> *%-----|
00782> *
00783> * SUB-AREA No.3
00784>
00785> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00786> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00787> SCS curve number CN=[81],
00788> Pervious surfaces: IApex=[4.67] (mm), SLPP=[1.5] (%),
00789> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00790> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.5] (%),
00791> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00792> RAINFALL=[ , , , ] (mm/hr), END=-1
00793> *%-----|
00794> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00795> *%-----|
00796> *
00797> * SUB-AREA No.4
00798>
00799> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00800> DWF=[0] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00801> RAINFALL=[ , , , ] (mm/hr), END=-1
00802> *%-----|
00803> *
00804>
00805> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
00806> *%-----|
00807> *
00808> ROUTE RESERVOIR IDout=[ 8 ], NHYD=["HIP-POND"], IDin=[ 7 ],
00809> RDT=[1.0] (min),
00810> TABLE of ( OUTFLOW-STORAGE ) values

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00811> (cms) - (ha-m)
00812> [ 0.0, 0.0 ]
00813> [ 0.048, 0.0574 ]
00814> [ 0.054, 0.2434 ]
00815> [ 0.059, 0.5834 ]
00816> [ 0.062, 0.8400 ]
00817> [ 0.064, 1.1024 ]
00818> [ 0.147, 1.3705 ]
00819> [ 0.280, 1.6444 ]
00820> [ 0.472, 1.9242 ]
00821> [ 0.724, 2.2097 ]
00822> [ 0.937, 2.5010 ]
00823> [ 1.262, 2.7981 ]
00824> [ 1.404, 3.1009 ]
00825> [ 1.532, 3.4096 ]
00826> [ 1.650, 3.7240 ]
00827> [ 2.409, 4.0442 ]
00828> [ 3.689, 4.3702 ]
00829> [ -1, -1 ] (max twenty pts)
00830>
00831> *%-----|-----|
00832> * SUB-AREA No. 5
00833> DESIGN NASHYD ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8] (ha),
00836> DWF=[0] (cms), CNC=[76], TP=[0.37]hrs,
00837> RAINFALL=[, , , ] (mm/hr), END=-1
00838> *%-----|-----|
00839> * SUB-AREA No. 6
00841> DESIGN NASHYD ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3] (ha),
00843> DWF=[0] (cms), CNC=[76], TP=[0.804]hrs,
00845> RAINFALL=[, , , ] (mm/hr), END=-1
00846> ADD HYD IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
00847> *%-----|-----|
00848>
00850> ***** CALCULATION OF 3HR - 125 YEAR STORM EVENT *****
00851> *****
00852>
00853> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00854> [ ] <- storm filename, one per line for NSTORM time
00855> *%-----|-----|
00856> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00857> ICASECS=[1],
00858> A=[1402.884], B=[6.018], and C=[0.819],
00859> *%-----|-----|
00860> DEFAULT VALUES ICASEDef=[1], read and print values
00861> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
00862> *%-----|-----|
00863>
00864> ***** ORGAWORLD FILE *****
00865> *****
00866> * SUB-AREA No. 1
00867>
00870> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00871> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00872> SCS curve number CN=[81],
00873> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
00874> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (min)
00875> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.52] (%),
00876> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00877> RAINFALL=[, , , ] (mm/hr), END=-1
00878> *%-----|-----|
00879> * SUB-AREA No. 2
00881>
00882> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00883> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00884> SCS curve number CN=[81],
00885> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
00886> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00887> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.50] (%),
00888> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00889> RAINFALL=[, , , ] (mm/hr), END=-1
00890> *%-----|-----|
00891> * SUB-AREA No. 3
00892>
00893> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[ 1.4 ] (ha),
00894> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00895> SCS curve number CN=[81],
00896> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
00897> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00898> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.51] (%),
00899> LGI=[225.63] (m), MNI=[0.03], SCI=[0.0]
00900> RAINFALL=[, , , ] (mm/hr), END=-1
00901> *%-----|-----|
00902> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00903> *%-----|-----|
00904> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00905> *%-----|-----|
00906> * SUB-AREA No. 4
00907>
00910> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00911> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00912> SCS curve number CN=[81],
00913> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[0.7] (%),
00914> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00915> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.93] (%),
00916> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
00917> RAINFALL=[, , , ] (mm/hr), END=-1
00918> *%-----|-----|
00919> * SUB-AREA No. 5
00921>
00922> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[ 2.66 ] (ha),
00923> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00924> SCS curve number CN=[81],
00925> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
00926> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
00927> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.61] (%),
00928> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0]
00929> RAINFALL=[, , , ] (mm/hr), END=-1
00930> *%-----|-----|
00931> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00932> *%-----|-----|
00933> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00934> *%-----|-----|
00935>
00936> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00937> RDT=[1.0] (min),
00938> TABLE of ( OUTFLOW-STORAGE ) values
00939> (cms) - (ha-m)
00940> [ 0.000, 0.0000 ]
00941> [ 0.008, 0.0656 ]
00942> [ 0.017, 0.1311 ]
00943> [ 0.093, 0.2831 ]
00944> [ 0.233, 0.3971 ]
00945> [ 0.337, 0.4731 ]

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00946> [ 0.465, 0.5491 ]
00947> [ 0.531, 0.5871 ]
00948> [ 0.598, 0.6251 ]
00949> [ 0.654, 0.6631 ]
00950> [ 0.797, 0.7391 ]
00951> [ 0.950, 0.8274 ]
00952> [ 1.304, 0.9157 ]
00953> [ 1.880, 1.0040 ]
00954> [ 2.577, 1.0923 ]
00955> [ -1, -1 ] (max twenty pts)
00956>
00957> *****
00958> * Remaining Hawthorne Industrial Park *
00959> *****
00960> * SUB-AREA No. 1
00961>
00962> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00963> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00964> SCS curve number CN=[81],
00965> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
00966> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00967> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.6] (%),
00968> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00969> RAINFALL=[, , , ] (mm/hr), END=-1
00970> *%-----|-----|
00971> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00972> *%-----|-----|
00973> * SUB-AREA No. 2
00974>
00975> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00976> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00977> SCS curve number CN=[81],
00978> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
00979> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00980> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.65] (%),
00981> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00982> RAINFALL=[, , , ] (mm/hr), END=-1
00983> *%-----|-----|
00984> * SUB-AREA No. 3
00985>
00986> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
00987> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00988> SCS curve number CN=[81],
00989> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
00990> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
00991> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.5] (%),
00992> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00993> RAINFALL=[, , , ] (mm/hr), END=-1
00994> *%-----|-----|
00995> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00996> *%-----|-----|
00997> * SUB-AREA No. 4
00998>
01001> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5] (min), AREA=[4.0] (ha),
01002> DWF=[ 0 ] (cms), CNC=[ 85 ], TP=[0.17] hrs,
01003> RAINFALL=[, , , ] (mm/hr), END=-1
01004> *%-----|-----|
01005> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
01006> *%-----|-----|
01007>
01010> ROUTE RESERVOIR IDout=[ 8 ], NHYD=["HIP-POND"], IDin=[ 7 ],
01011> RDT=[1.0] (min),
01012> TABLE of ( OUTFLOW-STORAGE ) values
01013> (cms) - (ha-m)
01014> [ 0.0, 0.0 ]
01015> [ 0.048, 0.0574 ]
01016> [ 0.054, 0.2434 ]
01017> [ 0.059, 0.5834 ]
01018> [ 0.062, 0.8400 ]
01019> [ 0.064, 1.1024 ]
01020> [ 0.147, 1.3705 ]
01021> [ 0.280, 1.6444 ]
01022> [ 0.472, 1.9242 ]
01023> [ 0.724, 2.2097 ]
01024> [ 0.937, 2.5010 ]
01025> [ 1.262, 2.7981 ]
01026> [ 1.404, 3.1009 ]
01027> [ 1.532, 3.4096 ]
01028> [ 1.650, 3.7240 ]
01029> [ 2.409, 4.0442 ]
01030> [ 3.689, 4.3702 ]
01031> [ -1, -1 ] (max twenty pts)
01032>
01036> * SUB-AREA No. 5
01037>
01038> DESIGN NASHYD ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8] (ha),
01039> DWF=[0] (cms), CNC=[76], TP=[0.37]hrs,
01040> RAINFALL=[, , , ] (mm/hr), END=-1
01041> *%-----|-----|
01042> * SUB-AREA No. 6
01043>
01044> DESIGN NASHYD ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3] (ha),
01045> DWF=[0] (cms), CNC=[76], TP=[0.804]hrs,
01046> RAINFALL=[, , , ] (mm/hr), END=-1
01047> *%-----|-----|
01048> ADD HYD IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
01049> *%-----|-----|
01050> *****
01051> ***** CALCULATION OF 3HR - 150 YEAR STORM EVENT *****
01052> *****
01053>
01054> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
01055> [ ] <- storm filename, one per line for NSTORM time
01056> *%-----|-----|
01057> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
01058> ICASECS=[1],
01059> A=[1569.580], B=[6.014], and C=[0.820],
01060> *%-----|-----|
01061> DEFAULT VALUES ICASEDef=[1], read and print values
01062> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
01063> *%-----|-----|
01064>
01065> ***** ORGAWORLD FILE *****
01066> *****
01067> * SUB-AREA No. 1
01068>
01070> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
01071> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
01072> SCS curve number CN=[81],
01073> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
01074> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (min)
01075> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.52] (%),
01076> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
01077> RAINFALL=[, , , ] (mm/hr), END=-1
01078> *%-----|-----|
01079>
01080>

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01081> RAINFALL=[ , , , ](mm/hr) , END=-1
01082> *
01083> * SUB-AREA No.2
01085>
01086> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[1.54 ] (ha),
01087> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
01088> SCS curve number CN=[81],
01089> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
01090> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01091> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.51] (%),
01092> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
01093> RAINFALL=[ , , , ](mm/hr) , END=-1
01094> *
01095> *
01096> * SUB-AREA No.3
01097>
01098> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
01099> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01100> SCS curve number CN=[81],
01101> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
01102> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01103> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.51] (%),
01104> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0] (min)
01105> RAINFALL=[ , , , ](mm/hr) , END=-1
01106> *
01107> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
01108> *
01109> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
01110> *
01111> *
01112> * SUB-AREA No.4
01113>
01114> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
01115> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01116> SCS curve number CN=[81],
01117> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[0.7] (%),
01118> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
01119> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.93] (%),
01120> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
01121> RAINFALL=[ , , , ](mm/hr) , END=-1
01122> *
01123> * SUB-AREA No.5
01125>
01126> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
01127> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01128> SCS curve number CN=[81],
01129> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
01130> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
01131> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.61] (%),
01132> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
01133> RAINFALL=[ , , , ](mm/hr) , END=-1
01134> *
01135> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
01136> *
01137> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+8]
01138> *
01139> *
01140> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
01141> RDT=[1.0] (min),
01142> TABLE of ( OUTFLOW-STORAGE ) values
01143> ( cms ) - ( ha-m )
01144> [ 0.000, 0.0000 ]
01145> [ 0.008, 0.0656 ]
01146> [ 0.017, 0.1311 ]
01147> [ 0.093, 0.2831 ]
01148> [ 0.233, 0.3971 ]
01149> [ 0.337, 0.4731 ]
01150> [ 0.465, 0.5491 ]
01151> [ 0.531, 0.5871 ]
01152> [ 0.593, 0.6251 ]
01153> [ 0.654, 0.6631 ]
01154> [ 0.797, 0.7391 ]
01155> [ 0.950, 0.8241 ]
01156> [ 1.304, 0.9157 ]
01157> [ 1.880, 1.0040 ]
01158> [ 2.577, 1.0923 ]
01159> [ -1, -1 ] (max twenty pts)
01160>
01161> *****
01162> * Remaining Hawthorne Industrial Park *
01163> *****
01164> *
01165> * SUB-AREA No.1
01166>
01167> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01168> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01169> SCS curve number CN=[81],
01170> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
01171> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
01172> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.6] (%),
01173> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01174> RAINFALL=[ , , , ](mm/hr) , END=-1
01175> *
01176> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
01177> *
01178> *
01179> * SUB-AREA No.2
01180>
01181> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01182> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01183> SCS curve number CN=[81],
01184> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
01185> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
01186> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.51] (%),
01187> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
01188> RAINFALL=[ , , , ](mm/hr) , END=-1
01189> *
01190> *
01191> * SUB-AREA No.3
01192>
01193> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
01194> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01195> SCS curve number CN=[81],
01196> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
01197> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
01198> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.51] (%),
01199> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
01200> RAINFALL=[ , , , ](mm/hr) , END=-1
01201> *
01202> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01203> *
01204> *
01205> * SUB-AREA No.4
01206>
01207> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
01208> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
01209> RAINFALL=[ , , , ](mm/hr), END=-1
01210> *
01211> *
01212> *
01213> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
01214> *
01215> *

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01216> ROUTE RESERVOIR IDout=[ 8 ], NHYD=["HIP-POND"], IDin=[ 7 ],
01217> RDT=[1.0] (min),
01218> TABLE of ( OUTFLOW-STORAGE ) values
01219> ( cms ) - ( ha-m )
01220> [ 0.0, 0.0 ]
01221> [ 0.048, 0.0574 ]
01222> [ 0.054, 0.2434 ]
01223> [ 0.059, 0.5834 ]
01224> [ 0.062, 0.8400 ]
01225> [ 0.064, 1.1024 ]
01226> [ 0.147, 1.3705 ]
01227> [ 0.280, 1.6444 ]
01228> [ 0.472, 1.9242 ]
01229> [ 0.724, 2.2097 ]
01230> [ 0.937, 2.5010 ]
01231> [ 1.262, 2.7981 ]
01232> [ 1.404, 3.1009 ]
01233> [ 1.532, 3.4096 ]
01234> [ 1.650, 3.7240 ]
01235> [ 2.409, 4.0442 ]
01236> [ 3.689, 4.3702 ]
01237> [ -1, -1 ] (max twenty pts)
01238> *
01239> *
01240> * SUB-AREA No. 5
01242> *
01243> DESIGN NASHYD ID = [9], NHYD=["A2"], DT=[2.5] min, AREA=[6.8] (ha),
01244> DWF=[0] (cms), CN=[76], TP=[0.37] hrs,
01245> RAINFALL=[ , , , ](mm/hr), END=-1
01246> *
01247> *
01248> * SUB-AREA No. 6
01249>
01250> DESIGN NASHYD ID = [10], NHYD=["A3"], DT=[2.5] min, AREA=[5.3] (ha),
01251> DWF=[0] (cms), CN=[76], TP=[0.804] hrs,
01252> RAINFALL=[ , , , ](mm/hr), END=-1
01253> *
01254> ADD HYD IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
01255> *
01256> *****
01257> * CALCULATION OF 3HR - 1:100 YEAR STORM EVENT *
01258> *****
01259>
01260>
01261> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
01262> *
01263> * [ ] <- storm filename, one per line for NSTORM time
01264> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
01265> ICASES=[1],
01266> A=[1735.689], B=[6.014], and C=[0.820],
01267> *
01268> DEFAULT VALUES ICASDef=[1], read and print values
01269> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL"]
01270> *
01271> *
01272> *****
01273> * ORGAWORLD FILE *
01274> *****
01275> *
01276> * SUB-AREA No.1
01277>
01278> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
01279> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
01280> SCS curve number CN=[81],
01281> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
01282> LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (min)
01283> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.52] (%),
01284> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
01285> RAINFALL=[ , , , ](mm/hr) , END=-1
01286> *
01287> *
01288> * SUB-AREA No.2
01289>
01290> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
01291> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
01292> SCS curve number CN=[81],
01293> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
01294> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01295> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.50] (%),
01296> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
01297> RAINFALL=[ , , , ](mm/hr) , END=-1
01298> *
01299> *
01300> * SUB-AREA No.3
01301>
01302> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
01303> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01304> SCS curve number CN=[81],
01305> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.0] (%),
01306> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01307> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.51] (%),
01308> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0] (min)
01309> RAINFALL=[ , , , ](mm/hr) , END=-1
01310> *
01311> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
01312> *
01313> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
01314> *
01315> *
01316> * SUB-AREA No.4
01317>
01318> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
01319> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01320> SCS curve number CN=[81],
01321> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[0.7] (%),
01322> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
01323> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.93] (%),
01324> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
01325> RAINFALL=[ , , , ](mm/hr) , END=-1
01326> *
01327> *
01328> * SUB-AREA No.5
01329>
01330> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
01331> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01332> SCS curve number CN=[81],
01333> Pervious surfaces: IAPER=[4.67] (mm), SLEP=[1.5] (%),
01334> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
01335> Impervious surfaces: IAIMP=[1.57] (mm), SLEP=[0.61] (%),
01336> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
01337> RAINFALL=[ , , , ](mm/hr) , END=-1
01338> *
01339> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
01340> *
01341> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+8]
01342> *
01343> *
01344> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
01345> RDT=[1.0] (min),
01346> TABLE of ( OUTFLOW-STORAGE ) values
01347> ( cms ) - ( ha-m )
01348> [ 0.000, 0.0000 ]
01349> [ 0.008, 0.0656 ]
01350> [ 0.017, 0.1311 ]

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```

01351> [ 0.093, 0.2831]
01352> [ 0.233, 0.3971]
01353> [ 0.337, 0.4731]
01354> [ 0.465, 0.5491]
01355> [ 0.531, 0.5871]
01356> [ 0.593, 0.6251]
01357> [ 0.654, 0.6631]
01358> [ 0.797, 0.7391]
01359> [ 0.950, 0.8274]
01360> [ 1.304, 0.9157]
01361> [ 1.880, 1.0040]
01362> [ 2.577, 1.0923]
01363> [ -1, -1 ] (max twenty pts)
01364>
01365> *****
01366> * Remaining Hawthorne Industrial Park *
01367> *****
01368> *
01369> * SUB-AREA No.1
01370>
01371> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01372> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01373> SCS curve number CN=[81],
01374> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01375> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01376> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.6] (%),
01377> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
01378> RAINFALL=[ , , , ] (mm/hr), END=-1
01379> *%-----|
01380> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
01381> *%-----|
01382> *
01383> * SUB-AREA No.2
01384>
01385> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01386> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01387> SCS curve number CN=[81],
01388> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01389> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01390> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.65] (%),
01391> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
01392> RAINFALL=[ , , , ] (mm/hr), END=-1
01393> *%-----|
01394> *
01395> * SUB-AREA No.3
01396>
01397> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[18.1] (ha),
01398> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01399> SCS curve number CN=[81],
01400> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01401> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
01402> Impervious surfaces: IAimp=[1.57] (mm), SLPI=[0.5] (%),
01403> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
01404> RAINFALL=[ , , , ] (mm/hr), END=-1
01405> *%-----|
01406> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01407> *%-----|
01408> *
01409> * SUB-AREA No.4
01410>
01411> DESIGN NASHYD ID=[ 6 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0] (ha),
01412> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17]hrs,
01413> RAINFALL=[ , , , ] (mm/hr), END=-1
01414> *%-----|
01415> *
01416>
01417> ADD HYD IDsum=[ 7 ], NHYD=["HIP06"], IDs to add=[2+5+6]
01418> *%-----|
01419> *
01420> ROUTE RESERVOIR IDout=[ 8 ], NHYD=["HIP-POND"], IDin=[ 7 ],
01421> RDT=[1.0] (min),
01422> TABLE of ( OUTFLOW-STORAGE ) values
01423> ( cms ) - ( ha-m )
01424> [ 0.0, 0.0 ]
01425> [ 0.048, 0.0574 ]
01426> [ 0.054, 0.2434 ]
01427> [ 0.059, 0.5834 ]
01428> [ 0.062, 0.8400 ]
01429> [ 0.064, 1.1024 ]
01430> [ 0.147, 1.3705 ]
01431> [ 0.280, 1.6444 ]
01432> [ 0.472, 1.9242 ]
01433> [ 0.724, 2.2097 ]
01434> [ 0.937, 2.5010 ]
01435> [ 1.262, 2.7981 ]
01436> [ 1.404, 3.1009 ]
01437> [ 1.532, 3.4096 ]
01438> [ 1.650, 3.7240 ]
01439> [ 2.409, 4.0442 ]
01440> [ 3.689, 4.3702 ]
01441> [ -1, -1 ] (max twenty pts)
01442>
01443> *%-----|
01444> *
01445> * SUB-AREA No. 5
01446> *
01447> DESIGN NASHYD ID = [9], NHYD=["A2"], DT=[2.5]min, AREA=[6.8] (ha),
01448> DWF=[0] (cms), CNC=[76], TP=[0.37]hrs,
01449> RAINFALL=[ , , , ] (mm/hr), END=-1
01450> *%-----|
01451> *
01452> * SUB-AREA No. 6
01453> *
01454> DESIGN NASHYD ID = [10], NHYD=["A3"], DT=[2.5]min, AREA=[5.3] (ha),
01455> DWF=[0] (cms), CNC=[76], TP=[0.804]hrs,
01456> RAINFALL=[ , , , ] (mm/hr), END=-1
01457> *%-----|
01458> ADD HYD IDsum=[1], NHYD=["Interim"], IDs to add=[8+9+10]
01459> *%-----|
01460>
01461>
01462> FINISH

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00001|-----
00002|-----
00003| SSSS W W M M H H Y Y M M O O 999 999 -----
00004| S W W M M H H Y Y M M O O 9 9 9 9
00005| SSSS W W M M H H H H Y Y M M O O ## 9 9 9 9 Ver. 4.02
00006| S W W M M H H Y Y M M O O 9999 9999 July 1999
00007| SSSS W W M M H H Y Y M M O O 9 9 9 9
00008|-----
00009| StormWater Management Hydrologic Model 999 999 -----
00010|-----
00011| ***** SWHYMO-99 Ver/4.02 *****
00012| *****
00013| ***** A single event and continuous hydrologic simulation model *****
00014| ***** based on the principles of HYMO and its successors *****
00015| *****
00016| *****
00017| ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018| ***** Ottawa, Ontario: (613) 727-5199 *****
00019| ***** Gatineau, Quebec: (819) 243-6858 *****
00020| *****
00021| ***** E-Mail: swmhyo@jifa.com *****
00022|-----
00023|+++++++ Licensed user: J. L. Richards & Associates Limited ++++++
00024|+++++++ Ottawa SERIAL#418403 ++++++
00025|+++++++
00026|+++++++
00027|-----
00028|*****
00029|***** PROGRAM ARRAY DIMENSIONS *****
00030|***** Maximum value for ID number : 10 *****
00031|***** Max. number of rainfall points: 15000 *****
00032|***** Max. number of flow points : 15000 *****
00033|-----
00034|-----
00035|***** DETAILED O U P P U T *****
00036|*****
00037|***** DATE: 2009-05-15 TIME: 08:57:02 RUN COUNTER: 000199 *****
00038|*****
00039|***** Input filename: V:\20983.DU\ENG\FINALS-1\SWHYM-1\SWM-INT.dat *****
00040|***** Output filename: V:\20983.DU\ENG\FINALS-1\SWHYM-1\SWM-INT.out *****
00041|***** Summary filename: V:\20983.DU\ENG\FINALS-1\SWHYM-1\SWM-INT.sum *****
00042|*****
00043|***** User comments: *****
00044|***** 1: *****
00045|***** 2: *****
00046|***** 3: *****
00047|-----
00048|-----
00049|-----
00050|001:0001-----
00051|*****
00052|***** Project Name : Hawthorne Industrial Park Project Number: [20983] *****
00053|***** Date : January, 2009 *****
00054|***** Revised : N/A *****
00055|***** Developed by : Mark Buchanan, E.I.T. *****
00056|***** Reviewed by : Guy Forget, P.Eng. *****
00057|***** Company : J.L. Richards & Associates Limited *****
00058|***** License # : 4418403 *****
00059|*****
00060|*****
00061|*****
00062|*****
00063|***** FILENAME: V:\20983.DU\ENG\SWHYMO\20983PST.DAT *****
00064|***** FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *****
00065|***** OF A FACILITY ASSOCIATED WITH THE OTHER COMPOSTING SITE *****
00066|*****
00067|*****
00068|*****
00069|***** SWHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE *****
00070|***** PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *****
00071|*****
00072|*****
00073|***** HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *****
00074|***** FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *****
00075|***** OF A FACILITY ASSOCIATED WITH THE OTHER COMPOSTING SITE *****
00076|*****
00077|***** POST-DEVELOPMENT UNCONTROLLED CONDITIONS *****
00078|*****
00079|*****
00080|***** CALCULATION OF 4 HR 25 MM STORM EVENT *****
00081|*****
00082|-----
00083| START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWHYM-1\
00084| Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWHYM-1\
00085| TZERO = .00 hrs on
00086| METOUT= 2 (output = METRIC)
00087| NRUN = 001
00088| NSTORM= 0
00089|-----
00090|001:0002-----
00091|-----
00092| READ STORM | Filename: V:\20983.DU\ENG\FINALS-1\SWHYM-1\4HR25-
00093| Ptotal= 25.00 mm | Comments: 4hr-15 min 25 MM STORM EVENT (CHICAGO DI
00094|-----
00095| TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00096| hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00097| .25 1.777 | 1.25 45.631 | 2.25 3.138 | 3.25 1.675
00098| .50 2.357 | 1.50 11.911 | 2.50 2.555 | 3.50 1.509
00099| .75 3.618 | 1.75 6.051 | 2.75 1.165 | 3.75 1.376
00100| 1.00 8.975 | 2.00 4.108 | 3.00 1.885 | 4.00 1.266
00101|-----
00102|-----
00103|001:0003-----
00104|-----
00105| DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWHYM-1\ORGA.VAL
00106| ICASEdV = 1 (read and print data)
00107| FileTitle= ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE
00108| PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60
00109| Horton's infiltration equation parameters:
00110| [F0= 50.00 mm/hr] [F1= 7.50 mm/hr] [ICAE= 2.00 /hr] [F= .00 mm]
00111| Parameters for PERVIOUS surfaces in STANDHYD:
00112| [IAper= 4.67 mm] [LGP=40.00 mm] [MNP= .250]
00113| Parameters for IMPERVIOUS surfaces in STANDHYD:
00114| [IALmp= 1.57 mm] [CLI= 1.50] [MNI= .035]
00115| Parameters used in RASHYD:
00116| [Ia= 4.67 mm] [N= 3.00]
00117|-----
00118|001:0004-----
00119|*****
00120|***** ORGAWRDL FILE *****
00121|*****
00122|*****
00123|***** SUB-AREA No.1 *****
00124|-----
00125| CALIB STANDHYD | Area (ha)= 2.07
00126| 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
00127|-----
00128|-----
00129| Surface Area (ha)= 1.74 .33
00130| Dep. Storage (mm)= 1.57 4.67
00131| Average Slope (%)= .52 1.00
00132| Length (m)= 204.72 20.00
00133| Mannings n = .030 .250
00134|-----
00135| Max. eff. Inten. (mm/hr)= 45.63 5.37

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00136| over (min) 10.00 30.00
00137| Storage Coeff. (min)= 10.80 (ii) 29.27 (ii)
00138| Unit Hyd. Tpeak (min)= 10.00 30.00
00139| Unit Hyd. peak (cms)= .11 .04
00140|-----
00141| PEAK FLOW (cms)= .16 .00 *TOTALS*
00142| TIME TO PEAK (hrs)= 1.29 1.75 .118 (iii)
00143| RUNOFF VOLUME (mm)= 23.43 5.17 20.508
00144| TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00145| RUNOFF COEFFICIENT = .94 .21 .820
00146|-----
00147| (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00148| CN* = 81.0 Ia = Dep. Storage (Above)
00149| (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00150| THAN THE STORAGE COEFFICIENT.
00151| (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00152|-----
00153|-----
00154|001:0005-----
00155|*****
00156|***** SUB-AREA No.2 *****
00157|-----
00158| CALIB STANDHYD | Area (ha)= 1.54
00159| 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00160|-----
00161| IMPERVIOUS PERVIOUS (i)
00162| Surface Area (ha)= 1.42 .12
00163| Dep. Storage (mm)= 1.57 4.67
00164| Average Slope (%)= .50 1.00
00165| Length (m)= 244.34 5.00
00166| Mannings n = .030 .030
00167|-----
00168| Max. eff. Inten. (mm/hr)= 45.63 7.24
00169| over (min) 12.50 15.00
00170| Storage Coeff. (min)= 12.15 (ii) 14.15 (ii)
00171| Unit Hyd. Tpeak (min)= 12.50 15.00
00172| Unit Hyd. peak (cms)= .09 .08
00173|-----
00174| PEAK FLOW (cms)= .12 .00 *TOTALS*
00175| TIME TO PEAK (hrs)= 1.33 1.46 1.333
00176| RUNOFF VOLUME (mm)= 23.43 5.17 21.969
00177| TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00178| RUNOFF COEFFICIENT = .94 .21 .879
00179|-----
00180| (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00181| CN* = 81.0 Ia = Dep. Storage (Above)
00182| (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00183| THAN THE STORAGE COEFFICIENT.
00184| (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00185|-----
00186|-----
00187|001:0006-----
00188|*****
00189|***** SUB-AREA No.3 *****
00190|-----
00191| CALIB STANDHYD | Area (ha)= 1.40
00192| 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00193|-----
00194| IMPERVIOUS PERVIOUS (i)
00195| Surface Area (ha)= 1.36 .04
00196| Dep. Storage (mm)= 1.57 4.67
00197| Average Slope (%)= .51 1.00
00198| Length (m)= 225.63 5.00
00199| Mannings n = .030 .030
00200|-----
00201| Max. eff. Inten. (mm/hr)= 45.63 7.97
00202| over (min) 12.50 12.50
00203| Storage Coeff. (min)= 11.52 (ii) 13.44 (ii)
00204| Unit Hyd. Tpeak (min)= 12.50 12.50
00205| Unit Hyd. peak (cms)= .10 .09
00206|-----
00207| PEAK FLOW (cms)= .12 .00 *TOTALS*
00208| TIME TO PEAK (hrs)= 1.33 1.42 .118 (iii)
00209| RUNOFF VOLUME (mm)= 23.43 5.17 22.881
00210| TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00211| RUNOFF COEFFICIENT = .94 .21 .915
00212|-----
00213| (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00214| CN* = 81.0 Ia = Dep. Storage (Above)
00215| (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00216| THAN THE STORAGE COEFFICIENT.
00217| (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00218|-----
00219|-----
00220|001:0007-----
00221|-----
00222| ADD HYD (040 ) | ID: NYHD AREA QPEAK TPEAK R.V. DWF
00223| (ha) (cms) (hrs) (mm) (cms)
00224| ID1 01:010 2.07 .158 1.29 20.51 .000
00225| +ID2 02:020 1.54 .121 1.33 21.97 .000
00226|-----
00227| SUM 04:040 3.61 .278 1.33 21.13 .000
00228|-----
00229| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00230|-----
00231|-----
00232|001:0008-----
00233|-----
00234| ADD HYD (050 ) | ID: NYHD AREA QPEAK TPEAK R.V. DWF
00235| (ha) (cms) (hrs) (mm) (cms)
00236| ID1 03:030 1.40 .118 1.33 22.88 .000
00237| +ID2 04:040 3.61 .278 1.33 21.13 .000
00238|-----
00239| SUM 05:050 5.01 .396 1.33 21.62 .000
00240|-----
00241| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00242|-----
00243|-----
00244|001:0009-----
00245|*****
00246|***** SUB-AREA No.4 *****
00247|-----
00248| CALIB STANDHYD | Area (ha)= .89
00249| 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00250|-----
00251| IMPERVIOUS PERVIOUS (i)
00252| Surface Area (ha)= .86 .03
00253| Dep. Storage (mm)= 1.57 4.67
00254| Average Slope (%)= .93 .70
00255| Length (m)= 164.82 40.00
00256| Mannings n = .030 .250
00257|-----
00258| Max. eff. Inten. (mm/hr)= 45.63 4.42
00259| over (min) 7.50 42.50
00260| Storage Coeff. (min)= 7.97 (ii) 41.62 (ii)
00261| Unit Hyd. Tpeak (min)= 7.50 42.50
00262| Unit Hyd. peak (cms)= .14 .03
00263|-----
00264| PEAK FLOW (cms)= .09 .00 *TOTALS*
00265| TIME TO PEAK (hrs)= 1.25 2.00 .089 (iii)
00266| RUNOFF VOLUME (mm)= 23.43 5.17 22.882
00267| TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00268| RUNOFF COEFFICIENT = .94 .21 .915
00269|-----
00270| (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

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00271> CN* = 81.0 Ia = Dep. Storage (Above)
00272> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00273> THAN THE STORAGE COEFFICIENT.
00274> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00275>
00276>
00277> 001:0010
00278> * SUB-AREA No.5
00280>
00281> CALIB STANDHYD | Area (ha)= 2.66
00282> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00283>
00284> IMPERVIOUS PERVIOUS (i)
00285> Surface Area (ha)= 2.58 08
00286> Dep. Storage (mm)= 1.57 4.67
00287> Average Slope (%)= .61 1.50
00288> Length (m)= 207.25 20.00
00289> Mannings n = .030 .250
00290>
00291> Max.eff.Inten.(mm/hr)= 45.63 5.66
00292> over (min) 10.00 27.50
00293> Storage Coeff. (min)= 10.37 (ii) 26.38 (ii)
00294> Unit Hyd. Tpeak (min)= 10.00 27.50
00295> Unit Hyd. peak (cms)= .11 .04
00296>
00297> PEAK FLOW (cms)= .24 .00 *TOTALS*
00298> TIME TO PEAK (hrs)= 1.29 1.67 1.292
00299> RUNOFF VOLUME (mm)= 23.43 5.17 22.862
00300> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00301> RUNOFF COEFFICIENT = .94 .21 .915
00302>
00303> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00304> CN* = 81.0 Ia = Dep. Storage (Above)
00305> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00306> THAN THE STORAGE COEFFICIENT.
00307> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00308>
00309>
00310> 001:0011
00311>
00312> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00313> | (ha) (cms) (hrs) (mm) (cms)
00314> ID1 06:060 .89 .089 1.25 22.88 .000
00315> +ID2 07:070 2.66 .238 1.29 22.88 .000
00316> =====
00317> SUM 08:080 3.55 .327 1.29 22.88 .000
00318>
00319> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00320>
00321>
00322> 001:0012
00323> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00324> | (ha) (cms) (hrs) (mm) (cms)
00325> ID1 05:050 5.01 .396 1.33 21.62 .000
00326> +ID2 08:080 3.55 .327 1.29 22.88 .000
00327> =====
00328> SUM 09:090 8.56 .716 1.29 22.14 .000
00329>
00330> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00331>
00332>
00333>
00334> 001:0013
00335>
00336> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00337> | IN>09: (090) |
00338> | OUT<10: (POND) |
00339> ===== OUTFLOW STORAGE TABLE =====
00340> OUTFLOW STORAGE | OUTFLOW STORAGE
00341> (cms) (ha.m.) | (cms) (ha.m.)
00342> .000 .0000E+00 | .593 .6251E+00
00343> .008 .6560E-01 | .654 .6631E+00
00344> .017 .1311E+00 | .797 .7391E+00
00345> .093 .2831E+00 | .950 .8274E+00
00346> .233 .3971E+00 | 1.304 .9157E+00
00347> .337 .4731E+00 | 1.880 .1004E+01
00348> .465 .5491E+00 | 2.577 .1092E+01
00349> .531 .5871E+00 | .000 .0000E+00
00350>
00351> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00352> (ha) (cms) (hrs) (mm)
00353> INFLOW >09: (090) 8.56 .716 1.292 22.143
00354> OUTFLOW<10: (POND) 8.56 .032 3.875 22.141
00355>
00356> PEAK FLOW REDUCTION [Qout/Qin] (%) = 4.470
00357> TIME SHIFT OF PEAK FLOW (min) = 155.00
00358> MAXIMUM STORAGE USED (ha.m.) = .1611E+00
00359>
00360> 001:0014
00361> *****
00362> * Remaining Hawthorne Industrial Park *
00363> *****
00364> *
00365> * SUB-AREA No.1
00366>
00367> CALIB STANDHYD | Area (ha)= 19.90
00368> | 01:H1P01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00369>
00370> IMPERVIOUS PERVIOUS (i)
00371> Surface Area (ha)= 14.13 5.77
00372> Dep. Storage (mm)= 1.57 4.67
00373> Average Slope (%)= .60 1.50
00374> Length (m)= 580.00 100.00
00375> Mannings n = .030 .250
00376>
00377> Max.eff.Inten.(mm/hr)= 34.39 11.90
00378> over (min) 22.50 52.50
00379> Storage Coeff. (min)= 21.64 (ii) 52.88 (ii)
00380> Unit Hyd. Tpeak (min)= 22.50 52.50
00381> Unit Hyd. peak (cms)= .05 .02
00382>
00383> PEAK FLOW (cms)= .60 .11 *TOTALS*
00384> TIME TO PEAK (hrs)= 1.50 2.13 1.542
00385> RUNOFF VOLUME (mm)= 8.56 8.74 16.085
00386> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00387> RUNOFF COEFFICIENT = .94 .35 .643
00388>
00389> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00390> CN* = 81.0 Ia = Dep. Storage (Above)
00391> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00392> THAN THE STORAGE COEFFICIENT.
00393> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00394>
00395>
00396> 001:0015
00397>
00398> | ADD HYD (H1P02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00399> | (ha) (cms) (hrs) (mm) (cms)
00400> ID1 10:POND 8.56 .032 3.88 22.14 .000
00401> +ID2 01:H1P01 19.90 .632 1.54 17.91 .000
00402> =====
00403> SUM 02:H1P02 28.46 .655 1.54 17.91 .000
00404>
00405> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

00406>
00407>
00408> 001:0016
00409>
00410> * SUB-AREA No.2
00411>
00412> CALIB STANDHYD | Area (ha)= 17.00
00413> | 03:H1P03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00414>
00415> IMPERVIOUS PERVIOUS (i)
00416> Surface Area (ha)= 12.07 4.93
00417> Dep. Storage (mm)= 1.57 4.67
00418> Average Slope (%)= .65 1.50
00419> Length (m)= 450.00 100.00
00420> Mannings n = .030 .250
00421>
00422> Max.eff.Inten.(mm/hr)= 40.81 12.73
00423> over (min) 17.50 47.50
00424> Storage Coeff. (min)= 16.94 (ii) 47.35 (ii)
00425> Unit Hyd. Tpeak (min)= 17.50 47.50
00426> Unit Hyd. peak (cms)= .07 .02
00427>
00428> PEAK FLOW (cms)= .60 .10 *TOTALS*
00429> TIME TO PEAK (hrs)= 1.42 2.00 1.458
00430> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00431> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00432> RUNOFF COEFFICIENT = .94 .35 .643
00433>
00434> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00435> CN* = 81.0 Ia = Dep. Storage (Above)
00436> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00437> THAN THE STORAGE COEFFICIENT.
00438> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00439>
00440>
00441> 001:0017
00442>
00443> * SUB-AREA No.3
00444>
00445> CALIB STANDHYD | Area (ha)= 18.10
00446> | 04:H1P04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00447>
00448> IMPERVIOUS PERVIOUS (i)
00449> Surface Area (ha)= 12.85 5.25
00450> Dep. Storage (mm)= 1.57 4.67
00451> Average Slope (%)= 1.50 1.50
00452> Length (m)= 600.00 100.00
00453> Mannings n = .030 .250
00454>
00455> Max.eff.Inten.(mm/hr)= 34.39 11.54
00456> over (min) 22.50 55.00
00457> Storage Coeff. (min)= 23.33 (ii) 54.95 (ii)
00458> Unit Hyd. Tpeak (min)= 22.50 55.00
00459> Unit Hyd. peak (cms)= .05 .02
00460>
00461> PEAK FLOW (cms)= .53 .09 *TOTALS*
00462> TIME TO PEAK (hrs)= 1.50 2.17 1.542
00463> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00464> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00465> RUNOFF COEFFICIENT = .94 .35 .643
00466>
00467> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00468> CN* = 81.0 Ia = Dep. Storage (Above)
00469> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00470> THAN THE STORAGE COEFFICIENT.
00471> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00472>
00473>
00474> 001:0018
00475>
00476> | ADD HYD (H1P05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00477> | (ha) (cms) (hrs) (mm) (cms)
00478> ID1 03:H1P03 17.00 .625 1.46 16.08 .000
00479> +ID2 04:H1P04 18.10 .562 1.54 16.08 .000
00480> =====
00481> SUM 05:H1P05 35.10 1.166 1.46 16.08 .000
00482>
00483> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00484>
00485>
00486> 001:0019
00487>
00488> * SUB-AREA No.4
00489>
00490> DESIGN WASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
00491> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00492> U.H. Tp(hrs)= .170
00493>
00494> Unit Hyd Qpeak (cms)= .899
00495>
00496> PEAK FLOW (cms)= .077 (i)
00497> TIME TO PEAK (hrs)= 1.375
00498> RUNOFF VOLUME (mm)= 6.343
00499> TOTAL RAINFALL (mm)= 24.999
00500> RUNOFF COEFFICIENT = .254
00501>
00502> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00503>
00504>
00505> 001:0020
00506>
00507> | ADD HYD (H1P06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00508> | (ha) (cms) (hrs) (mm) (cms)
00509> ID1 02:H1P02 28.46 .655 1.54 17.91 .000
00510> +ID2 05:H1P05 35.10 1.166 1.46 16.08 .000
00511> +ID3 06:Pond-B 4.00 .077 1.38 6.34 .000
00512> =====
00513> SUM 07:H1P06 67.56 1.887 1.50 16.28 .000
00514>
00515> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00516>
00517>
00518> 001:0021
00519>
00520> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00521> | IN>07: (H1P06) |
00522> | OUT<08: (H1P-PO) |
00523> ===== OUTFLOW STORAGE TABLE =====
00524> OUTFLOW STORAGE | OUTFLOW STORAGE
00525> (cms) (ha.m.) | (cms) (ha.m.)
00526> .000 .0000E+00 | .724 .2210E+01
00527> .048 .5740E-01 | .937 .2501E+01
00528> .054 .2434E+00 | 1.262 .2798E+01
00529> .059 .5834E+00 | 1.404 .3101E+01
00530> .062 .8400E+00 | 1.532 .3410E+01
00531> .064 .1102E+01 | 1.650 .3724E+01
00532> .147 .1370E+01 | 2.409 .4044E+01
00533> .280 .1644E+01 | 3.689 .4370E+01
00534> .472 .1924E+01 | .000 .0000E+00
00535>
00536> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00537> (ha) (cms) (hrs) (mm)
00538> INFLOW >07: (H1P06) 67.56 1.887 1.500 16.275
00539> OUTFLOW<08: (H1P-PO) 67.56 .062 5.417 16.275
00540>
00541> PEAK FLOW REDUCTION [Qout/Qin] (%) = 3.289

00541> TIME SHIFT OF PEAK FLOW (min)= 235.00
00542> MAXIMUM STORAGE USED (ha.m.)=.8484E+00
00543>
00544>

00545> 001:0022
00546> *
00547> *SUB-AREA No. 5
00548>
00549>
00550> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00
00551> | 01:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00552> | U.H. Tp (hrs)= .370
00553>
00554> Unit Hyd Opeak (cms)= .702
00555>
00556> PEAK FLOW (cms)= .053 (i)
00557> TIME TO PEAK (hrs)= 1.708
00558> RUNOFF VOLUME (mm)= 4.111
00559> TOTAL RAINFALL (mm)= 24.999
00560> RUNOFF COEFFICIENT = .164
00561>
00562> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00563>
00564>
00565> 001:0023
00566> *
00567> *SUB-AREA No. 6
00568>
00569>
00570> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00
00571> | 10:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00572> | U.H. Tp (hrs)= .804
00573>
00574> Unit Hyd Opeak (cms)= .252
00575>
00576> PEAK FLOW (cms)= .025 (i)
00577> TIME TO PEAK (hrs)= 2.333
00578> RUNOFF VOLUME (mm)= 4.110
00579> TOTAL RAINFALL (mm)= 24.999
00580> RUNOFF COEFFICIENT = .164
00581>
00582> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00583>
00584>
00585> 001:0024
00586>
00587> | ADD HYD (Interi) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00588> | (ha) (cms) (hrs) (mm) (mm) (cms)
00589> | ID1 08:HIP-PO 67.56 .052 5.42 16.28 .000
00590> | +ID2 09:A2 6.80 .053 1.71 4.11 .000
00591> | +ID3 10:A3 5.30 .025 2.33 4.11 .000
00592> |-----
00593> | SUM 01:Interi 79.66 .127 1.83 14.43 .000
00594>
00595> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00596>
00597>
00598> 001:0025
00599> *****
00600> * CALCULATION OF 3HR - 12 YEAR STORM EVENT *
00601> *****
00602>
00603> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMMHYM-1\
00604> | Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMMHYM-1\
00605> | TZERO = .00 hrs on 0
00606> | METOUT= 2 (output = METRIC)
00607> | NRUN = 001
00608> | NSTORM = 0
00609>
00610> 001:0002
00611>
00612> | CHICAGO STORM | IDF curve parameters: A= 732.951
00613> | Ptotal= 31.86 mm | B= 6.199
00614> | used in: INTENSITY = A / (t + B)^C
00615>
00616> | Duration of storm = 3.00 hrs
00617> | Storm time step = 10.00 min
00618> | Time to peak ratio = .33
00619>
00620>
00621> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00622> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00623> | .17 2.815 | 1.00 76.805 | 1.83 5.095 | 2.67 2.684
00624> | .33 3.498 | 1.17 24.079 | 2.00 4.291 | 2.83 2.463
00625> | .50 4.687 | 1.33 12.364 | 2.17 3.718 | 3.00 2.279
00626> | .67 7.305 | 1.50 8.324 | 2.33 3.288
00627> | .83 18.209 | 1.67 6.303 | 2.50 2.952 |
00628>
00629>
00630> 001:0003
00631>
00632> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMMHYM-1\ORGA.VAL
00633> | ICSSEdV = 1 (read and print data)
00634> |-----
00635> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----C
00636> | Horton's infiltration equation parameters:
00637> | [F0= 50.00 mm/hr] [F0= 7.50 mm/hr] [DCAY= 2.00 /hr] [Fw = .00 mm]
00638> | Parameters for PERVIOUS surfaces in STANDHYD:
00639> | [Ia= 4.67 mm] [LGS=40.00 mm] [MNF= .250]
00640> | Parameters for IMPERVIOUS surfaces in STANDHYD:
00641> | [Ia= 1.57 mm] [CII= 1.50] [NFI= .035]
00642> | Parameters used in NASHYD:
00643> | [Ia= 4.67 mm] [N= 3.00]
00644>
00645> 001:0004
00646> *****
00647> * ORGAWORLD FILE *
00648> *****
00649> *
00650> * SUB-AREA No.1
00651>
00652> | CALIB STANDHYD | Area (ha)= 2.07
00653> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
00654>
00655>
00656> | IMPERVIOUS PERVIOUS (i)
00657> Surface Area (ha)= 1.74 .33
00658> Dep. Storage (mm)= 1.57 4.67
00659> Average Slope (%)= .52 1.00
00660> Length (m)= 204.72 20.00
00661> Mannings n = .030 .250
00662>
00663> Max.eff.Inten.(mm/hr)= 76.81 11.88
00664> over (min) 10.00 22.50
00665> Storage Coeff. (min)= 8.77 (ii) 22.21 (ii)
00666> Unit Hyd. Tpeak (min)= 10.00 22.50
00667> Unit Hyd. peak (cms)= .12 .05
00668>
00669> PEAK FLOW (cms)= .24 .01 *TOTALS*
00670> TIME TO PEAK (hrs)= 1.08 1.38 .245 (iii)
00671> RUNOFF VOLUME (mm)= 30.29 8.52 26.807
00672> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00673> RUNOFF COEFFICIENT = .95 .27 .841
00674>
00675> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 81.0 Ia = Dep. Storage (Above)

00676> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00677> THAN THE STORAGE COEFFICIENT.
00678> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00679>
00680>
00681> 001:0005
00682> *
00683> * SUB-AREA No.2
00684>
00685> | CALIB STANDHYD | Area (ha)= 1.54
00686> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00687>
00688>
00689> | IMPERVIOUS PERVIOUS (i)
00690> Surface Area (ha)= 1.42 .12
00691> Dep. Storage (mm)= 1.57 4.67
00692> Average Slope (%)= .50 1.00
00693> Length (m)= 244.34 5.00
00694> Mannings n = .030 .030
00695>
00696> Max.eff.Inten.(mm/hr)= 76.81 15.07
00697> over (min) 10.00 12.50
00698> Storage Coeff. (min)= 9.87 (ii) 11.36 (ii)
00699> Unit Hyd. Tpeak (min)= 10.00 12.50
00700> Unit Hyd. peak (cms)= .11 .10
00701>
00702> PEAK FLOW (cms)= .19 .00 *TOTALS*
00703> TIME TO PEAK (hrs)= 1.08 1.17 .192 (iii)
00704> RUNOFF VOLUME (mm)= 30.29 8.52 28.548
00705> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00706> RUNOFF COEFFICIENT = .95 .27 .896
00707>
00708> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 81.0 Ia = Dep. Storage (Above)
00709> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00710> THAN THE STORAGE COEFFICIENT.
00711> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00712>
00713>
00714> 001:0006
00715> *
00716> * SUB-AREA No.3
00717>
00718> | CALIB STANDHYD | Area (ha)= 1.40
00719> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00720>
00721>
00722> | IMPERVIOUS PERVIOUS (i)
00723> Surface Area (ha)= 1.36 .04
00724> Dep. Storage (mm)= 1.57 4.67
00725> Average Slope (%)= .51 1.00
00726> Length (m)= 225.63 5.00
00727> Mannings n = .030 .030
00728>
00729> Max.eff.Inten.(mm/hr)= 76.81 16.59
00730> over (min) 10.00 10.00
00731> Storage Coeff. (min)= 9.25 (ii) 10.76 (ii)
00732> Unit Hyd. Tpeak (min)= 10.00 10.00
00733> Unit Hyd. peak (cms)= .12 .11
00734>
00735> PEAK FLOW (cms)= .18 .00 *TOTALS*
00736> TIME TO PEAK (hrs)= 1.08 1.13 .186 (iii)
00737> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00738> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00739> RUNOFF COEFFICIENT = .95 .27 .930
00740>
00741> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 81.0 Ia = Dep. Storage (Above)
00742> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00743> THAN THE STORAGE COEFFICIENT.
00744> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00745>
00746>
00747> 001:0007
00748>
00749> | ADD HYD (040) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00750> | (ha) (cms) (hrs) (mm) (mm) (cms)
00751> | ID1 01:010 2.07 .245 1.08 26.81 .000
00752> | +ID2 02:020 1.54 .192 1.08 28.55 .000
00753> |-----
00754> | SUM 04:040 3.61 .436 1.08 27.55 .000
00755>
00756> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00757>
00758>
00759> 001:0008
00760>
00761> | ADD HYD (050) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00762> | (ha) (cms) (hrs) (mm) (mm) (cms)
00763> | ID1 03:030 1.40 .186 1.08 29.64 .000
00764> | +ID2 04:040 3.61 .436 1.08 27.55 .000
00765> |-----
00766> | SUM 05:050 5.01 .623 1.08 28.13 .000
00767>
00768> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00769>
00770>
00771> 001:0009
00772> *
00773> * SUB-AREA No.4
00774>
00775> | CALIB STANDHYD | Area (ha)= .89
00776> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00777>
00778>
00779> | IMPERVIOUS PERVIOUS (i)
00780> Surface Area (ha)= .86 .03
00781> Dep. Storage (mm)= 1.57 4.67
00782> Average Slope (%)= .93 .70
00783> Length (m)= 164.82 40.00
00784> Mannings n = .030 .250
00785>
00786> Max.eff.Inten.(mm/hr)= 76.81 10.24
00787> over (min) 7.50 30.00
00788> Storage Coeff. (min)= 6.47 (ii) 30.53 (ii)
00789> Unit Hyd. Tpeak (min)= 7.50 30.00
00790> Unit Hyd. peak (cms)= .16 .04
00791>
00792> PEAK FLOW (cms)= .14 .00 *TOTALS*
00793> TIME TO PEAK (hrs)= 1.04 1.54 .139 (iii)
00794> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00795> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00796> RUNOFF COEFFICIENT = .95 .27 .930
00797>
00798> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 81.0 Ia = Dep. Storage (Above)
00799> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00800> THAN THE STORAGE COEFFICIENT.
00801> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00802>
00803>
00804> 001:0010
00805> *
00806> * SUB-AREA No.5
00807>
00808> | CALIB STANDHYD | Area (ha)= 2.66
00809> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00810>

00811> Surface Area (ha)= 2.58 IMPERVIOUS PERVIOUS (i)
00812> Dep. Storage (mm)= 1.57 4.67
00813> Average Slope (%)= .61 1.50
00815> Length (m)= 207.25 20.00
00816> Mannings n = .030 .250
00817> Max. eff. Inten. (mm/hr)= 76.81 12.71
00818> over (min)= 7.50 20.00
00820> Storage Coeff. (min)= 8.42 (ii) 20.00 (ii)
00821> Unit Hyd. Tpeak (min)= 7.50 20.00
00822> Unit Hyd. peak (cms)= .14 .06
00823> PEAK FLOW (cms)= .38 .00 *TOTALS*
00825> TIME TO PEAK (hrs)= 1.04 1.33 1.042 (iii)
00826> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00827> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00828> RUNOFF COEFFICIENT = .95 .27 .930
00829>
00830> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00831> CN* = 81.0 Ia = Dep. Storage (Above)
00832> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00833> THAN THE STORAGE COEFFICIENT.
00834> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00835>
00836>
00837> 001:0011
00838> | ADD HYD (080) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00839> (ha) (cms) (hrs) (mm) (cms)
00840> ID1 06:060 .89 .139 1.04 29.64 .000
00841> +ID2 07:070 2.66 .379 1.04 29.64 .000
00842> SUM 08:080 3.55 .518 1.04 29.64 .000
00843>
00844> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00845>
00846>
00847>
00848>
00849> 001:0012
00850> | ADD HYD (090) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00851> (ha) (cms) (hrs) (mm) (cms)
00852> ID1 05:050 5.01 .623 1.08 28.13 .000
00853> +ID2 08:080 3.55 .518 1.04 29.64 .000
00854> SUM 09:090 8.56 1.118 1.08 28.76 .000
00855>
00856> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00857>
00858>
00859>
00860>
00861> 001:0013
00862> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00863> | IN>09: (POND) |
00864> | OUT<10: (POND) |
00865> ===== OUTFLOW STORAGE TABLE =====
00866> OUTFLOW STORAGE | OUTFLOW STORAGE
00867> (cms) (ha.m.) | (cms) (ha.m.)
00868> .000 .000E+00 | .593 .625E+00
00869> .008 .656E-01 | .654 .663E+00
00870> .017 .131E+00 | .797 .739E+00
00871> .093 .283E+00 | .950 .827E+00
00872> .233 .397E+00 | 1.304 .915E+00
00873> .337 .473E+00 | 1.880 .100E+01
00874> .463 .599E+00 | 2.577 .102E+01
00875> .531 .587E+00 | .000 .000E+00
00876>
00877> ROUTING RESULTS AREA OPEAK TPEAK R.V.
00878> Dep. Storage (mm) (ha) (cms) (hrs) (mm)
00879> INFLOW >09: (POND) 8.56 1.118 1.083 28.757
00880> OUTFLOW<10: (POND) 8.56 .056 3.000 28.754
00881>
00882> PEAK FLOW REDUCTION [Qout/Qin] (%)= 5.030
00883> TIME SHIFT OF PEAK FLOW (min)= 115.00
00884> MAXIMUM STORAGE USED (ha.m.)= 2095E+00
00885>
00886>
00887> 001:0014
00888> *****
00889> * Remaining Hawthorn Industrial Park *
00890> *****
00891> *
00892> * SUB-AREA No. 1
00893> | CALIB STANDHYD | Area (ha)= 19.90
00894> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00895>
00896>
00897>
00898> Surface Area (ha)= 14.13 IMPERVIOUS PERVIOUS (i)
00899> Dep. Storage (mm)= 1.57 4.67
00900> Average Slope (%)= .60 1.50
00901> Length (m)= 580.00 100.00
00902> Mannings n = .030 .250
00903> Max. eff. Inten. (mm/hr)= 54.21 23.06
00904> over (min)= 17.50 42.50
00905> Storage Coeff. (min)= 18.04 (ii) 42.02 (ii)
00906> Unit Hyd. Tpeak (min)= 17.50 42.50
00907> Unit Hyd. peak (cms)= .06 .03
00908> PEAK FLOW (cms)= .95 .21 *TOTALS*
00909> TIME TO PEAK (hrs)= 1.21 1.71 1.020 (iii)
00910> RUNOFF VOLUME (mm)= 30.29 13.34 21.814
00911> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00912> RUNOFF COEFFICIENT = .95 .42 .685
00913>
00914> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00915> CN* = 81.0 Ia = Dep. Storage (Above)
00916> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00917> THAN THE STORAGE COEFFICIENT.
00918> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00919>
00920>
00921>
00922>
00923> 001:0015
00924> | ADD HYD (HIP02) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
00925> (ha) (cms) (hrs) (mm) (cms)
00926> ID1 10:POND 8.56 .056 3.00 28.75 .000
00927> +ID2 01:HIP02 19.90 1.020 1.25 23.90 .000
00928> SUM 02:HIP02 28.46 1.039 1.25 23.90 .000
00929>
00930> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00931>
00932>
00933>
00934>
00935> 001:0016
00936> *
00937> * SUB-AREA No. 2
00938>
00939> | CALIB STANDHYD | Area (ha)= 17.00
00940> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00941>
00942>
00943> Surface Area (ha)= 12.07 IMPERVIOUS PERVIOUS (i)
00944> Dep. Storage (mm)= 1.57 4.67
00945> Average Slope (%)= .65 1.50

00946> Length (m)= 450.00 100.00
00947> Mannings n = .030 .250
00948> Max. eff. Inten. (mm/hr)= 59.23 25.04
00949> over (min)= 15.00 37.50
00950> Storage Coeff. (min)= 14.60 (ii) 37.80 (ii)
00951> Unit Hyd. Tpeak (min)= 15.00 37.50
00952> Unit Hyd. peak (cms)= .08 .03
00953> PEAK FLOW (cms)= .91 .19 *TOTALS*
00954> TIME TO PEAK (hrs)= 1.17 1.63 1.167 (iii)
00955> RUNOFF VOLUME (mm)= 30.29 13.34 21.814
00956> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00957> RUNOFF COEFFICIENT = .95 .42 .685
00958>
00959> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00960> CN* = 81.0 Ia = Dep. Storage (Above)
00961> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00962> THAN THE STORAGE COEFFICIENT.
00963> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00964>
00965>
00966>
00967>
00968> 001:0017
00969> *
00970> * SUB-AREA No. 3
00971>
00972> | CALIB STANDHYD | Area (ha)= 18.10
00973> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00974>
00975>
00976> Surface Area (ha)= 12.85 IMPERVIOUS PERVIOUS (i)
00977> Dep. Storage (mm)= 1.57 4.67
00978> Average Slope (%)= .50 1.50
00979> Length (m)= 600.00 100.00
00980> Mannings n = .030 .250
00981> Max. eff. Inten. (mm/hr)= 50.44 22.17
00982> over (min)= 20.00 45.00
00983> Storage Coeff. (min)= 20.01 (ii) 44.37 (ii)
00984> Unit Hyd. Tpeak (min)= 20.00 45.00
00985> Unit Hyd. peak (cms)= .06 .03
00986> PEAK FLOW (cms)= .80 .18 *TOTALS*
00987> TIME TO PEAK (hrs)= 1.25 1.79 .874 (iii)
00988> RUNOFF VOLUME (mm)= 30.29 13.34 21.814
00989> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00990> RUNOFF COEFFICIENT = .95 .42 .685
00991>
00992> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00993> CN* = 81.0 Ia = Dep. Storage (Above)
00994> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00995> THAN THE STORAGE COEFFICIENT.
00996> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00997>
00998>
00999>
01000>
01001> 001:0018
01002> | ADD HYD (HIP05) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01003> (ha) (cms) (hrs) (mm) (cms)
01004> ID1 03:HIP03 17.00 .978 1.17 21.81 .000
01005> +ID2 04:HIP04 18.10 .874 1.29 21.81 .000
01006> SUM 05:HIP05 35.10 1.814 1.21 21.81 .000
01007>
01008> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01009>
01010>
01011>
01012>
01013> 001:0019
01014> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
01015> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01016> | U.H. Tp (hrs)= .170
01017>
01018> Unit Hyd Tpeak (cms)= .899
01019> PEAK FLOW (cms)= .145 (i)
01020> TIME TO PEAK (hrs)= 1.167
01021> RUNOFF VOLUME (mm)= 10.266
01022> TOTAL RAINFALL (mm)= 31.860
01023> RUNOFF COEFFICIENT = .322
01024>
01025> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01026>
01027>
01028>
01029>
01030>
01031>
01032> 001:0020
01033> | ADD HYD (HIP06) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01034> (ha) (cms) (hrs) (mm) (cms)
01035> ID1 02:HIP02 28.46 1.039 1.25 23.90 .000
01036> +ID2 05:HIP05 35.10 1.814 1.21 21.81 .000
01037> +ID3 06:Pond-B 4.00 .145 1.17 10.27 .000
01038> SUM 07:HIP06 67.56 2.992 1.21 22.01 .000
01039>
01040> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01041>
01042>
01043>
01044>
01045> 001:0021
01046> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01047> | IN>07: (HIP06) |
01048> | OUT<08: (HIP-PO) |
01049> ===== OUTFLOW STORAGE TABLE =====
01050> OUTFLOW STORAGE | OUTFLOW STORAGE
01051> (cms) (ha.m.) | (cms) (ha.m.)
01052> .000 .000E+00 | .724 .2210E+01
01053> .048 .5740E-01 | .937 .2501E+01
01054> .054 .2434E+00 | 1.262 .2798E+01
01055> .059 .5834E+00 | 1.404 .3101E+01
01056> .062 .8400E+00 | 1.532 .3410E+01
01057> .064 .1102E+01 | 1.650 .3724E+01
01058> .147 .1370E+01 | 2.409 .4044E+01
01059> .280 .1644E+01 | 3.689 .4370E+01
01060> .472 .1924E+01 | .000 .0000E+00
01061>
01062> ROUTING RESULTS AREA OPEAK TPEAK R.V.
01063> Dep. Storage (mm) (ha) (cms) (hrs) (mm) (cms)
01064> INFLOW >07: (HIP06) 67.56 2.992 1.208 22.009
01065> OUTFLOW<08: (HIP-PO) 67.56 .093 4.444 22.009
01066>
01067> PEAK FLOW REDUCTION [Qout/Qin] (%)= 3.122
01068> TIME SHIFT OF PEAK FLOW (min)= 194.17
01069> MAXIMUM STORAGE USED (ha.m.)= .1197E+01
01070>
01071>
01072> 001:0022
01073> *
01074> * SUB-AREA No. 5
01075>
01076>
01077> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00
01078> | 09:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01079> | U.H. Tp (hrs)= .370
01080>

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01081> Unit Hyd Qpeak (cms)= .702
01082>
01083> PEAK FLOW (cms)= .102 (i)
01084> TIME TO PEAK (hrs)= 1.458
01085> RUNOFF VOLUME (mm)= 6.883
01086> TOTAL RAINFALL (mm)= 31.860
01087> RUNOFF COEFFICIENT = .216
01088>
01089> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01090>
01091> -----
01092> 001:0023-----
01093> *
01094> *SUB-AREA No. 6
01095>
01096> -----
01097> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00
01098> | 10:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01099> | U.H. Tp (hrs)= .804
01100>
01101> Unit Hyd Qpeak (cms)= .252
01102>
01103> PEAK FLOW (cms)= .048 (i)
01104> TIME TO PEAK (hrs)= 2.083
01105> RUNOFF VOLUME (mm)= 6.883
01106> TOTAL RAINFALL (mm)= 31.860
01107> RUNOFF COEFFICIENT = .216
01108>
01109> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01110>
01111> -----
01112> 001:0024-----
01113>
01114> | ADD HYD (Interi) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01115> | ID1 08:H1P-PO | (ha) (cms) (hrs) (mm) (cms)
01116> | +ID2 09:A2 | 6.80 .093 4.44 22.01 .000
01117> | +ID3 10:A3 | 5.30 .102 1.46 6.88 .000
01118> | | 5.30 .048 2.08 6.88 .000
01119> | | | | | |
01120> | SUM 01:Interi | 79.66 .194 1.58 19.71 .000
01121>
01122> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01123>
01124> -----
01125> 001:0025-----
01126> *****
01127> * CALCULATION OF 3HR - 15 YEAR STORM EVENT *
01128> *****
01129> | START | Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
01130> | TZERO = .00 hrs on 0
01131> | METOUT= 2 (output = METRIC)
01132> | NRUN = 001
01133> | NSTORM= 0
01134>
01135> -----
01136> 001:0002-----
01137>
01138> | CHICAGO STORM | IDFC curve parameters: A= 998.071
01139> | Ptotal= 42.51 mm | B= 6.053
01140> | | C= .814
01141> | used in: INTENSITY = A / (t + B)^C
01142>
01143> Duration of storm = 3.00 hrs
01144> Storm time step = 10.00 min
01145> Time to peak ratio = .33
01146>
01147>
01148>
01149>
01150>
01151>
01152>
01153>
01154>
01155>
01156>
01157> 001:0003-----
01158>
01159> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\ORGA.VAL
01160> | ICaseEv = 1 (read and print data)
01161> | FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE -----
01162> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----
01163> | Horton's infiltration equation parameters:
01164> | [F= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAV= 2.00 /hr] [F= .00 mm]
01165> | Parameters for PERVIOUS surfaces in STANDHYD:
01166> | [IAPER= 4.67 mm] [LGP=40.00 mm] [MNI= .250]
01167> | Parameters for IMPERVIOUS surfaces in STANDHYD:
01168> | [Iaimp= 1.57 mm] [CII= 1.50] [MNI= .035]
01169> | Parameters used in NASHYD:
01170> | [Ia= 4.67 mm] [N= 3.00]
01171>
01172> 001:0004-----
01173> *****
01174> * ORGAWORLD FILE *
01175> *****
01176> *
01177> * SUB-AREA No. 1
01178>
01179> | CALIB STANDHYD | Area (ha)= 2.07
01180> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
01181>
01182> IMPERVIOUS PERVIOUS (i)
01183> Surface Area (ha)= 1.74 .33
01184> Dep. Storage (mm)= 1.57 4.67
01185> Average Slope (%)= .52 1.00
01186> Length (m)= 204.72 20.00
01187> Mannings n = .030 .250
01188>
01189> Max. eff. Inten. (mm/hr)= 104.19 24.26
01190> over (min)= 7.50 17.50
01191> Storage Coeff. (min)= 7.76 (ii) 17.86 (ii)
01192> Unit Hyd. Tpeak (min)= 7.50 17.50
01193> Unit Hyd. peak (cms)= .15 .06
01194>
01195> PEAK FLOW (cms)= .36 .01 *TOTALS*
01196> TIME TO PEAK (hrs)= 1.04 1.25 1.042 (iii)
01197> RUNOFF VOLUME (mm)= 40.94 14.70 36.745
01198> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01199> RUNOFF COEFFICIENT = .96 .35 .864
01200>
01201> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01202> CN* = 81.0 Ia = Dep. Storage (Above)
01203> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01204> THAN THE STORAGE COEFFICIENT.
01205> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01206>
01207> -----
01208> 001:0005-----
01209> *
01210> * SUB-AREA No. 2
01211>
01212> | CALIB STANDHYD | Area (ha)= 1.54
01213> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
01214>
01215> IMPERVIOUS PERVIOUS (i)

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01216> Surface Area (ha)= 1.42 .12
01217> Dep. Storage (mm)= 1.57 4.67
01218> Average Slope (%)= .50 1.00
01219> Length (m)= 244.34 5.00
01220> Mannings n = .030 .030
01221>
01222> Max. eff. Inten. (mm/hr)= 104.19 31.02
01223> over (min)= 7.50 10.00
01224> Storage Coeff. (min)= 8.73 (ii) 9.85 (ii)
01225> Unit Hyd. Tpeak (min)= 7.50 10.00
01226> Unit Hyd. peak (cms)= .14 .11
01227>
01228> PEAK FLOW (cms)= .28 .01 *TOTALS*
01229> TIME TO PEAK (hrs)= 1.04 1.13 1.042 (iii)
01230> RUNOFF VOLUME (mm)= 40.94 14.70 38.845
01231> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01232> RUNOFF COEFFICIENT = .96 .35 .914
01233>
01234> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01235> CN* = 81.0 Ia = Dep. Storage (Above)
01236> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01237> THAN THE STORAGE COEFFICIENT.
01238> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01239>
01240> -----
01241> 001:0006-----
01242> *
01243> * SUB-AREA No. 3
01244>
01245> | CALIB STANDHYD | Area (ha)= 1.40
01246> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01247>
01248> IMPERVIOUS PERVIOUS (i)
01249> Surface Area (ha)= 1.36 .04
01250> Dep. Storage (mm)= 1.57 4.67
01251> Average Slope (%)= .51 1.00
01252> Length (m)= 225.63 5.00
01253> Mannings n = .030 .030
01254>
01255> Max. eff. Inten. (mm/hr)= 104.19 31.02
01256> over (min)= 7.50 10.00
01257> Storage Coeff. (min)= 8.28 (ii) 9.39 (ii)
01258> Unit Hyd. Tpeak (min)= 7.50 10.00
01259> Unit Hyd. peak (cms)= .14 .12
01260>
01261> PEAK FLOW (cms)= .27 .00 *TOTALS*
01262> TIME TO PEAK (hrs)= 1.04 1.13 1.042 (iii)
01263> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01264> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01265> RUNOFF COEFFICIENT = .96 .35 .945
01266>
01267> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01268> CN* = 81.0 Ia = Dep. Storage (Above)
01269> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01270> THAN THE STORAGE COEFFICIENT.
01271> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01272>
01273> -----
01274> 001:0007-----
01275>
01276> | ADD HYD (040 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01277> | ID1 01:010 | (ha) (cms) (hrs) (mm) (cms)
01278> | +ID2 02:020 | 2.07 .362 1.04 36.75 .000
01279> | | 1.54 .283 1.04 38.84 .000
01280> | | | | | |
01281> | SUM 04:040 | 3.61 .645 1.04 37.64 .000
01282>
01283> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01284>
01285> -----
01286> 001:0008-----
01287>
01288> | ADD HYD (050 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01289> | ID1 03:030 | (ha) (cms) (hrs) (mm) (cms)
01290> | +ID2 04:040 | 1.40 .274 1.04 40.16 .000
01291> | | 3.61 .645 1.04 37.64 .000
01292> | | | | | |
01293> | SUM 05:050 | 5.01 .918 1.04 38.34 .000
01294>
01295> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01296>
01297> -----
01298> 001:0009-----
01299> *
01300> * SUB-AREA No. 4
01301>
01302> | CALIB STANDHYD | Area (ha)= .89
01303> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01304>
01305> IMPERVIOUS PERVIOUS (i)
01306> Surface Area (ha)= .86 .03
01307> Dep. Storage (mm)= 1.57 4.67
01308> Average Slope (%)= .93 .70
01309> Length (m)= 164.82 40.00
01310> Mannings n = .030 .250
01311>
01312> Max. eff. Inten. (mm/hr)= 104.19 20.32
01313> over (min)= 5.00 25.00
01314> Storage Coeff. (min)= 5.72 (ii) 24.02 (ii)
01315> Unit Hyd. Tpeak (min)= 5.00 25.00
01316> Unit Hyd. peak (cms)= .20 .05
01317>
01318> PEAK FLOW (cms)= .20 .00 *TOTALS*
01319> TIME TO PEAK (hrs)= 1.00 1.38 1.000
01320> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01321> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01322> RUNOFF COEFFICIENT = .96 .35 .945
01323>
01324> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01325> CN* = 81.0 Ia = Dep. Storage (Above)
01326> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01327> THAN THE STORAGE COEFFICIENT.
01328> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01329>
01330> -----
01331> 001:0010-----
01332> *
01333> * SUB-AREA No. 5
01334>
01335> | CALIB STANDHYD | Area (ha)= 2.66
01336> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01337>
01338> IMPERVIOUS PERVIOUS (i)
01339> Surface Area (ha)= 2.58 .08
01340> Dep. Storage (mm)= 1.57 4.67
01341> Average Slope (%)= .61 1.50
01342> Length (m)= 207.25 20.00
01343> Mannings n = .030 .250
01344>
01345> Max. eff. Inten. (mm/hr)= 104.19 24.26
01346> over (min)= 7.50 17.50
01347> Storage Coeff. (min)= 7.45 (ii) 16.40 (ii)
01348> Unit Hyd. Tpeak (min)= 7.50 17.50
01349> Unit Hyd. peak (cms)= .15 .07
01350>
01351> *TOTALS*

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01351> PEAK FLOW (cms)= .54 .00 .538 (iii)
01352> TIME TO PEAK (hrs)= 1.04 1.25 1.042
01353> RUNOFF VOLUME (mm)= 40.94 14.70 40.154
01354> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01355> RUNOFF COEFFICIENT = .96 .35 .945
01356>

01357> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 81.0 Ia = Dep. Storage (Above)
01358> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
01359> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01363> 001:0011
01364> | ADD HYD (080) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01367> (ha) (cms) (hrs) (mm) (cms)
01368> ID1 06:060 .89 .205 1.00 40.16 .000
01369> +ID2 07:070 2.66 .538 1.04 40.16 .000
01370>
01371> SUM 08:080 3.55 .733 1.04 40.16 .000
01372>

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01376> 001:0012
01377> | ADD HYD (090) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01378> (ha) (cms) (hrs) (mm) (cms)
01381> ID1 05:050 5.01 .918 1.04 36.34 .000
01382> +ID2 08:080 3.55 .733 1.04 40.16 .000
01383>
01384> SUM 09:090 8.56 1.651 1.04 39.10 .000
01385>

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01388> 001:0013
01389> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01391> | IN>09: (090) |
01392> | OUT<10: (POND) |

Table with columns: OUTFLOW (cms), STORAGE (ha.m.), OUTFLOW STORAGE TABLE, STORAGE (ha.m.). Rows show data for various time steps from 01394 to 01403.

ROUTING RESULTS AREA OPEAK TPEAK R.V.
01404> (ha) (cms) (hrs) (mm)
01406> INFLOW >09: (090) 8.56 1.651 1.042 39.096
01407> OUTFLOW<10: (POND) 8.56 .089 2.625 39.093
01408>

01409> PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.413
01410> TIME SHIFT OF PEAK FLOW (min) = 95.00
01411> MAXIMUM STORAGE USED (ha.m.) = 2758E+00
01412>

01414> 001:0014
01415> *****
01416> * Remaining Hawthorne Industrial Park *
01417> *****
01418> *
01419> * SUB-AREA No.1

01421> | CALIB STANDHYD | Area (ha)= 19.90
01422> | 01:H1P01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
01423>

01424> Surface Area (ha)= 14.13 IMPERVIOUS 5.77 PERVIOUS (i)
01425> Dep. Storage (mm)= 1.57 4.67
01427> Average Slope (%)= .60 1.50
01428> Length (m)= 580.00 100.00
01429> Mannings n = .030 .250
01430>

01431> Max. eff. Inten. (mm/hr)= 80.14 42.65
01432> over (min) 15.00 35.00
01433> Storage Coeff. (min)= 15.43 (ii) 34.18 (ii)
01434> Unit Hyd. Tpeak (min)= 15.00 35.00
01435> Unit Hyd. peak (cms)= .07 .03

TOTALS

01437> PEAK FLOW (cms)= 1.41 .40 1.572 (iii)
01438> TIME TO PEAK (hrs)= 1.17 1.54 1.208
01439> RUNOFF VOLUME (mm)= 40.94 21.31 41.514
01440> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01441> RUNOFF COEFFICIENT = .96 .50 .732
01442>

01443> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 81.0 Ia = Dep. Storage (Above)
01444> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
01445> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01450> 001:0015
01451> | ADD HYD (H1P02) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01454> (ha) (cms) (hrs) (mm) (cms)
01455> ID1 10: POND 8.56 .089 2.63 39.09 .000
01456> +ID2 01:H1P01 19.90 1.572 1.21 31.13 .000
01457>
01458> SUM 02:H1P02 28.46 1.615 1.21 33.52 .000
01459>

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01462> 001:0016
01463> *
01464> * SUB-AREA No.2

01466> | CALIB STANDHYD | Area (ha)= 17.00
01467> | 03:H1P03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
01468>

01469> Surface Area (ha)= 12.07 IMPERVIOUS 4.93 PERVIOUS (i)
01470> Dep. Storage (mm)= 1.57 4.67
01472> Average Slope (%)= .65 1.50
01473> Length (m)= 450.00 100.00
01474> Mannings n = .030 .250
01475>

01476> Max. eff. Inten. (mm/hr)= 89.76 47.48
01477> over (min) 12.50 30.00
01478> Storage Coeff. (min)= 12.36 (ii) 30.32 (ii)
01479> Unit Hyd. Tpeak (min)= 12.50 30.00
01480> Unit Hyd. peak (cms)= .09 .04

TOTALS

01482> PEAK FLOW (cms)= 1.36 .37 1.504 (iii)
01483> TIME TO PEAK (hrs)= 1.13 1.46 1.167
01484> RUNOFF VOLUME (mm)= 40.94 21.31 41.514
01485> TOTAL RAINFALL (mm)= 42.51 42.51 42.514

01486> RUNOFF COEFFICIENT = .96 .50 .732
01487>
01488> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01489> CN* = 81.0 Ia = Dep. Storage (Above)
01490> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
01491> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01495> 001:0017
01496> *
01497> * SUB-AREA No.3

01498> | CALIB STANDHYD | Area (ha)= 18.10
01499> | 04:H1P04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
01500>
01501> IMPERVIOUS PERVIOUS (i)
01502> Surface Area (ha)= 12.85 5.25
01503> Dep. Storage (mm)= 1.57 4.67
01504> Average Slope (%)= .50 1.50
01505> Length (m)= 600.00 100.00
01506> Mannings n = .030 .250
01507>
01508> Max. eff. Inten. (mm/hr)= 73.27 42.65
01509> over (min) 17.50 35.00
01510> Storage Coeff. (min)= 17.24 (ii) 35.98 (ii)
01511> Unit Hyd. Tpeak (min)= 17.50 35.00
01512> Unit Hyd. peak (cms)= .07 .03
01513>

TOTALS

01515> PEAK FLOW (cms)= 1.19 .35 1.364 (iii)
01516> TIME TO PEAK (hrs)= 1.21 1.54 1.250
01517> RUNOFF VOLUME (mm)= 40.94 21.31 41.514
01518> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01519> RUNOFF COEFFICIENT = .96 .50 .732
01520>

01521> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 81.0 Ia = Dep. Storage (Above)
01522> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
01523> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01528> 001:0018
01529> | ADD HYD (H1P05) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01530> (ha) (cms) (hrs) (mm) (cms)
01531> ID1 03:H1P03 17.00 1.504 1.17 31.13 .000
01532> +ID2 04:H1P04 18.10 1.364 1.25 31.13 .000
01533>
01534> SUM 05:H1P05 35.10 2.800 1.17 31.13 .000
01535>

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01539> 001:0019
01540> *
01541> * SUB-AREA No.4

01544> | DESIGN NASHDY | Area (ha)= 4.00 Curve Number (CN)=85.00
01545> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01546> | U.H. Tp (hrs)= .170
01547>

01548> Unit Hyd Opeak (cms)= .899
01549>
01550> PEAK FLOW (cms)= .260 (i)
01551> TIME TO PEAK (hrs)= 1.157
01552> RUNOFF VOLUME (mm)= 17.326
01553> TOTAL RAINFALL (mm)= 42.514
01554> RUNOFF COEFFICIENT = .408
01555>

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

01559> 001:0020
01560> | ADD HYD (H1P06) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01562> (ha) (cms) (hrs) (mm) (cms)
01563> ID1 02:H1P02 28.46 1.615 1.21 33.52 .000
01564> +ID2 05:H1P05 35.10 2.800 1.17 31.13 .000
01565> +ID3 06:Pond-B 4.00 .260 1.17 17.32 .000
01566>
01567> SUM 07:H1P06 67.56 4.661 1.17 31.32 .000
01568>

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01572> 001:0021
01573> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01575> | IN>07: (H1P06) |
01576> | OUT<08: (H1P-PO) |

Table with columns: OUTFLOW (cms), STORAGE (ha.m.), OUTFLOW STORAGE TABLE, STORAGE (ha.m.). Rows show data for various time steps from 01578 to 01588.

01589> ROUTING RESULTS AREA OPEAK TPEAK R.V.
01590> (ha) (cms) (hrs) (mm)
01591> INFLOW >07: (H1P06) 67.56 4.661 1.167 31.317
01592> OUTFLOW<08: (H1P-PO) 67.56 .288 1.167 31.317
01593>

01594> PEAK FLOW REDUCTION [Qout/Qin] (%) = 6.182
01595> TIME SHIFT OF PEAK FLOW (min) = 145.83
01596> MAXIMUM STORAGE USED (ha.m.) = 1656E+01
01597>

01598> 001:0022
01599> *
01600> * SUB-AREA No. 5

01604> | DESIGN NASHDY | Area (ha)= 6.80 Curve Number (CN)=76.00
01605> | 09:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01606> | U.H. Tp (hrs)= .370
01607>

01608> Unit Hyd Opeak (cms)= .702
01609>
01610> PEAK FLOW (cms)= .187 (i)
01611> TIME TO PEAK (hrs)= 1.458
01612> RUNOFF VOLUME (mm)= 12.131
01613> TOTAL RAINFALL (mm)= 42.514
01614> RUNOFF COEFFICIENT = .285
01615>

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

01619> 001:0023
01620> *


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01621> *SUB-AREA No. 6
01622> *
01623> | DESIGN WASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00
01624> | 10:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01625> | U.H. Tp(hrs)= .804
01626>
01627> Unit Hyd Qpeak (cms)= .252
01628>
01629>
01630> PEAK FLOW (cms)= .086 (i)
01631> TIME TO PEAK (hrs)= 2.042
01632> RUNOFF VOLUME (mm)= 12.131
01633> TOTAL RAINFALL (mm)= 42.514
01634> RUNOFF COEFFICIENT = .285
01635>
01636> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01637>
01638>
01639> 001:0024-----
01640>
01641> | ADD HYD (Interi) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01642> | (ha) (cms) (hrs) (mm) (cms)
01643> | ID1 08:HIP-PO 67.56 .288 3.60 31.32 .000
01644> | +ID2 05:A2 6.80 .187 1.46 12.13 .000
01645> | +ID3 10:A3 5.30 .086 2.04 12.13 .000
01646>
01647> SUM 01:Interi 79.66 .359 3.08 28.40 .000
01648>
01649> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01650>
01651>
01652> 001:0025-----
01653> *****
01654> * CALCULATION OF 3HR - 1:10 YEAR STORM EVENT *
01655> *****
01656> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
01657> | TZERO = .00 hrs on 0
01658> | METOUT= 2 (output= METRIC)
01659> | NRUN = 001
01660> | NSTORM= 0
01661>
01662>
01663> 001:0002-----
01664>
01665> | CHICAGO STORM | IDF curve parameters: A=1174.184
01666> | Ptotal= 49.50 mm | B= 6.014
01667> | C= .816
01668>
01669> used in: INTENSITY = A / (t + B)^C
01670>
01671> Duration of storm = 3.00 hrs
01672> Storm time step = 10.00 min
01673> Time to peak ratio = .33
01674>
01675>
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01756> TIME TO PEAK (hrs)= 1.04 1.13 1.042
01757> RUNOFF VOLUME (mm)= 47.93 19.25 45.640
01758> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01759> RUNOFF COEFFICIENT = .97 .39 .922
01760>
01761> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01762> CN* = 81.0 Ia = Dep. Storage (Above)
01763> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01764> THAN THE STORAGE COEFFICIENT.
01765> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01766>
01767>
01768> 001:0006-----
01769> *
01770> * SUB-AREA No.3
01771>
01772> | CALIB STANDHYD | Area (ha)= 1.40
01773> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01774>
01775> IMPERVIOUS PERVIOUS (i)
01776> Surface Area (ha)= 1.36 .04
01777> Dep. Storage (mm)= 1.57 4.67
01778> Average Slope (%)= .51 1.00
01779> Length (m)= 225.63 5.00
01780> Mannings n = .030 .030
01781>
01782> Max.eff.Inten.(mm/hr)= 122.14 48.18
01783> over (min) 7.50 7.50
01784> Storage Coeff. (min)= 7.77 (ii) 8.70 (ii)
01785> Unit Hyd. Tpeak (min)= 7.50 7.50
01786> Unit Hyd. peak (cms)= .15 .14
01787>
01788> PEAK FLOW (cms)= .33 .00 *TOTALS*
01789> TIME TO PEAK (hrs)= 1.04 1.08 .329 (iii)
01790> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01791> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01792> RUNOFF COEFFICIENT = .97 .39 .951
01793>
01794> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01795> CN* = 81.0 Ia = Dep. Storage (Above)
01796> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01797> THAN THE STORAGE COEFFICIENT.
01798> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01799>
01800>
01801> 001:0007-----
01802>
01803> | ADD HYD (040 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01804> | (ha) (cms) (hrs) (mm) (cms)
01805> | ID1 01:010 2.07 .437 1.04 43.35 .000
01806> | +ID2 02:020 1.54 .341 1.04 45.64 .000
01807>
01808> SUM 04:040 3.61 .778 1.04 44.32 .000
01809>
01810> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01811>
01812>
01813> 001:0008-----
01814>
01815> | ADD HYD (050 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01816> | (ha) (cms) (hrs) (mm) (cms)
01817> | ID1 03:030 1.40 .329 1.04 47.07 .000
01818> | +ID2 04:040 3.61 .778 1.04 44.32 .000
01819>
01820> SUM 05:050 5.01 1.107 1.04 45.09 .000
01821>
01822> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01823>
01824>
01825> 001:0009-----
01826> *
01827> * SUB-AREA No.4
01828>
01829> | CALIB STANDHYD | Area (ha)= .89
01830> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01831>
01832> IMPERVIOUS PERVIOUS (i)
01833> Surface Area (ha)= .86 .03
01834> Dep. Storage (mm)= 1.57 4.67
01835> Average Slope (%)= .53 .70
01836> Length (m)= 164.82 40.00
01837> Mannings n = .030 .250
01838>
01839> Max.eff.Inten.(mm/hr)= 122.14 31.19
01840> over (min) 5.00 20.00
01841> Storage Coeff. (min)= 5.37 (ii) 20.78 (ii)
01842> Unit Hyd. Tpeak (min)= 5.00 20.00
01843> Unit Hyd. peak (cms)= .21 .06
01844>
01845> PEAK FLOW (cms)= .24 .00 *TOTALS*
01846> TIME TO PEAK (hrs)= 1.00 1.29 1.000
01847> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01848> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01849> RUNOFF COEFFICIENT = .97 .39 .951
01850>
01851> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01852> CN* = 81.0 Ia = Dep. Storage (Above)
01853> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01854> THAN THE STORAGE COEFFICIENT.
01855> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01856>
01857>
01858> 001:0010-----
01859> *
01860> * SUB-AREA No.5
01861>
01862> | CALIB STANDHYD | Area (ha)= 2.66
01863> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01864>
01865> IMPERVIOUS PERVIOUS (i)
01866> Surface Area (ha)= 2.58 .08
01867> Dep. Storage (mm)= 1.57 4.67
01868> Average Slope (%)= .61 1.50
01869> Length (m)= 207.25 20.00
01870> Mannings n = .030 .250
01871>
01872> Max.eff.Inten.(mm/hr)= 122.14 34.69
01873> over (min) 7.50 15.00
01874> Storage Coeff. (min)= 7.00 (ii) 14.75 (ii)
01875> Unit Hyd. Tpeak (min)= 7.50 15.00
01876> Unit Hyd. peak (cms)= .16 .08
01877>
01878> PEAK FLOW (cms)= .64 .00 *TOTALS*
01879> TIME TO PEAK (hrs)= 1.04 1.21 1.042
01880> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01881> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01882> RUNOFF COEFFICIENT = .97 .39 .951
01883>
01884> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01885> CN* = 81.0 Ia = Dep. Storage (Above)
01886> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01887> THAN THE STORAGE COEFFICIENT.
01888> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01889>
01890>

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01891> 001:0011-----
01892> | ADD HYD (080 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01893> | ID1 06:060 |      (ha) (cms) (hrs) (mm) (cms)
01894> | +ID2 07:070 |      2.66 .645 1.04 47.07 .000
01895> |-----|-----|-----|-----|-----|-----|
01896> | SUM 08:080 |      3.55 .876 1.04 47.07 .000
01897>
01898> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01900>
01901>
01902> 001:0012-----
01903> | ADD HYD (090 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
01904> | ID1 05:050 |      (ha) (cms) (hrs) (mm) (cms)
01905> | +ID2 08:080 |      3.55 .876 1.04 47.07 .000
01906> |-----|-----|-----|-----|-----|-----|
01907> | SUM 09:090 |      8.56 1.984 1.04 45.91 .000
01908>
01909> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01911>
01912>
01913>
01914>
01915> 001:0013-----
01916> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01917> | IN>09: (090 ) |
01918> | OUT<10: (POND ) |
01919> |-----|-----|-----|-----|-----|-----|
01920> |=====  
01921> | OUTFLOW STORAGE | OUTFLOW STORAGE  
01922> | (cms) (ha.m.) | (cms) (ha.m.)  
01923> | .000 .0000E+00 | .593 .6251E+00  
01924> | .008 .6560E-01 | .654 .6631E+00  
01925> | .017 .1311E+00 | .797 .7391E+00  
01926> | .053 .2831E+00 | .950 .8274E+00  
01927> | .233 .3971E+00 | 1.304 .9157E+00  
01928> | .337 .4731E+00 | 1.880 .1004E+01  
01929> | .465 .5491E+00 | 2.577 .1092E+01  
01930> | .531 .5871E+00 | .000 .0000E+00  
01931>
01932> ROUTING RESULTS AREA OPEAK TPEAK R.V.
01933> | (ha) (cms) (hrs) (mm)  
01934> | INFLOW >09: (090 ) | 8.56 1.984 1.042 45.914  
01935> | OUTFLOW<10: (POND ) | 8.56 .132 2.278 45.912  
01936>
01937> PEAK FLOW REDUCTION [Qout/Qin] (%) = 6.640  
01938> TIME SHIFT OF PEAK FLOW (min) = 74.17  
01939> MAXIMUM STORAGE USED (ha.m.) = .3146E+00  
01940>
01941> 001:0014-----
01942> *****  
01943> * Remaining Hawthorne Industrial Park *  
01944> *****  
01945> *  
01946> * SUB-AREA No.1  
01947>
01948> | CALIB STANDHYD | Area (ha)= 19.90  
01949> | 01:HIF01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00  
01950>
01951> IMPERVIOUS PERVIOUS (i)  
01952> | Surface Area (ha)= 14.13 5.77  
01953> | Dep. Storage (mm)= 1.57 4.67  
01954> | Average Slope (ft)= .60 1.50  
01955> | Length (m)= 580.00 100.00  
01956> | Mannings n = .030 .250  
01957>
01958> Max.eff.Inten.(mm/hr)= 93.86 60.56  
01959> | over (min)= .00 30.00  
01960> | Storage Coeff. (min)= 14.48 (ii) 30.78 (ii)  
01961> | Unit Hyd. Tpeak (min)= 15.00 30.00  
01962> | Unit Hyd. peak (cms)= .08 .04  
01963>
01964> PEAK FLOW (cms)= 1.70 .55 *TOTALS*  
01965> | over (min)= 1.17 1.46 1.983 (iii)  
01966> | TIME TO PEAK (hrs)= 1.17 1.46 1.983  
01967> | RUNOFF VOLUME (mm)= 47.93 26.92 37.426  
01968> | TOTAL RAINFALL (mm)= 49.50 49.50 49.505  
01969> | RUNOFF COEFFICIENT = .97 .54 .756  
01970>
01971> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
01972> | CN* = 81.0 Ia = Dep. Storage (Above)  
01973> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
01974> | THAN THE STORAGE COEFFICIENT.  
01975> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.  
01976>
01977> 001:0015-----
01978> | ADD HYD (HIPO2 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF  
01979> | ID1 10:POND |      (ha) (cms) (hrs) (mm) (cms)  
01980> | +ID2 01:HIF01 |      8.56 .132 2.28 45.91 .000  
01981> |-----|-----|-----|-----|-----|-----|  
01982> | SUM 02:HIF02 |      28.46 2.044 1.21 39.98 .000  
01983>
01984> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.  
01987>
01988> 001:0016-----
01989> * SUB-AREA No.2  
01990>
01991> | CALIB STANDHYD | Area (ha)= 17.00  
01992> | 03:HIF03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00  
01993>
01994> IMPERVIOUS PERVIOUS (i)  
01995> | Surface Area (ha)= 12.07 4.93  
01996> | Dep. Storage (mm)= 1.57 4.67  
01997> | Average Slope (ft)= .65 1.50  
02000> | Length (m)= 450.00 100.00  
02001> | Mannings n = .030 .250  
02002>
02003> Max.eff.Inten.(mm/hr)= 105.17 63.81  
02004> | over (min)= 12.50 27.50  
02005> | Storage Coeff. (min)= 11.50 (ii) 27.56 (ii)  
02006> | Unit Hyd. Tpeak (min)= 12.50 27.50  
02007> | Unit Hyd. peak (cms)= .09 .04  
02008>
02009> PEAK FLOW (cms)= 1.63 .51 *TOTALS*  
02010> | over (min)= 1.13 1.42 1.865 (iii)  
02011> | TIME TO PEAK (hrs)= 1.13 1.42 1.865  
02012> | RUNOFF VOLUME (mm)= 47.93 26.92 37.426  
02013> | TOTAL RAINFALL (mm)= 49.50 49.50 49.505  
02014> | RUNOFF COEFFICIENT = .97 .54 .756  
02015>
02016> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
02017> | CN* = 81.0 Ia = Dep. Storage (Above)  
02018> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
02019> | THAN THE STORAGE COEFFICIENT.  
02020> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.  
02021>
02022> 001:0017-----
02023> * SUB-AREA No.3  
02024>
02025>

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02026> | CALIB STANDHYD | Area (ha)= 18.10  
02027> | 04:HIF04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00  
02028>
02029> IMPERVIOUS PERVIOUS (i)  
02030> | Surface Area (ha)= 12.85 5.25  
02031> | Dep. Storage (mm)= 1.57 4.67  
02032> | Average Slope (ft)= .50 1.50  
02033> | Length (m)= 600.00 100.00  
02034> | Mannings n = .030 .250  
02035>
02036> Max.eff.Inten.(mm/hr)= 93.86 57.19  
02037> | over (min)= 15.00 32.50  
02038> | Storage Coeff. (min)= 15.61 (ii) 32.28 (ii)  
02039> | Unit Hyd. Tpeak (min)= 15.00 32.50  
02040> | Unit Hyd. peak (cms)= .07 .03  
02041>
02042> PEAK FLOW (cms)= 1.49 .48 *TOTALS*  
02043> | TIME TO PEAK (hrs)= 1.17 1.50 1.208  
02044> | RUNOFF VOLUME (mm)= 47.93 26.92 37.426  
02045> | TOTAL RAINFALL (mm)= 49.50 49.50 49.505  
02046> | RUNOFF COEFFICIENT = .97 .54 .756  
02047>
02048> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
02049> | CN* = 81.0 Ia = Dep. Storage (Above)  
02050> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
02051> | THAN THE STORAGE COEFFICIENT.  
02052> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.  
02053>
02054> 001:0018-----
02055> | ADD HYD (HIF05 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF  
02056> | ID1 03:HIF03 |      (ha) (cms) (hrs) (mm) (cms)  
02057> | +ID2 04:HIF04 |      17.00 1.865 1.17 37.43 .000  
02058> |-----|-----|-----|-----|-----|-----|  
02059> | SUM 05:HIF05 |      35.10 3.572 1.17 37.43 .000  
02060>
02061> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.  
02062>
02063>
02064>
02065>
02066> 001:0019-----
02067> * SUB-AREA No.4  
02068>
02069> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00  
02070> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res.(N)= 3.00  
02071> | U.H. Tp(hrs)= .170  
02072>
02073> Unit Hyd Qpeak (cms)= .899  
02074>
02075> PEAK FLOW (cms)= .345 (i)  
02076> | TIME TO PEAK (hrs)= 1.167  
02077> | RUNOFF VOLUME (mm)= 22.420  
02078> | TOTAL RAINFALL (mm)= 49.505  
02079> | RUNOFF COEFFICIENT = .453  
02080>
02081> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.  
02082>
02083>
02084>
02085> 001:0020-----
02086> | ADD HYD (HIF06 ) | ID: NHYD AREA OPEAK TPEAK R.V. DWF  
02087> | ID1 02:HIF02 |      (ha) (cms) (hrs) (mm) (cms)  
02088> | +ID2 05:HIF05 |      28.46 2.044 1.21 39.98 .000  
02089> |-----|-----|-----|-----|-----|-----|  
02090> | SUM 07:HIF06 |      67.56 5.939 1.17 37.61 .000  
02091>
02092> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.  
02093>
02094>
02095>
02096> 001:0021-----
02097> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.  
02098> | IN>07: (HIPO6 ) |  
02099> | OUT<08: (HIP-PO ) |
02100> |-----|-----|-----|-----|-----|-----|
02101> |=====  
02102> | OUTFLOW STORAGE | OUTFLOW STORAGE  
02103> | (cms) (ha.m.) | (cms) (ha.m.)  
02104> | .000 .0000E+00 | .724 .2210E+01  
02105> | .048 .5740E-01 | .937 .2501E+01  
02106> | .054 .2434E+00 | 1.262 .2798E+01  
02107> | .059 .5834E+00 | 1.404 .3101E+01  
02108> | .062 .8400E+00 | 1.532 .3410E+01  
02109> | .064 .1102E+01 | 1.650 .3724E+01  
02110> | .147 .1370E+01 | 2.409 .4044E+01  
02111> | .280 .1644E+01 | 3.689 .4370E+01  
02112> | .472 .1924E+01 | .000 .0000E+00  
02113>
02114> ROUTING RESULTS AREA OPEAK TPEAK R.V.
02115> | (ha) (cms) (hrs) (mm)  
02116> | INFLOW >07: (HIPO6 ) | 67.56 5.939 1.167 37.611  
02117> | OUTFLOW<08: (HIP-PO ) | 67.56 .487 3.361 37.611  
02118>
02119> PEAK FLOW REDUCTION [Qout/Qin] (%) = 8.200  
02120> | TIME SHIFT OF PEAK FLOW (min)= 131.67  
02121> | MAXIMUM STORAGE USED (ha.m.) = .1941E+01  
02122>
02123>
02124>
02125> 001:0022-----
02126> * SUB-AREA No. 5  
02127>
02128> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00  
02129> | 09:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res.(N)= 3.00  
02130> | U.H. Tp(hrs)= .370  
02131>
02132> Unit Hyd Qpeak (cms)= .702  
02133>
02134> PEAK FLOW (cms)= .252 (i)  
02135> | TIME TO PEAK (hrs)= 1.417  
02136> | RUNOFF VOLUME (mm)= 16.075  
02137> | TOTAL RAINFALL (mm)= 49.505  
02138> | RUNOFF COEFFICIENT = .325  
02139>
02140> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.  
02141>
02142>
02143>
02144> 001:0023-----
02145> * SUB-AREA No. 6  
02146>
02147>
02148> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00  
02149> | 10:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res.(N)= 3.00  
02150> | U.H. Tp(hrs)= .804  
02151>
02152> Unit Hyd Qpeak (cms)= .252  
02153>
02154> PEAK FLOW (cms)= .115 (i)  
02155> | TIME TO PEAK (hrs)= 2.000  
02156> | RUNOFF VOLUME (mm)= 16.075  
02157> | TOTAL RAINFALL (mm)= 49.505  
02158>
02159>
02160>

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02161> RUNOFF COEFFICIENT = .325
02162>
02163> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02164>
02165>
02166> 001:0024-----
02167>
02168> | ADD HYD (Interi) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02169> | CHICAGO STORM | (ha) (cms) (hrs) (mm) (cms)
02170> | ID1 08:H1P-PO 67.56 .487 3.36 37.61 .000
02171> | +ID2 09:A2 6.80 .252 1.42 16.08 .000
02172> | +ID3 10:A3 5.30 .115 2.00 16.08 .000
02173>
02174> |-----|-----|-----|-----|-----|-----|
02175> | SUM 01:Interi 79.66 .589 3.04 34.34 .000
02176>
02177> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02178>
02179> 001:0025-----
02180> *****
02181> * CALCULATION OF 3HR - 1:25 YEAR STORM EVENT *
02182> *****
02183>
02184> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
02185> | Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
02186> | TZERO = .00 hrs on 0
02187> | METOUT= 2 (output = METRIC)
02188> | NRUN= 001
02189> | NFORM= 0
02190>
02191> 001:0002-----
02192>
02193> | CHICAGO STORM | IDF curve parameters: A=1402.884
02194> | Total= 58.23 mm | C= 6.018
02195> |-----|-----|-----|-----|-----|-----|
02196> | used in: INTENSITY = A / (t + B)^C
02197>
02198> | Duration of storm = 3.00 hrs
02199> | Storm time step = 10.00 min
02200> | Time to peak ratio = .33
02201>
02202> |-----|-----|-----|-----|-----|-----|
02203> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
02204> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
02205> | .17 4.934 | 1.00 144.593 | 1.93 9.014 | 2.67 4.701 |
02206> | .33 6.152 | 1.17 43.904 | 2.00 7.571 | 2.83 4.310 |
02207> | .50 8.282 | 1.33 22.224 | 2.17 6.544 | 3.00 3.983 |
02208> | .67 13.006 | 1.50 14.852 | 2.33 5.776 | |
02209> | .83 33.041 | 1.67 11.192 | 2.50 5.179 | |
02210>
02211> 001:0003-----
02212>
02213> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\ORGA.VAL
02214> |-----|-----|-----|-----|-----|-----|
02215> | Filetitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE
02216> |-----|-----|-----|-----|-----|-----|
02217> | Horton's infiltration equation parameters:
02218> | [F0= 50.00 mm/hr] [F1= 7.50 mm/hr] [DCAY= 2.00 /hr] [F2= .00 mm]
02219> | Parameters for PERVIOUS surfaces in STANDHYD:
02220> | [IAPER= 4.67 mm] [LGP=40.00 mm] [MNP= .250]
02221> | Parameters for IMPERVIOUS surfaces in STANDHYD:
02222> | [IAMP= 1.57 mm] [CLI= 1.50] [MNI= .035]
02223> | Parameters used in NASHYD:
02224> | [Ia= 4.67 mm] [N= 3.00]
02225>
02226> 001:0004-----
02227> *****
02228> * ORGAWORD FILE *****
02229> *****
02230>
02231> * SUB-AREA No.1
02232>
02233> | CALIB STANDHYD | Area (ha)= 2.07
02234> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
02235>
02236> |-----|-----|-----|-----|-----|-----|
02237> | IMPERVIOUS PERVIOUS (i)
02238> | Surface Area (ha)= 1.74 .33
02239> | Dep. Storage (mm)= 1.57 4.67
02240> | Average Slope (%)= .52 1.00
02241> | Length (m)= 204.72 20.00
02242> | Mannings n = .030 .250
02243>
02244> | Max.eff.Inten.(mm/hr)= 144.69 47.07
02245> | over (min)= 7.50 15.00
02246> | Storage Coeff. (min)= 6.81 (ii) 14.56 (ii)
02247> | Unit Hyd. Tpeak (min)= 7.50 15.00
02248> | Unit Hyd. peak (cms)= .16 .08
02249>
02250> | PEAK FLOW (cms)= .52 .03 *TOTALS*
02251> | TIME TO PEAK (hrs)= 1.04 1.21 1.52 (iii)
02252> | RUNOFF VOLUME (mm)= 56.66 25.35 51.647
02253> | TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02254> | RUNOFF COEFFICIENT = .97 .44 .887
02255>
02256> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02257> CN* = 81.0 Ia = Dep. Storage (Above)
02258> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02259> THAN THE STORAGE COEFFICIENT.
02260> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02261>
02262> 001:0005-----
02263> * SUB-AREA No.2
02264>
02265> | CALIB STANDHYD | Area (ha)= 1.54
02266> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
02267>
02268> |-----|-----|-----|-----|-----|-----|
02269> | IMPERVIOUS PERVIOUS (i)
02270> | Surface Area (ha)= 1.42 .12
02271> | Dep. Storage (mm)= 1.57 4.67
02272> | Average Slope (%)= .50 1.00
02273> | Length (m)= 244.34 5.00
02274> | Mannings n = .030 .030
02275>
02276> | Max.eff.Inten.(mm/hr)= 144.69 65.19
02277> | over (min)= 7.50 7.50
02278> | Storage Coeff. (min)= 7.66 (ii) 8.49 (ii)
02279> | Unit Hyd. Tpeak (min)= 7.50 7.50
02280> | Unit Hyd. peak (cms)= .15 .14
02281>
02282> | PEAK FLOW (cms)= .40 .01 *TOTALS*
02283> | TIME TO PEAK (hrs)= 1.04 1.08 1.042
02284> | RUNOFF VOLUME (mm)= 56.66 25.35 54.152
02285> | TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02286> | RUNOFF COEFFICIENT = .97 .44 .930
02287>
02288> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02289> CN* = 81.0 Ia = Dep. Storage (Above)
02290> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02291> THAN THE STORAGE COEFFICIENT.
02292> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02293>
02294>
02295> 001:0006-----

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02296> *
02297> * SUB-AREA No.3
02298>
02299> | CALIB STANDHYD | Area (ha)= 1.40
02300> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02301>
02302> |-----|-----|-----|-----|-----|-----|
02303> | IMPERVIOUS PERVIOUS (i)
02304> | Surface Area (ha)= 1.36 .04
02305> | Dep. Storage (mm)= 1.57 4.67
02306> | Average Slope (%)= .51 1.00
02307> | Length (m)= 225.63 5.00
02308> | Mannings n = .030 .030
02309>
02310> | Max.eff.Inten.(mm/hr)= 144.69 65.19
02311> | over (min)= 7.50 7.50
02312> | Storage Coeff. (min)= 7.26 (ii) 8.09 (ii)
02313> | Unit Hyd. Tpeak (min)= 7.50 7.50
02314> | Unit Hyd. peak (cms)= .15 .14
02315>
02316> | PEAK FLOW (cms)= .40 .00 *TOTALS*
02317> | TIME TO PEAK (hrs)= 1.04 1.08 1.042 (iii)
02318> | RUNOFF VOLUME (mm)= 56.66 25.35 55.717
02319> | TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02320> | RUNOFF COEFFICIENT = .97 .44 .957
02321>
02322> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02323> CN* = 81.0 Ia = Dep. Storage (Above)
02324> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02325> THAN THE STORAGE COEFFICIENT.
02326> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02327>
02328> 001:0007-----
02329>
02330> | ADD HYD (040) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02331> | CHICAGO STORM | (ha) (cms) (hrs) (mm) (cms)
02332> | ID1 01:010 2.07 .532 1.04 51.65 .000
02333> | +ID2 02:020 1.54 .418 1.04 54.15 .000
02334>
02335> |-----|-----|-----|-----|-----|-----|
02336> | SUM 04:040 3.61 .950 1.04 52.72 .000
02337>
02338> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02339>
02340> 001:0008-----
02341>
02342> | ADD HYD (050) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02343> | CHICAGO STORM | (ha) (cms) (hrs) (mm) (cms)
02344> | ID1 03:030 1.40 .400 1.04 55.72 .000
02345> | +ID2 04:040 3.61 .950 1.04 52.72 .000
02346>
02347> |-----|-----|-----|-----|-----|-----|
02348> | SUM 05:050 5.01 1.350 1.04 53.55 .000
02349>
02350> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02351>
02352> 001:0009-----
02353> * SUB-AREA No.4
02354>
02355> | CALIB STANDHYD | Area (ha)= .89
02356> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02357>
02358> |-----|-----|-----|-----|-----|-----|
02359> | IMPERVIOUS PERVIOUS (i)
02360> | Surface Area (ha)= .86 .03
02361> | Dep. Storage (mm)= 1.57 4.67
02362> | Average Slope (%)= .93 .70
02363> | Length (m)= 164.82 40.00
02364> | Mannings n = .030 .250
02365>
02366> | Max.eff.Inten.(mm/hr)= 144.69 44.12
02367> | over (min)= 5.00 17.50
02368> | Storage Coeff. (min)= 5.02 (ii) 18.44 (ii)
02369> | Unit Hyd. Tpeak (min)= 5.00 17.50
02370> | Unit Hyd. peak (cms)= .22 .06
02371>
02372> | PEAK FLOW (cms)= .30 .00 *TOTALS*
02373> | TIME TO PEAK (hrs)= 1.00 1.25 1.000
02374> | RUNOFF VOLUME (mm)= 56.66 25.35 55.717
02375> | TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02376> | RUNOFF COEFFICIENT = .97 .44 .957
02377>
02378> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02379> CN* = 81.0 Ia = Dep. Storage (Above)
02380> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02381> THAN THE STORAGE COEFFICIENT.
02382> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02383>
02384> 001:0010-----
02385> * SUB-AREA No.5
02386>
02387> | CALIB STANDHYD | Area (ha)= 2.66
02388> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02389>
02390> |-----|-----|-----|-----|-----|-----|
02391> | IMPERVIOUS PERVIOUS (i)
02392> | Surface Area (ha)= 2.58 .08
02393> | Dep. Storage (mm)= 1.57 4.67
02394> | Average Slope (%)= .61 1.50
02395> | Length (m)= 207.25 20.00
02396> | Mannings n = .030 .250
02397>
02398> | Max.eff.Inten.(mm/hr)= 144.69 51.33
02399> | over (min)= 7.50 12.50
02400> | Storage Coeff. (min)= 6.54 (ii) 13.16 (ii)
02401> | Unit Hyd. Tpeak (min)= 7.50 12.50
02402> | Unit Hyd. peak (cms)= .16 .09
02403>
02404> | PEAK FLOW (cms)= .78 .01 *TOTALS*
02405> | TIME TO PEAK (hrs)= 1.04 1.17 1.042 (iii)
02406> | RUNOFF VOLUME (mm)= 56.66 25.35 55.717
02407> | TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02408> | RUNOFF COEFFICIENT = .97 .44 .957
02409>
02410> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02411> CN* = 81.0 Ia = Dep. Storage (Above)
02412> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02413> THAN THE STORAGE COEFFICIENT.
02414> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02415>
02416> 001:0011-----
02417>
02418> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02419> | CHICAGO STORM | (ha) (cms) (hrs) (mm) (cms)
02420> | ID1 06:060 2.89 .296 1.00 55.72 .000
02421> | +ID2 07:070 1.86 .783 1.04 55.72 .000
02422>
02423> |-----|-----|-----|-----|-----|-----|
02424> | SUM 08:080 3.55 1.060 1.04 55.72 .000
02425>
02426> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02427>
02428>
02429> 001:0012-----

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02431>-----
02432> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02433> | (ha) (cms) (hrs) (mm) (cms)
02434> | ID1 05:050 5.01 1.350 1.04 53.55 .000
02435> | +ID2 08:080 8.56 2.410 1.04 55.72 .000
02436>-----
02437> | SUM 09:090 8.56 2.410 1.04 54.45 .000
02438>-----
02439> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02440>-----
02441>-----
02442> | 001:0013-----
02443> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02444> | IN-09: (090) |
02445> | OUT<10: (POND) |
02446>-----
02447> | ===== OUTFLOW STORAGE TABLE =====
02448> | OUTFLOW STORAGE | OUTFLOW STORAGE
02449> | (cms) (ha.m.) | (cms) (ha.m.)
02450> | .000 .000E+00 | .593 .6251E+00
02451> | .008 .656E-01 | .654 .6631E+00
02452> | .017 .1311E+00 | .797 .7391E+00
02453> | .093 .2831E+00 | .950 .8274E+00
02454> | .233 .3971E+00 | 1.304 .9157E+00
02455> | .337 .4731E+00 | 1.880 .1004E+01
02456> | .465 .5491E+00 | 2.577 .1092E+01
02457> | .531 .5871E+00 | .000 .0000E+00
02458>-----
02459> | ROUTING RESULTS AREA QPEAK TPEAK R.V.
02460> | (ha) (cms) (hrs) (mm)
02461> | INFLOW >09: (090) 8.56 2.410 1.04 54.451
02462> | OUTFLOW<10: (POND) 8.56 1.189 2.056 54.449
02463>-----
02464> | PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.838
02465> | TIME SHIFT OF PEAK FLOW (min) = 60.83
02466> | MAXIMUM STORAGE USED (ha.m.) = .3612E+00
02467>-----
02468> | 001:0014-----
02469> | *****
02470> | * Remaining Hawthorne Industrial Park *
02471> | *****
02472> | *
02473> | * SUB-AREA No.1
02474> |-----
02475> | CALIB STANDHYD | Area (ha) = 19.90
02476> | 01:HIP01 DT= 2.50 | Total Imp (%) = 71.00 Dir. Conn. (%) = 50.00
02477>-----
02478> | IMPERVIOUS PERVIOUS (i)
02479> | Surface Area (ha) = 14.13 5.77
02480> | Dep. Storage (mm) = 1.57 4.67
02481> | Average Slope (%) = .60 1.50
02482> | Length (m) = 580.00 100.00
02483> | Mannings n = .030 .250
02484>-----
02485> | Max. eff. Inten. (mm/hr) = 124.54 81.98
02486> | over (min) 12.50 27.50
02487> | Storage Coeff. (min) = 12.93 (ii) 27.37 (ii)
02488> | Unit Hyd. Tpeak (min) = 12.50 27.50
02489> | Unit Hyd. peak (cms) = .09 .04
02490>-----
02491> | PEAK FLOW (cms) = 2.16 .77 *TOTALS*
02492> | TIME TO PEAK (hrs) = 1.13 1.42 2.548 (iii)
02493> | RUNOFF VOLUME (mm) = 56.66 34.22 1.167
02494> | TOTAL RAINFALL (mm) = 58.23 58.23 45.437
02495> | RUNOFF COEFFICIENT = .97 .59 58.226
02496>-----
02497> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02498> | CN* = 81.0 Ia = Dep. Storage (Above)
02499> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02500> | THAN THE STORAGE COEFFICIENT.
02501> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02502>-----
02503>-----
02504> | 001:0015-----
02505> |-----
02506> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02507> | (ha) (cms) (hrs) (mm) (cms)
02508> | ID1 10:POND 8.56 .189 2.06 54.45 .000
02509> | +ID2 01:HIP01 19.90 2.548 1.17 45.44 .000
02510>-----
02511> | SUM 02:HIP02 28.46 2.622 1.17 48.15 .000
02512>-----
02513> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02514>-----
02515>-----
02516> | 001:0016-----
02517> | *
02518> | * SUB-AREA No.2
02519> |-----
02520> | CALIB STANDHYD | Area (ha) = 17.00
02521> | 03:HIP03 DT= 2.50 | Total Imp (%) = 71.00 Dir. Conn. (%) = 50.00
02522>-----
02523> | IMPERVIOUS PERVIOUS (i)
02524> | Surface Area (ha) = 12.07 4.93
02525> | Dep. Storage (mm) = 1.57 4.67
02526> | Average Slope (%) = .65 1.50
02527> | Length (m) = 450.00 100.00
02528> | Mannings n = .030 .250
02529>-----
02530> | Max. eff. Inten. (mm/hr) = 144.69 87.13
02531> | over (min) 10.00 25.00
02532> | Storage Coeff. (min) = 10.21 (ii) 24.30 (ii)
02533> | Unit Hyd. Tpeak (min) = 10.00 25.00
02534> | Unit Hyd. peak (cms) = .11 .05
02535>-----
02536> | PEAK FLOW (cms) = 2.10 .71 *TOTALS*
02537> | TIME TO PEAK (hrs) = 1.08 1.38 2.398 (iii)
02538> | RUNOFF VOLUME (mm) = 56.66 34.22 1.125
02539> | TOTAL RAINFALL (mm) = 58.23 58.23 45.437
02540> | RUNOFF COEFFICIENT = .97 .59 58.226
02541>-----
02542> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02543> | CN* = 81.0 Ia = Dep. Storage (Above)
02544> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02545> | THAN THE STORAGE COEFFICIENT.
02546> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02547>-----
02548>-----
02549> | 001:0017-----
02550> | *
02551> | * SUB-AREA No.3
02552> |-----
02553> | CALIB STANDHYD | Area (ha) = 18.10
02554> | 04:HIP04 DT= 2.50 | Total Imp (%) = 71.00 Dir. Conn. (%) = 50.00
02555>-----
02556> | IMPERVIOUS PERVIOUS (i)
02557> | Surface Area (ha) = 12.85 5.25
02558> | Dep. Storage (mm) = 1.57 4.67
02559> | Average Slope (%) = .50 1.50
02560> | Length (m) = 600.00 100.00
02561> | Mannings n = .030 .250
02562>-----
02563> | Max. eff. Inten. (mm/hr) = 111.10 77.71
02564> | over (min) 15.00 30.00
02565> | Storage Coeff. (min) = 14.59 (ii) 29.34 (ii)

02566> | Unit Hyd. Tpeak (min) = 15.00 30.00
02567> | Unit Hyd. peak (cms) = .08 .04
02568>-----
02569> | *TOTALS*
02570> | PEAK FLOW (cms) = 1.82 .67 2.180 (iii)
02571> | TIME TO PEAK (hrs) = 1.17 1.46 1.208
02572> | RUNOFF VOLUME (mm) = 56.66 34.22 45.437
02573> | TOTAL RAINFALL (mm) = 58.23 58.23 58.226
02574> | RUNOFF COEFFICIENT = .97 .59 .780
02575>-----
02576> | (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02577> | CN* = 81.0 Ia = Dep. Storage (Above)
02578> | (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02579> | THAN THE STORAGE COEFFICIENT.
02580> | (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02581>-----
02582> | 001:0018-----
02583> |-----
02584> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02585> | (ha) (cms) (hrs) (mm) (cms)
02586> | ID1 03:HIP03 17.00 2.398 1.13 45.44 .000
02587> | +ID2 04:HIP04 18.10 2.180 1.21 45.44 .000
02588>-----
02589> | SUM 05:HIP05 35.10 4.439 1.13 45.44 .000
02590>-----
02591> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02592>-----
02593>-----
02594> | 001:0019-----
02595> | *
02596> | * SUB-AREA No.4
02597> |-----
02598> | DESIGN NASHYD | Area (ha) = 4.00 Curve Number (CN)=85.00
02599> | 06:Pond-B DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
02600> | U.H. Tp (hrs) = .170
02601>-----
02602> | Unit Hyd Opeak (cms) = .899
02603>-----
02604> | PEAK FLOW (cms) = .459 (i)
02605> | TIME TO PEAK (hrs) = 1.167
02606> | RUNOFF VOLUME (mm) = 29.155
02607> | TOTAL RAINFALL (mm) = 58.226
02608> | RUNOFF COEFFICIENT = .501
02609>-----
02610> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02611>-----
02612>-----
02613> | 001:0020-----
02614> |-----
02615> | ADD HYD (HIP06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02616> | (ha) (cms) (hrs) (mm) (cms)
02617> | ID1 02:HIP02 28.46 2.622 1.17 48.15 .000
02618> | +ID2 05:HIP05 35.10 4.439 1.13 45.44 .000
02619> | +ID3 06:Pond-B 4.00 .459 1.17 29.15 .000
02620>-----
02621> | SUM 07:HIP06 67.56 7.499 1.17 45.61 .000
02622>-----
02623> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02624>-----
02625>-----
02626> | 001:0021-----
02627> |-----
02628> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02629> | IN-07: (HIP06) |
02630> | OUT<08: (HIP-PO) |
02631>-----
02632> | ===== OUTFLOW STORAGE TABLE =====
02633> | OUTFLOW STORAGE | OUTFLOW STORAGE
02634> | (cms) (ha.m.) | (cms) (ha.m.)
02635> | .000 .0000E+00 | .724 .2210E+01
02636> | .048 .5740E-01 | .937 .2501E+01
02637> | .054 .2434E+00 | 1.262 .2798E+01
02638> | .059 .5834E+00 | 1.404 .3101E+01
02639> | .062 .8400E+00 | 1.532 .3410E+01
02640> | .064 .1102E+01 | 1.650 .3724E+01
02641> | .147 .1370E+01 | 2.409 .4044E+01
02642> | .280 .1644E+01 | 3.689 .4370E+01
02643> | .472 .1924E+01 | .000 .0000E+00
02644>-----
02645> | ROUTING RESULTS AREA QPEAK TPEAK R.V.
02646> | (ha) (cms) (hrs) (mm)
02647> | INFLOW >07: (HIP06) 67.56 7.499 1.167 45.613
02648> | OUTFLOW<08: (HIP-PO) 67.56 .773 3.181 45.613
02649>-----
02650> | PEAK FLOW REDUCTION [Qout/Qin] (%) = 10.306
02651> | TIME SHIFT OF PEAK FLOW (min) = 120.83
02652> | MAXIMUM STORAGE USED (ha.m.) = .2276E+01
02653>-----
02654> | 001:0022-----
02655> | *
02656> | * SUB-AREA No.5
02657> |-----
02658> | DESIGN NASHYD | Area (ha) = 6.80 Curve Number (CN)=76.00
02659> | 09:A2 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
02660> | U.H. Tp (hrs) = .370
02661>-----
02662> | Unit Hyd Opeak (cms) = .702
02663>-----
02664> | PEAK FLOW (cms) = .343 (i)
02665> | TIME TO PEAK (hrs) = 1.417
02666> | RUNOFF VOLUME (mm) = 21.442
02667> | TOTAL RAINFALL (mm) = 58.226
02668> | RUNOFF COEFFICIENT = .368
02669>-----
02670> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02671>-----
02672>-----
02673> | 001:0023-----
02674> | *
02675> | * SUB-AREA No.6
02676> |-----
02677> |-----
02678> | DESIGN NASHYD | Area (ha) = 5.30 Curve Number (CN)=76.00
02679> | 10:A3 DT= 2.50 | Ia (mm) = 4.670 # of Linear Res. (N)= 3.00
02680> | U.H. Tp (hrs) = .804
02681>-----
02682> | Unit Hyd Opeak (cms) = .252
02683>-----
02684> | PEAK FLOW (cms) = .155 (i)
02685> | TIME TO PEAK (hrs) = 2.000
02686> | RUNOFF VOLUME (mm) = 21.442
02687> | TOTAL RAINFALL (mm) = 58.226
02688> | RUNOFF COEFFICIENT = .368
02689>-----
02690> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02691>-----
02692>-----
02693> | 001:0024-----
02694> |-----
02695> | ADD HYD (Interi) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02696> | (ha) (cms) (hrs) (mm) (cms)
02697> | ID1 08:HIP-PO 67.56 .773 3.18 45.61 .000
02698> | +ID2 09:A2 6.80 .343 1.42 21.44 .000
02699> | +ID3 10:A3 5.30 .155 2.00 21.44 .000
02700>-----

02701> SUM 01:Interi 79.66 .939 2.60 41.94 .000

02702> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

02703> 02704> 02705> 02706> 001:0025-----

02707> ***** CALCULATION OF 3HR - 1:50 YEAR STORM EVENT *****

02711> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\

02712> | CHICAGO STORM | IDF curve parameters: A=1569.580

02728> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN

02738> 001:0003-----

02740> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\ORGA.VAL

02745> | HORTON'S INFILTRATION EQUATION PARAMETERS:

02750> | PARAMETERS USED IN WASHYD:

02752> 001:0004-----

02755> * SUB-AREA No.1

02760> | CALIB STANDHYD | Area (ha)= 2.07

02765> Surface Area (ha)= IMPERVIOUS PERVIOUS (i)

02770> Max.eff.Inten.(mm/hr)= 161.47 62.27

02775> PEAK FLOW (cms)= .59 .03 *TOTALS*

02782> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

02785> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

02790> 001:0005-----

02793> | CALIB STANDHYD | Area (ha)= 1.54

02800> Surface Area (ha)= IMPERVIOUS PERVIOUS (i)

02810> Max.eff.Inten.(mm/hr)= 161.47 78.73

02815> PEAK FLOW (cms)= .46 .02 *TOTALS*

02822> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

02825> 001:0006-----

02826> | CALIB STANDHYD | Area (ha)= 1.40

02830> Surface Area (ha)= IMPERVIOUS PERVIOUS (i)

02836> Max.eff.Inten.(mm/hr)= 161.47 78.73

02842> PEAK FLOW (cms)= .45 .01 *TOTALS*

02849> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

02852> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02857> | ADD HYD (040) | ID: NHYD

02862> SUM 04:040 3.61 1.084 1.04 59.08 .000

02868> 001:0008-----

02871> | ADD HYD (050) | ID: NHYD

02876> SUM 05:050 5.01 1.538 1.04 59.96 .000

02882> * SUB-AREA No.4

02887> | CALIB STANDHYD | Area (ha)= .89

02892> Surface Area (ha)= IMPERVIOUS PERVIOUS (i)

02897> Max.eff.Inten.(mm/hr)= 161.47 53.28

02900> PEAK FLOW (cms)= .33 .00 *TOTALS*

02908> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

02912> 001:0010-----

02916> | CALIB STANDHYD | Area (ha)= 2.66

02922> Surface Area (ha)= IMPERVIOUS PERVIOUS (i)

02927> Max.eff.Inten.(mm/hr)= 161.47 62.27

02932> PEAK FLOW (cms)= .88 .01 *TOTALS*

02939> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

02942> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02947> | ADD HYD (080) | ID: NHYD

02952> SUM 08:080 3.55 1.197 1.04 62.25 .000

02957> 001:0012-----

02959> | ADD HYD (090) | ID: NHYD

02963> SUM 09:090 8.56 2.735 1.04 60.91 .000

02968> 001:0013-----


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03241> METOUT= 2 (output = METRIC)
03242> NRUN = 001
03243> NSTORM= 0
03244>
03245> 001:0002-----
03246>
03247> | CHICAGO STORM | IDF curve parameters: A=1735.688
03248> | Ptotal= 71.66 mm | B= 6.014
03249> | | C= .820
03250>
03251> used in: INTENSITY = A / (t + B)^C
03252>
03253> Duration of storm = 3.00 hrs
03254> Storm time step = 10.00 min
03255> Time to peak ratio = .33
03256>
03257> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
03258> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
03259> .17 6.046 | 1.00 178.559 | 1.83 11.059 | 2.67 5.760
03260> .32 7.542 | 1.17 54.049 | 2.00 9.285 | 2.83 5.280
03261> .50 10.159 | 1.33 27.318 | 2.17 8.024 | 3.00 4.879
03262> .67 15.969 | 1.50 18.240 | 2.33 7.080 |
03263> .83 40.655 | 1.67 13.737 | 2.50 6.347 |
03264>
03265> 001:0003-----
03266>
03267> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\ORGA.VAL
03268> | ICASEdv = 1 (read and print data)
03269> Filetitle=----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE
03270> |----- PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----|
03271> Horton's infiltration equation parameters:
03272> [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [F= .00 mm]
03273> Parameters for PERVIOUS surfaces in STANDHYD:
03274> [Iapez= 4.67 mm] [IGP=10.00 m] [DMP= .250]
03275> Parameters for IMPERVIOUS surfaces in STANDHYD:
03276> [IAimp= 1.57 mm] [CLI= 1.50] [MWI= .035]
03277> Parameters used in NASHYD:
03278> [Ia= 4.67 mm] [N= 3.00]
03279>
03280> 001:0004-----
03281> *-----*
03282> * ORGAWORLD FILE *
03283> *-----*
03284> *
03285> * SUB-AREA No.1
03286>
03287> | CALIB STANDHYD | Area (ha)= 2.07
03288> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
03289>
03290> IMPERVIOUS PERVIOUS (i)
03291> Surface Area (ha)= 1.74 .33
03292> Dep. Storage (mm)= 1.57 4.67
03293> Average Slope (%)= .52 1.00
03294> Length (m)= 204.72 20.00
03295> Mannings n = .030 .250
03296>
03297> Max.eff.Inten.(mm/hr)= 178.56 74.05
03298> over (min) 7.50 12.50
03299> Storage Coeff.(min)= 6.26 (ii) 12.72 (ii)
03300> Unit Hyd. Tpeak (min)= 7.50 12.50
03301> Unit Hyd. peak (cms)= .17 .09
03302>
03303> PEAK FLOW (cms)= .66 .04 *TOTALS*
03304> TIME TO PEAK (hrs)= 1.04 1.17 .685 (iii)
03305> RUNOFF VOLUME (mm)= 70.09 35.46 1.042
03306> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03307> RUNOFF COEFFICIENT = .98 .49 .901
03308>
03309> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03310> CN* = 81.0 Ia = Dep. Storage (Above)
03311> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03312> THAN THE STORAGE COEFFICIENT.
03313> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03314>
03315>
03316> 001:0005-----
03317> *
03318> * SUB-AREA No.2
03319>
03320> | CALIB STANDHYD | Area (ha)= 1.54
03321> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
03322>
03323> IMPERVIOUS PERVIOUS (i)
03324> Surface Area (ha)= 1.42 .12
03325> Dep. Storage (mm)= 1.57 4.67
03326> Average Slope (%)= .50 1.00
03327> Length (m)= 244.34 5.00
03328> Mannings n = .030 .030
03329>
03330> Max.eff.Inten.(mm/hr)= 178.56 93.23
03331> over (min) 7.50 7.50
03332> Storage Coeff.(min)= 7.04 (ii) 7.76 (ii)
03333> Unit Hyd. Tpeak (min)= 7.50 7.50
03334> Unit Hyd. peak (cms)= .16 .15
03335>
03336> PEAK FLOW (cms)= .51 .02 *TOTALS*
03337> TIME TO PEAK (hrs)= 1.04 1.08 .534 (iii)
03338> RUNOFF VOLUME (mm)= 70.09 35.46 67.324
03339> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03340> RUNOFF COEFFICIENT = .98 .49 .939
03341>
03342> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03343> CN* = 81.0 Ia = Dep. Storage (Above)
03344> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03345> THAN THE STORAGE COEFFICIENT.
03346> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03347>
03348>
03349> 001:0006-----
03350> *
03351> * SUB-AREA No.3
03352>
03353> | CALIB STANDHYD | Area (ha)= 1.40
03354> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03355>
03356> IMPERVIOUS PERVIOUS (i)
03357> Surface Area (ha)= 1.36 .04
03358> Dep. Storage (mm)= 1.57 4.67
03359> Average Slope (%)= .51 1.00
03360> Length (m)= 225.63 5.00
03361> Mannings n = .030 .030
03362>
03363> Max.eff.Inten.(mm/hr)= 178.56 93.23
03364> over (min) 7.50 7.50
03365> Storage Coeff.(min)= 6.67 (ii) 7.39 (ii)
03366> Unit Hyd. Tpeak (min)= 7.50 7.50
03367> Unit Hyd. peak (cms)= .16 .15
03368>
03369> PEAK FLOW (cms)= .50 .01 *TOTALS*
03370> TIME TO PEAK (hrs)= 1.04 1.08 1.509 (iii)
03371> RUNOFF VOLUME (mm)= 70.09 35.46 69.056
03372> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03373> RUNOFF COEFFICIENT = .98 .49 .964
03374>
03375> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

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03376> CN* = 81.0 Ia = Dep. Storage (Above)
03377> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03378> THAN THE STORAGE COEFFICIENT.
03379> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03380>
03381>
03382> 001:0007-----
03383>
03384> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03385> (ha) (cms) (hrs) (mm) (cms)
03386> ID1 01:010 2.07 .685 1.04 64.55 .000
03387> +ID2 02:020 1.54 .534 1.04 67.32 .000
03388>
03389> =====
03390> SUM 04:040 3.61 1.220 1.04 65.74 .000
03391>
03392> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03393>
03394> 001:0008-----
03395>
03396> | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03397> (ha) (cms) (hrs) (mm) (cms)
03398> ID1 03:030 1.40 .509 1.04 69.06 .000
03399> +ID2 04:040 3.61 1.220 1.04 65.74 .000
03400>
03401> =====
03402> SUM 05:050 5.01 1.729 1.04 66.66 .000
03403>
03404> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03405>
03406> 001:0009-----
03407> *
03408> * SUB-AREA No.4
03409>
03410> | CALIB STANDHYD | Area (ha)= .89
03411> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03412>
03413> IMPERVIOUS PERVIOUS (i)
03414> Surface Area (ha)= 1.56 .03
03415> Dep. Storage (mm)= 1.57 4.67
03416> Average Slope (%)= .92 .70
03417> Length (m)= 164.82 40.00
03418> Mannings n = .030 .250
03419>
03420> Max.eff.Inten.(mm/hr)= 178.56 67.61
03421> over (min) 5.00 15.00
03422> Storage Coeff.(min)= 4.62 (ii) 15.92 (ii)
03423> Unit Hyd. Tpeak (min)= 5.00 15.00
03424> Unit Hyd. peak (cms)= .24 .07
03425>
03426> PEAK FLOW (cms)= .37 .00 *TOTALS*
03427> TIME TO PEAK (hrs)= 1.00 1.21 1.000
03428> RUNOFF VOLUME (mm)= 70.09 35.46 69.056
03429> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03430> RUNOFF COEFFICIENT = .98 .49 .964
03431>
03432> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03433> CN* = 81.0 Ia = Dep. Storage (Above)
03434> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03435> THAN THE STORAGE COEFFICIENT.
03436> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03437>
03438>
03439> 001:0010-----
03440> *
03441> * SUB-AREA No.5
03442>
03443> | CALIB STANDHYD | Area (ha)= 2.66
03444> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
03445>
03446> IMPERVIOUS PERVIOUS (i)
03447> Surface Area (ha)= 2.58 .08
03448> Dep. Storage (mm)= 1.57 4.67
03449> Average Slope (%)= .61 1.50
03450> Length (m)= 207.25 20.00
03451> Mannings n = .030 .250
03452>
03453> Max.eff.Inten.(mm/hr)= 178.56 74.05
03454> over (min) 5.00 12.50
03455> Storage Coeff.(min)= 6.01 (ii) 11.73 (ii)
03456> Unit Hyd. Tpeak (min)= 5.00 12.50
03457> Unit Hyd. peak (cms)= .20 .09
03458>
03459> PEAK FLOW (cms)= 1.03 .01 *TOTALS*
03460> TIME TO PEAK (hrs)= 1.00 1.17 1.000
03461> RUNOFF VOLUME (mm)= 70.09 35.46 69.056
03462> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03463> RUNOFF COEFFICIENT = .98 .49 .964
03464>
03465> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03466> CN* = 81.0 Ia = Dep. Storage (Above)
03467> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03468> THAN THE STORAGE COEFFICIENT.
03469> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03470>
03471>
03472> 001:0011-----
03473>
03474> | ADD HYD (080 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03475> (ha) (cms) (hrs) (mm) (cms)
03476> ID1 06:060 5.89 .374 1.00 69.06 .000
03477> +ID2 07:070 2.66 1.034 1.00 69.06 .000
03478>
03479> =====
03480> SUM 08:080 3.55 1.408 1.00 69.06 .000
03481>
03482> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03483>
03484> 001:0012-----
03485> *
03486> * SUB-AREA No.6
03487>
03488> | CALIB STANDHYD | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03489> (ha) (cms) (hrs) (mm) (cms)
03490> ID1 05:050 5.01 1.729 1.04 66.66 .000
03491> +ID2 08:080 3.55 1.408 1.00 69.06 .000
03492>
03493> =====
03494> SUM 09:090 8.56 3.067 1.04 67.66 .000
03495>
03496> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03497>
03498> 001:0013-----
03499> *
03500> * ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03501> | IN:09:(090 ) |
03502> | OUT<10:(POND) |
03503> ===== OUTFLOW STORAGE TABLE =====
03504> OUTFLOW STORAGE | OUTFLOW STORAGE
03505> (cms) (ha.m.) | (cms) (ha.m.)
03506> .000 .0000E+00 | .593 .6251E+00
03507> .008 .6560E-01 | .654 .6631E+00
03508> .017 .1311E+00 | .797 .7391E+00
03509> .093 .2831E+00 | .950 .8274E+00
03510> .233 .3971E+00 | 1.304 .9157E+00
03511> .337 .4731E+00 | 1.880 .1004E+01
03512> .465 .5491E+00 | 2.577 .1092E+01
03513> .531 .5871E+00 | .000 .0000E+00

```

03511> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03512> (ha) (cms) (hrs) (mm)
03513> INFLOW >09: (090) 8.56 3.067 1.042 67.655
03514> OUTFLOW <10: (POND) 8.56 .283 1.861 67.653
03515>
03516>
03517> PEAK FLOW REDUCTION [Qout/Qin] (%) = 9.214
03518> TIME SHIFT OF PEAK FLOW (min) = 49.17
03519> MAXIMUM STORAGE USED (ha.m.) = 4333E+00
03520>
03521>
03522> 001:0014
03523> *****
03524> * Remaining Hawthorne Industrial Park *
03525> *****
03526> *
03527> * SUB-AREA No.1
03528>
03529> | CALIB STANDHYD | Area (ha)= 19.90
03530> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
03531>
03532> IMPERVIOUS PERVIOUS (i)
03533> Surface Area (ha)= 14.13 5.77
03534> Dep. Storage (mm)= 1.57 4.67
03535> Average Slope (%)= .60 1.50
03536> Length (m)= 580.00 100.00
03537> Mannings n = .030 .250
03538>
03539> Max. eff. Inten. (mm/hr)= 153.66 117.89
03540> over (min) 12.50 25.00
03541> Storage Coeff. (min)= 11.89 (ii) 24.37 (ii)
03542> Unit Hyd. Tpeak (min)= 12.50 25.00
03543> Unit Hyd. peak (cms)= .09 .05
03544>
03545> PEAK FLOW (cms)= 2.77 1.13 3.419 (iii)
03546> TIME TO PEAK (hrs)= 1.13 1.38 1.167
03547> RUNOFF VOLUME (mm)= 70.09 45.94 58.015
03548> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03549> RUNOFF COEFFICIENT = .98 .64 .810
03550>
03551> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03552> CN* = 81.0 Ia = Dep. Storage (Above)
03553> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03554> THAN THE STORAGE COEFFICIENT.
03555> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03556>
03557>
03558> 001:0015
03559> *****
03560> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03561> (ha) (cms) (hrs) (mm) (cms)
03562> ID1 10:POND 8.56 .283 1.86 67.65 .000
03563> +ID2 01:HIP01 19.90 3.419 1.17 58.02 .000
03564> *****
03565> SUM 02:HIP02 28.46 3.554 1.17 60.91 .000
03566>
03567> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03568>
03569>
03570> 001:0016
03571> *
03572> * SUB-AREA No.2
03573>
03574> | CALIB STANDHYD | Area (ha)= 17.00
03575> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
03576>
03577> IMPERVIOUS PERVIOUS (i)
03578> Surface Area (ha)= 12.07 4.93
03579> Dep. Storage (mm)= 1.57 4.67
03580> Average Slope (%)= .65 1.50
03581> Length (m)= 450.00 100.00
03582> Mannings n = .030 .250
03583>
03584> Max. eff. Inten. (mm/hr)= 178.56 126.60
03585> over (min) 10.00 22.50
03586> Storage Coeff. (min)= 9.39 (ii) 21.52 (ii)
03587> Unit Hyd. Tpeak (min)= 10.00 22.50
03588> Unit Hyd. peak (cms)= .12 .05
03589>
03590> PEAK FLOW (cms)= 2.68 1.05 3.203 (iii)
03591> TIME TO PEAK (hrs)= 1.08 1.33 1.125
03592> RUNOFF VOLUME (mm)= 70.09 45.94 58.015
03593> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03594> RUNOFF COEFFICIENT = .98 .64 .810
03595>
03596> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03597> CN* = 81.0 Ia = Dep. Storage (Above)
03598> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03599> THAN THE STORAGE COEFFICIENT.
03600> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03601>
03602>
03603> 001:0017
03604> *
03605> * SUB-AREA No.3
03606>
03607> | CALIB STANDHYD | Area (ha)= 18.10
03608> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
03609>
03610> IMPERVIOUS PERVIOUS (i)
03611> Surface Area (ha)= 12.85 5.25
03612> Dep. Storage (mm)= 1.57 4.67
03613> Average Slope (%)= .50 1.50
03614> Length (m)= 600.00 100.00
03615> Mannings n = .030 .250
03616>
03617> Max. eff. Inten. (mm/hr)= 153.66 117.89
03618> over (min) 12.50 25.00
03619> Storage Coeff. (min)= 12.92 (ii) 25.30 (ii)
03620> Unit Hyd. Tpeak (min)= 12.50 25.00
03621> Unit Hyd. peak (cms)= .09 .04
03622>
03623> PEAK FLOW (cms)= 2.43 1.01 3.031 (iii)
03624> TIME TO PEAK (hrs)= 1.13 1.38 1.167
03625> RUNOFF VOLUME (mm)= 70.09 45.94 58.015
03626> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
03627> RUNOFF COEFFICIENT = .98 .64 .810
03628>
03629> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03630> CN* = 81.0 Ia = Dep. Storage (Above)
03631> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03632> THAN THE STORAGE COEFFICIENT.
03633> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03634>
03635>
03636> 001:0018
03637> *
03638> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03639> (ha) (cms) (hrs) (mm) (cms)
03640> ID1 03:HIP03 17.00 3.203 1.13 58.02 .000
03641> +ID2 04:HIP04 18.10 3.031 1.17 58.02 .000
03642> *****
03643> SUM 05:HIP05 35.10 6.178 1.13 58.02 .000
03644>
03645> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

03646>
03647>
03648> 001:0019
03649> *
03650> *SUB-AREA No.4
03651>
03652> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
03653> | 06:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
03654> U.H. Tp(hrs)= 1.70
03655>
03656> Unit Hyd Qpeak (cms)= .899
03657>
03658> PEAK FLOW (cms)= .649 (i)
03659> TIME TO PEAK (hrs)= 1.125
03660> RUNOFF VOLUME (mm)= 40.139
03661> TOTAL RAINFALL (mm)= 71.665
03662> RUNOFF COEFFICIENT = .560
03663>
03664> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03665>
03666>
03667> 001:0020
03668> *
03669> | ADD HYD (HIP06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03670> (ha) (cms) (hrs) (mm) (cms)
03671> ID1 02:HIP02 28.46 3.554 1.17 60.91 .000
03672> +ID2 05:HIP05 35.10 6.178 1.13 58.02 .000
03673> +ID3 06:Pond-B 4.00 .649 1.13 40.14 .000
03674> *****
03675> SUM 07:HIP06 67.56 10.299 1.13 58.18 .000
03676>
03677> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03678>
03679>
03680> 001:0021
03681> *
03682> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03683> | IN>07: (HIP06) |
03684> | OUT<08: (HIP-PO) |
03685>
03686> *****
03687> OUTFLOW STORAGE TABLE
03688> (cms) (ha.m.) (cms) (ha.m.)
03689> .000 .000E+00 | .724 .2210E+01
03690> .048 .5740E+01 | .937 .2501E+01
03691> .054 .2434E+00 | 1.262 .2798E+01
03692> .059 .5934E+00 | 1.404 .3101E+01
03693> .062 .8400E+00 | 1.532 .3410E+01
03694> .064 .1102E+01 | 1.650 .3724E+01
03695> .147 .1370E+01 | 2.409 .4044E+01
03696> .280 .1644E+01 | 3.689 .4370E+01
03697> .472 .1924E+01 | .000 .0000E+00
03698>
03699> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03700> (ha) (cms) (hrs) (mm) (cms)
03701> INFLOW >07: (HIP06) 67.56 10.299 1.125 58.176
03702> OUTFLOW<08: (HIP-PO) 67.56 1.246 2.958 58.176
03703>
03704> PEAK FLOW REDUCTION [Qout/Qin] (%) = 12.102
03705> TIME SHIFT OF PEAK FLOW (min) = 110.00
03706> MAXIMUM STORAGE USED (ha.m.) = 2784E+01
03707>
03708> 001:0022
03709> *
03710> *SUB-AREA No. 5
03711>
03712> | DESIGN NASHYD | Area (ha)= 6.80 Curve Number (CN)=76.00
03713> | 09:A2 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
03714> U.H. Tp(hrs)= .370
03715>
03716> Unit Hyd Qpeak (cms)= .702
03717>
03718> PEAK FLOW (cms)= .497 (i)
03719> TIME TO PEAK (hrs)= 1.417
03720> RUNOFF VOLUME (mm)= 30.490
03721> TOTAL RAINFALL (mm)= 71.665
03722> RUNOFF COEFFICIENT = .425
03723>
03724> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03725>
03726>
03727> 001:0023
03728> *
03729> *SUB-AREA No. 6
03730>
03731>
03732> | DESIGN NASHYD | Area (ha)= 5.30 Curve Number (CN)=76.00
03733> | 10:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
03734> U.H. Tp(hrs)= .804
03735>
03736> Unit Hyd Qpeak (cms)= .252
03737>
03738> PEAK FLOW (cms)= .223 (i)
03739> TIME TO PEAK (hrs)= 1.958
03740> RUNOFF VOLUME (mm)= 30.490
03741> TOTAL RAINFALL (mm)= 71.665
03742> RUNOFF COEFFICIENT = .425
03743>
03744> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03745>
03746>
03747> 001:0024
03748> *
03749> | ADD HYD (Interi) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03750> (ha) (cms) (hrs) (mm) (cms)
03751> ID1 08:HIP-PO 67.56 1.246 2.96 58.18 .000
03752> +ID2 09:A2 6.80 .497 1.42 30.49 .000
03753> +ID3 10:A3 5.30 .223 1.96 30.49 .000
03754> *****
03755> SUM 01:Interi 79.66 1.531 2.39 53.97 .000
03756>
03757> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03758>
03759>
03760> 001:0025
03761> FINISH
03762> *****
03763> *****
03764> WARNINGS / ERRORS / NOTES
03765> *****
03766> Simulation ended on 2009-05-15 at 08:57:05
03767>
03768>
03769>

A P P E N D I X ' H '

**SWMHYMO INPUT AND OUTPUT FILES
(Post-Development Controlled Phase 2 Conditions)**

```

00001> 2 Metric units
00002> *#*****
00003> *# Project Name : Hawthorne Industrial Park Project Number: [20983] *
00004> *# Date : January, 2009
00005> *# Revised : WA
00006> *# Developed by : Mark Buchanan, E.I.T.
00007> *# Reviewed by : Guy Forget, P.Eng.
00008> *# Company : J.L. Richards & Associates Limited
00009> *# License # : 4418403
00010> *#*****
00011> *
00012> *
00013> *#*****
00014> *# FILENAME: V:\20983.DU\ENG\SWMHYMO\20983PST.DAT *
00015> *# FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
00016> *# OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE *
00017> *#*****
00018> *
00019> *
00020> * SSMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE
00021> * PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00022> *#*****
00023> *
00024> *#*****
00025> *# HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *
00026> *# FOR DESIGN STORMS OF 1.2, 5, 10, 25, 50, AND 100 YR *
00027> *#*****
00028> *
00029> *#*****
00030> *# POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00031> *#*****
00032> *
00033> *#*****
00034> *# CALCULATION OF 4 HR 25 MM STORM EVENT *
00035> *#*****
00036> *
00037> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00038> *# [ ] <- storm filename, one per line for NSTORM time
00039> READ STORM STORM_FILENAME=[4HR25-15.STM]
00040> *#-----
00041> *#
00042> *#
00043> *#
00044> *#
00045> *#
00046> *# ORGAWORLD FILE *
00047> *#
00048> *#
00049> *# SUB-AREA No.1
00050> *#
00051> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00052> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00053> SCS curve number CN=[81],
00054> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00055> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (mi)
00056> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00057> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00058> RAINFALL=[ , , , ] (mm/hr), END=-1
00059> *#-----
00060> *#
00061> *# SUB-AREA No.2
00062> *#
00063> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00064> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00065> SCS curve number CN=[81],
00066> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00067> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (mi),
00068> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00069> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00070> RAINFALL=[ , , , ] (mm/hr), END=-1
00071> *#-----
00072> *#
00073> *# SUB-AREA No.3
00074> *#
00075> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00076> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00077> SCS curve number CN=[81],
00078> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00079> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (mi),
00080> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.51] (%),
00081> LGI=[224.53] (m), MNI=[0.03], SCI=[0.0]
00082> RAINFALL=[ , , , ] (mm/hr), END=-1
00083> *#-----
00084> ADD HYD IDsum=[4], NHYD="040", IDs to add=[1+2]
00085> *#-----
00086> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00087> *#-----
00088> *#
00089> *# SUB-AREA No.4
00090> *#
00091> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00092> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00093> SCS curve number CN=[81],
00094> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
00095> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (mi)
00096> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.93] (%),
00097> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0]
00098> RAINFALL=[ , , , ] (mm/hr), END=-1
00099> *#-----
00100> *#
00101> *# SUB-AREA No.5
00102> *#
00103> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00104> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00105> SCS curve number CN=[81],
00106> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00107> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00108> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00109> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0]
00110> RAINFALL=[ , , , ] (mm/hr), END=-1
00111> *#-----
00112> ADD HYD IDsum=[8], NHYD="080", IDs to add=[6+7]
00113> *#-----
00114> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00115> *#-----
00116> *#
00117> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00118> RDT=[1.0] (min),
00119> *#
00120> TABLE of ( OUTFLOW-STORAGE ) values
00121> (cms) - (ha-m)
00122> [ 0.008, 0.0600 ]
00123> [ 0.017, 0.1311 ]
00124> [ 0.093, 0.2831 ]
00125> [ 0.233, 0.3971 ]
00126> [ 0.337, 0.4731 ]
00127> [ 0.485, 0.5491 ]
00128> [ 0.531, 0.5871 ]
00129> [ 0.593, 0.6251 ]
00130> [ 0.654, 0.6631 ]
00131> [ 0.797, 0.7391 ]
00132> [ 0.950, 0.8274 ]
00133> [ 1.304, 0.9157 ]
00134> [ 1.880, 1.0040 ]
00135> [ 2.577, 1.0923 ]

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```

00136> [ -1, -1 ] (max twenty pts)
00137> *#-----
00138> *#
00139> *# Remaining Hawthorne Industrial Park *
00140> *#*****
00141> *#
00142> *# SUB-AREA No.1
00143> *#
00144> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00145> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00146> SCS curve number CN=[81],
00147> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00148> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00149> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00150> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00151> RAINFALL=[ , , , ] (mm/hr), END=-1
00152> *#-----
00153> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[1+1]
00154> *#-----
00155> *#
00156> *# SUB-AREA No.2
00157> *#
00158> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00159> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00160> SCS curve number CN=[81],
00161> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00162> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00163> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00164> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00165> RAINFALL=[ , , , ] (mm/hr), END=-1
00166> *#-----
00167> *#
00168> *# SUB-AREA No.3
00169> *#
00170> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
00171> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00172> SCS curve number CN=[81],
00173> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00174> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00175> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00176> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00177> RAINFALL=[ , , , ] (mm/hr), END=-1
00178> *#-----
00179> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00180> *#-----
00181> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
00182> *#-----
00183> *#
00184> *# SUB-AREA No.4
00185> *#
00186> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
00187> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00188> SCS curve number CN=[81],
00189> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00190> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
00191> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.7] (%),
00192> LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min)
00193> RAINFALL=[ , , , ] (mm/hr), END=-1
00194> *#-----
00195> *#
00196> *#
00197> *# SUB-AREA No.5
00198> *#
00199> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5] (min), AREA=[4.0] (ha),
00200> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00201> RAINFALL=[ , , , ] (mm/hr), END=-1
00202> *#-----
00203> *#
00204> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
00205> *#-----
00206> *#
00207> ROUTE RESERVOIR IDout=[ 10 ], NHYD=["HIP-POND"], IDin=[ 9 ],
00208> RDT=[1.0] (min),
00209> *#
00210> TABLE of ( OUTFLOW-STORAGE ) values
00211> (cms) - (ha-m)
00212> [ 0.0, 0.0 ]
00213> [ 0.048, 0.0574 ]
00214> [ 0.054, 0.2434 ]
00215> [ 0.059, 0.5834 ]
00216> [ 0.062, 0.8400 ]
00217> [ 0.064, 1.1024 ]
00218> [ 0.147, 1.3705 ]
00219> [ 0.280, 1.6444 ]
00220> [ 0.472, 1.9242 ]
00221> [ 0.724, 2.2097 ]
00222> [ 0.937, 2.5010 ]
00223> [ 1.262, 2.7981 ]
00224> [ 1.404, 3.1009 ]
00225> [ 1.532, 3.4096 ]
00226> [ 1.650, 3.7240 ]
00227> [ 2.409, 4.0442 ]
00228> [ 3.689, 4.3702 ]
00229> [ -1, -1 ] (max twenty pts)
00230> *#-----
00231> *#
00232> *# SUB-AREA No.6
00233> *#
00234> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5] (min), AREA=[2.7] (ha),
00235> DWF=[0] (cms), CMC=[76], TP=[0.80] hrs,
00236> RAINFALL=[ , , , ] (mm/hr), END=-1
00237> *#-----
00238> *#
00239> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
00240> *#-----
00241> *#
00242> *#
00243> *#*****
00244> *# CALCULATION OF 3HR - 1.2 YEAR STORM EVENT *
00245> *#*****
00246> *#
00247> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00248> *# [ ] <- storm filename, one per line for NSTORM time
00249> *#
00250> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00251> ICASES=[1],
00252> A=[732.951], B=[6.199], and C=[0.810],
00253> *#
00254> DEFAULT VALUES ICASEDef=[1], read and print values
00255> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
00256> *#-----
00257> *#
00258> *# ORGAWORLD FILE *
00259> *#
00260> *#
00261> *#
00262> *# SUB-AREA No.1
00263> *#
00264> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00265> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00266> SCS curve number CN=[81],
00267> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00268> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (mi)
00269> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00270> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]

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00271> RAINFALL=[ , , , ](mm/hr) , END=-1
00272> *%-----
00273> *
00274> * SUB-AREA No.2
00275> *
00276> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
00277> XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
00278> SCS curve number CN=[81],
00279> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.0](%)
00280> LGP=[20.0](m), MNP=[0.03], SCP=[0.0](min),
00281> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.50](%)
00282> LGI=[244.34](m), MNI=[0.03], SCI=[0.0]
00283> RAINFALL=[ , , , ](mm/hr) , END=-1
00284> *%-----
00285> *
00286> * SUB-AREA No.3
00287> *
00288> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
00289> XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
00290> SCS curve number CN=[81],
00291> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.0](%)
00292> LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
00293> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.51](%)
00294> LGI=[225.63](m), MNI=[0.03], SCI=[0.0]
00295> RAINFALL=[ , , , ](mm/hr) , END=-1
00296> *%-----
00297> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
00298> *%-----
00299> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
00300> *%-----
00301> *
00302> * SUB-AREA No.4
00303> *
00304> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
00305> XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
00306> SCS curve number CN=[81],
00307> Pervious surfaces: IAPER=[4.67](mm), SLPP=[0.7](%)
00308> LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
00309> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.93](%)
00310> LGI=[154.82](m), MNI=[0.03], SCI=[0.0]
00311> RAINFALL=[ , , , ](mm/hr) , END=-1
00312> *%-----
00313> *
00314> * SUB-AREA No.5
00315> *
00316> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
00317> XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
00318> SCS curve number CN=[81],
00319> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.5](%)
00320> LGP=[20.0](m), MNP=[0.25], SCP=[0.0](min)
00321> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.61](%)
00322> LGI=[207.25](m), MNI=[0.03], SCI=[0.0]
00323> RAINFALL=[ , , , ](mm/hr) , END=-1
00324> *%-----
00325> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
00326> *%-----
00327> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+8]
00328> *%-----
00329> *
00330> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00331> RDT=[1.0](min)
00332> TABLE of ( OUTFLOW-STORAGE ) values
00333> (cms) - (ha-m)
00334> [ 0.000, 0.0000]
00335> [ 0.008, 0.0565]
00336> [ 0.017, 0.1311]
00337> [ 0.093, 0.2831]
00338> [ 0.233, 0.3971]
00339> [ 0.337, 0.4731]
00340> [ 0.465, 0.5491]
00341> [ 0.531, 0.5871]
00342> [ 0.593, 0.6251]
00343> [ 0.654, 0.6631]
00344> [ 0.797, 0.7391]
00345> [ 0.950, 0.8274]
00346> [ 1.304, 0.9157]
00347> [ 1.880, 1.0040]
00348> [ 2.577, 1.0923]
00349> [ -1, -1 ] (max twenty pts)
00350> *%-----
00351> *****
00352> * Remaining Hawthorne Industrial Park *
00353> *
00354> *
00355> * SUB-AREA No.1
00356> *
00357> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5](min), AREA=[19.9](ha),
00358> XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
00359> SCS curve number CN=[81],
00360> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.5](%)
00361> LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
00362> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.6](%)
00363> LGI=[580](m), MNI=[0.03], SCI=[0.0]
00364> RAINFALL=[ , , , ](mm/hr) , END=-1
00365> *%-----
00366> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00367> *%-----
00368> *
00369> * SUB-AREA No.2
00370> *
00371> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5](min), AREA=[17](ha),
00372> XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
00373> SCS curve number CN=[81],
00374> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.5](%)
00375> LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
00376> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.65](%)
00377> LGI=[450](m), MNI=[0.03], SCI=[0.0]
00378> RAINFALL=[ , , , ](mm/hr) , END=-1
00379> *%-----
00380> *
00381> * SUB-AREA No.3
00382> *
00383> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5](min), AREA=[15.6](ha),
00384> XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
00385> SCS curve number CN=[81],
00386> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.5](%)
00387> LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
00388> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.5](%)
00389> LGI=[600](m), MNI=[0.03], SCI=[0.0]
00390> RAINFALL=[ , , , ](mm/hr) , END=-1
00391> *%-----
00392> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00393> *%-----
00394> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
00395> *%-----
00396> *
00397> * SUB-AREA No.4
00398> *
00399> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5](min), AREA=[12.2](ha),
00400> XIMP=[0.50], TIMP=[0.71], DWF=[0.0](cms), LOSS=[2],
00401> SCS curve number CN=[81],
00402> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.5](%)
00403> LGP=[100.0](m), MNP=[0.25], SCP=[0.0](min)
00404> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.7](%)
00405> LGI=[210](m), MNI=[0.03], SCI=[0.0]

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00406> RAINFALL=[ , , , ](mm/hr) , END=-1
00407> *%-----
00408> *
00409> *
00410> * SUB-AREA No.5
00411> *
00412> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0](ha),
00413> DWF=[ 0 ](cms), CN/C=[ 85 ], TP=[0.17]hrs,
00414> RAINFALL=[ , , , ](mm/hr) , END=-1
00415> *%-----
00416> *
00417> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
00418> *%-----
00419> *
00420> ROUTE RESERVOIR IDout=[ 10 ], NHYD=["HIP-POND"], IDin=[ 9 ],
00421> RDT=[1.0](min),
00422> TABLE of ( OUTFLOW-STORAGE ) values
00423> (cms) - (ha-m)
00424> [ 0.0, 0.0 ]
00425> [ 0.048, 0.0574 ]
00426> [ 0.054, 0.2434 ]
00427> [ 0.059, 0.5834 ]
00428> [ 0.062, 0.8400 ]
00429> [ 0.064, 1.1024 ]
00430> [ 0.147, 1.3705 ]
00431> [ 0.280, 1.6444 ]
00432> [ 0.472, 1.9242 ]
00433> [ 0.724, 2.2097 ]
00434> [ 0.937, 2.5010 ]
00435> [ 1.262, 2.7981 ]
00436> [ 1.404, 3.1009 ]
00437> [ 1.532, 3.4096 ]
00438> [ 1.650, 3.7240 ]
00439> [ 2.409, 4.0442 ]
00440> [ 3.689, 4.3702 ]
00441> [ -1, -1 ] (max twenty pts)
00442> *%-----
00443> *
00444> *
00445> * SUB-AREA No. 6
00446> *
00447> *
00448> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7](ha),
00449> DWF=[0](cms), CN/C=[76], TP=[0.80]hrs,
00450> RAINFALL=[ , , , ](mm/hr) , END=-1
00451> *%-----
00452> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
00453> *%-----
00454> *
00455> *****
00456> * CALCULATION OF 3HR - 1.5 YEAR STORM EVENT *
00457> *****
00458> *
00459> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00460> [ ] <- storm filename, one per line for NSTORM time
00461> *%-----
00462> CHICAGO STORM IUNITS=[2], TD=[3.0](hrs), TPRAT=[0.333], CSDT=[10.0](min)
00463> ICASEC=[1],
00464> A=[998.071], B=[6.053], and C=[0.814],
00465> *%-----
00466> DEFAULT VALUES ICSEDef=[1], read and print values
00467> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWHYM\ORGA.VAL]
00468> *%-----
00469> *
00470> *****
00471> * ORGANORLD FILE *
00472> *****
00473> *
00474> * SUB-AREA No.1
00475> *
00476> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5](min), AREA=[ 2.07 ](ha),
00477> XIMP=[0.84], TIMP=[0.84], DWF=[0.0](cms), LOSS=[2],
00478> SCS curve number CN=[81],
00479> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.0](%)
00480> LGP=[20](m), MNP=[0.25], SCP=[0.0](min)
00481> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.52](%)
00482> LGI=[204.72](m), MNI=[0.03], SCI=[0.0]
00483> RAINFALL=[ , , , ](mm/hr) , END=-1
00484> *%-----
00485> *
00486> * SUB-AREA No.2
00487> *
00488> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5](min), AREA=[ 1.54 ](ha),
00489> XIMP=[0.92], TIMP=[0.92], DWF=[0.0](cms), LOSS=[2],
00490> SCS curve number CN=[81],
00491> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.0](%)
00492> LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
00493> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.50](%)
00494> LGI=[244.34](m), MNI=[0.03], SCI=[0.0]
00495> RAINFALL=[ , , , ](mm/hr) , END=-1
00496> *%-----
00497> *
00498> * SUB-AREA No.3
00499> *
00500> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5](min), AREA=[1.4](ha),
00501> XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
00502> SCS curve number CN=[81],
00503> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.0](%)
00504> LGP=[5](m), MNP=[0.03], SCP=[0.0](min),
00505> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.51](%)
00506> LGI=[225.63](m), MNI=[0.03], SCI=[0.0]
00507> RAINFALL=[ , , , ](mm/hr) , END=-1
00508> *%-----
00509> ADD HYD IDsum=[4], NHYD=[ "040" ], IDs to add=[1+2]
00510> *%-----
00511> ADD HYD IDsum=[5], NHYD=[ "050" ], IDs to add=[3+4]
00512> *%-----
00513> *
00514> * SUB-AREA No.4
00515> *
00516> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5](min), AREA=[0.89](ha),
00517> XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
00518> SCS curve number CN=[81],
00519> Pervious surfaces: IAPER=[4.67](mm), SLPP=[0.7](%)
00520> LGP=[40](m), MNP=[0.25], SCP=[0.0](min)
00521> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.93](%)
00522> LGI=[154.82](m), MNI=[0.03], SCI=[0.0]
00523> RAINFALL=[ , , , ](mm/hr) , END=-1
00524> *%-----
00525> *
00526> * SUB-AREA No.5
00527> *
00528> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5](min), AREA=[2.66](ha),
00529> XIMP=[0.97], TIMP=[0.97], DWF=[0.0](cms), LOSS=[2],
00530> SCS curve number CN=[81],
00531> Pervious surfaces: IAPER=[4.67](mm), SLPP=[1.5](%)
00532> LGP=[20.0](m), MNP=[0.25], SCP=[0.0](min)
00533> Impervious surfaces: IAIMP=[1.57](mm), SLPI=[0.61](%)
00534> LGI=[207.25](m), MNI=[0.03], SCI=[0.0]
00535> RAINFALL=[ , , , ](mm/hr) , END=-1
00536> *%-----
00537> ADD HYD IDsum=[8], NHYD=[ "080" ], IDs to add=[6+7]
00538> *%-----
00539> ADD HYD IDsum=[9], NHYD=[ "090" ], IDs to add=[5+8]
00540> *%-----

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00541>
00542> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00543> RDT=[1.0] (min),
00544> TABLE of ( OUTFLOW-STORAGE ) values
00545> ( cms ) ( ha-m )
00546> [ 0.000, 0.0000 ]
00547> [ 0.008, 0.0656 ]
00548> [ 0.017, 0.1311 ]
00549> [ 0.093, 0.2831 ]
00550> [ 0.233, 0.3971 ]
00551> [ 0.337, 0.4731 ]
00552> [ 0.465, 0.5491 ]
00553> [ 0.531, 0.5871 ]
00554> [ 0.593, 0.6251 ]
00555> [ 0.654, 0.6631 ]
00556> [ 0.797, 0.7391 ]
00557> [ 0.950, 0.8274 ]
00558> [ 1.304, 0.9157 ]
00559> [ 1.880, 1.0040 ]
00560> [ 2.577, 1.0923 ]
00561> [ -1, -1 ] (max twenty pts)
00562>
00563> *****
00564> * Remaining Hawthorne Industrial Park *
00565> *****
00566> *
00567> * SUB-AREA No.1
00568>
00569> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00570> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00571> SCS curve number CN=[81],
00572> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00573> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00574> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00575> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00576> RAINFALL=[ , , , ] (mm/hr), END=-1
00577> *
00578> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00579> *
00580> *
00581> * SUB-AREA No.2
00582>
00583> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00584> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00585> SCS curve number CN=[81],
00586> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00587> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00588> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00589> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00590> RAINFALL=[ , , , ] (mm/hr), END=-1
00591> *
00592> *
00593> * SUB-AREA No.3
00594>
00595> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
00596> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00597> SCS curve number CN=[81],
00598> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00599> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00600> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00601> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00602> RAINFALL=[ , , , ] (mm/hr), END=-1
00603> *
00604> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
00605> *
00606> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
00607> *
00608> *
00609> * SUB-AREA No.4
00610>
00611> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
00612> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00613> SCS curve number CN=[81],
00614> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00615> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00616> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.7] (%),
00617> LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min)
00618> RAINFALL=[ , , , ] (mm/hr), END=-1
00619> *
00620> *
00621> *
00622> * SUB-AREA No.5
00623>
00624> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
00625> DWF=[0] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
00626> RAINFALL=[ , , , ] (mm/hr), END=-1
00627> *
00628>
00629> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
00630> *
00631>
00632> ROUTE RESERVOIR IDout=[ 10 ], NHYD=["HIP-POND"], IDin=[ 9 ],
00633> RDT=[1.0] (min),
00634> TABLE of ( OUTFLOW-STORAGE ) values
00635> ( cms ) ( ha-m )
00636> [ 0.0, 0.0 ]
00637> [ 0.048, 0.0574 ]
00638> [ 0.054, 0.2434 ]
00639> [ 0.059, 0.5834 ]
00640> [ 0.062, 0.8400 ]
00641> [ 0.064, 1.1024 ]
00642> [ 0.147, 1.3705 ]
00643> [ 0.280, 1.6444 ]
00644> [ 0.472, 1.9242 ]
00645> [ 0.724, 2.2097 ]
00646> [ 0.937, 2.5010 ]
00647> [ 1.262, 2.7981 ]
00648> [ 1.404, 3.1009 ]
00649> [ 1.532, 3.4096 ]
00650> [ 1.650, 3.7240 ]
00651> [ 2.409, 4.0442 ]
00652> [ 3.689, 4.3702 ]
00653> [ -1, -1 ] (max twenty pts)
00654>
00655> *
00656> *
00657> * SUB-AREA No. 6
00658>
00659> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5]min, AREA=[2.7] (ha),
00660> DWF=[0] (cms), CNC=[76], TP=[0.80]hrs,
00661> RAINFALL=[ , , , ] (mm/hr), END=-1
00662> *
00663>
00664> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
00665> *
00666>
00667> *****
00668> * CALCULATION OF 3HR - 1:10 YEAR STORM EVENT *
00669> *****
00670>
00671> START TZERO=[0.0], MPEOUT=[2], NSTORM=[0], NRUN=[0]
00672> * [ ] <- storm filename, one per line for NSTORM time
00673> *
00674> CHICAGO STORM IUNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00675> ICASEcs=[1],

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00676> A=[1174.184], B=[6.014], and C=[0.816],
00677> *
00678> DEFAULT VALUES ICASEdef=[1], read and print values
00679> DEFVAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL"]
00680> *
00681> *****
00682> *****
00683> * ORGWORLD FILE *
00684> *****
00685> *
00686> * SUB-AREA No.1
00687>
00688> CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00689> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00690> SCS curve number CN=[81],
00691> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00692> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (m)
00693> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00694> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
00695> RAINFALL=[ , , , ] (mm/hr), END=-1
00696> *
00697> *
00698> * SUB-AREA No.2
00699>
00700> CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00701> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00702> SCS curve number CN=[81],
00703> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00704> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min)
00705> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00706> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
00707> RAINFALL=[ , , , ] (mm/hr), END=-1
00708> *
00709> *
00710> * SUB-AREA No.3
00711>
00712> CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
00713> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00714> SCS curve number CN=[81],
00715> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00716> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min)
00717> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00718> LGI=[225.63] (m), MNI=[0.03], SCI=[0.0] (min)
00719> RAINFALL=[ , , , ] (mm/hr), END=-1
00720> *
00721> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00722> *
00723> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00724> *
00725> *
00726> * SUB-AREA No.4
00727>
00728> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
00729> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00730> SCS curve number CN=[81],
00731> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
00732> LGP=[20] (m), MNP=[0.25], SCP=[0.0] (min)
00733> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00734> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
00735> RAINFALL=[ , , , ] (mm/hr), END=-1
00736> *
00737> *
00738> * SUB-AREA No.5
00739>
00740> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
00741> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00742> SCS curve number CN=[81],
00743> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00744> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (m)
00745> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.93] (%),
00746> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
00747> RAINFALL=[ , , , ] (mm/hr), END=-1
00748> *
00749> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00750> *
00751> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00752> *
00753>
00754> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
00755> RDT=[1.0] (min),
00756> TABLE of ( OUTFLOW-STORAGE ) values
00757> ( cms ) ( ha-m )
00758> [ 0.000, 0.0000 ]
00759> [ 0.008, 0.0656 ]
00760> [ 0.017, 0.1311 ]
00761> [ 0.093, 0.2831 ]
00762> [ 0.233, 0.3971 ]
00763> [ 0.337, 0.4731 ]
00764> [ 0.465, 0.5491 ]
00765> [ 0.531, 0.5871 ]
00766> [ 0.593, 0.6251 ]
00767> [ 0.654, 0.6631 ]
00768> [ 0.797, 0.7391 ]
00769> [ 0.950, 0.8274 ]
00770> [ 1.304, 0.9157 ]
00771> [ 1.880, 1.0040 ]
00772> [ 2.577, 1.0923 ]
00773> [ -1, -1 ] (max twenty pts)
00774>
00775> *****
00776> * Remaining Hawthorne Industrial Park *
00777> *****
00778> *
00779> * SUB-AREA No.1
00780>
00781> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
00782> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00783> SCS curve number CN=[81],
00784> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00785> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00786> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00787> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
00788> RAINFALL=[ , , , ] (mm/hr), END=-1
00789> *
00790> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
00791> *
00792> *
00793> * SUB-AREA No.2
00794>
00795> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
00796> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00797> SCS curve number CN=[81],
00798> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00799> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00800> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.65] (%),
00801> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
00802> RAINFALL=[ , , , ] (mm/hr), END=-1
00803> *
00804> *
00805> * SUB-AREA No.3
00806>
00807> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
00808> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00809> SCS curve number CN=[81],
00810> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),

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00811> Impervious surfaces: LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00812> IAImp=[1.57] (mm), SLP=[0.5] (%)
00813> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
00814> RAINFALL=[ , , , ] (mm/hr), END=-1
00815> *%-----
00816> ADD HYD IDsum=[ 5 ], NHYD=["HIPO5"], IDs to add=[3+4]
00817> *%-----
00818> ADD HYD IDsum=[ 6 ], NHYD=["HIPO6"], IDs to add=[5+2]
00819> *%-----
00820> *
00821> * SUB-AREA No. 4
00822> *%-----
00823> CALIB STANDHYD ID=[ 7 ], NHYD=["HIPO7"], 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), SLEPP=[1.5] (%),
LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.5] (%)
LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
00830> *%-----
00831> *
00832> *%-----
00833> *
00834> * SUB-AREA No. 5
00835> *%-----
00836> 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
00837> *%-----
00838> *
00839> *%-----
00840> *
00841> ADD HYD IDsum=[ 9 ], NHYD=["HIPO8"], IDs to add=[6+7+8]
00842> *%-----
00843> *
00844> ROUTE RESERVOIR IDout=[ 10 ], NHYD=["HIP-POND"], IDin=[ 9 ],
RDT=[1.0] (min),
TABLE of ( OUTFLOW-STORAGE ) values
00845> ( cms ) - ( ha-m )
00846> [ 0.0 , 0.0 ]
00847> [ 0.048 , 0.0574 ]
00848> [ 0.054 , 0.2434 ]
00849> [ 0.059 , 0.5834 ]
00850> [ 0.062 , 0.8400 ]
00851> [ 0.064 , 1.1024 ]
00852> [ 0.147 , 1.3705 ]
00853> [ 0.280 , 1.6444 ]
00854> [ 0.472 , 1.9242 ]
00855> [ 0.724 , 2.2097 ]
00856> [ 0.937 , 2.5010 ]
00857> [ 1.262 , 2.7981 ]
00858> [ 1.404 , 3.1009 ]
00859> [ 1.532 , 3.4096 ]
00860> [ 1.650 , 3.7240 ]
00861> [ 2.409 , 4.0442 ]
00862> [ 3.689 , 4.3702 ]
00863> [ -1 , -1 ] (max twenty pts)
00864> *%-----
00865> *
00866> *%-----
00867> *
00868> *
00869> * SUB-AREA No. 6
00870> *%-----
00871> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5] min, AREA=[2.7] (ha),
DWF=[0] (cms), CN/C=[76], TP=[0.60] hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00872> *%-----
00873> *
00874> *%-----
00875> *
00876> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
00877> *%-----
00878> *
00879> *%-----
00880> *
00881> * CALCULATION OF 3HR - 1.25 YEAR STORM EVENT *
00882> *%-----
00883> *
00884> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00885> * [ ] <- storm filename, one per line for NSTORM time
00886> *%-----
00887> CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
00888> ICASEC=[1],
A=[1402.884], B=[6.018], and C=[0.819],
00889> *%-----
00890> *
00891> DEFAULT VALUES ICASEDef=[1], read and print values
DEFVAL_FILENAME=[V:\22975.DU\ENG\SWMHYMO\ORGA.VAL]
00892> *%-----
00893> *
00894> *%-----
00895> *
00896> * ORGWORLD FILE *
00897> *%-----
00898> *
00899> * SUB-AREA No. 1
00900> *%-----
00901> 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), SLEPP=[1.0] (%),
LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.5] (%)
LGI=[225.63] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
00909> *%-----
00910> *
00911> * SUB-AREA No. 2
00912> *%-----
00913> 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), SLEPP=[1.0] (%),
LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.5] (%)
LGI=[244.34] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
00922> *%-----
00923> * SUB-AREA No. 3
00924> *%-----
00925> 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), SLEPP=[1.0] (%),
LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.5] (%)
LGI=[225.63] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
00932> *%-----
00933> *
00934> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
00935> *%-----
00936> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
00937> *%-----
00938> *
00939> * SUB-AREA No. 4
00940> *%-----
00941> 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), SLEPP=[1.0] (%),
LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)

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00946> Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.93] (%),
LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
00950> *%-----
00951> * SUB-AREA No. 5
00952> *%-----
00953> 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), SLEPP=[1.5] (%),
LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.61] (%)
LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
00960> *%-----
00961> *
00962> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
00963> *%-----
00964> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
00965> *%-----
00966> *
00967> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
RDT=[1.0] (min),
TABLE of ( OUTFLOW-STORAGE ) values
00968> ( cms ) - ( ha-m )
00969> [ 0.000 , 0.0000 ]
00970> [ 0.008 , 0.0566 ]
00971> [ 0.017 , 0.1311 ]
00972> [ 0.093 , 0.2831 ]
00973> [ 0.233 , 0.3971 ]
00974> [ 0.337 , 0.4731 ]
00975> [ 0.465 , 0.5491 ]
00976> [ 0.531 , 0.5871 ]
00977> [ 0.593 , 0.6251 ]
00978> [ 0.654 , 0.6631 ]
00979> [ 0.797 , 0.7391 ]
00980> [ 0.950 , 0.8274 ]
00981> [ 1.304 , 0.9157 ]
00982> [ 1.880 , 1.0040 ]
00983> [ 2.577 , 1.0923 ]
00984> [ -1 , -1 ] (max twenty pts)
00985> *%-----
00986> *
00987> *%-----
00988> *
00989> * Remaining Hawthorne Industrial Park *
00990> *%-----
00991> *
00992> * SUB-AREA No. 1
00993> *%-----
00994> CALIB STANDHYD ID=[ 1 ], NHYD=["HIPO1"], 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), SLEPP=[1.5] (%),
LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.6] (%)
LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
01000> *%-----
01001> *
01002> *
01003> ADD HYD IDsum=[ 2 ], NHYD=["HIPO2"], IDs to add=[10+1]
01004> *%-----
01005> *
01006> * SUB-AREA No. 2
01007> *%-----
01008> CALIB STANDHYD ID=[ 3 ], NHYD=["HIPO3"], 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), SLEPP=[1.5] (%),
LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.5] (%)
LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
01015> *%-----
01016> *
01017> *
01018> * SUB-AREA No. 3
01019> *%-----
01020> CALIB STANDHYD ID=[ 4 ], NHYD=["HIPO4"], 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), SLEPP=[1.5] (%),
LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.5] (%)
LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
01028> *%-----
01029> ADD HYD IDsum=[ 5 ], NHYD=["HIPO5"], IDs to add=[3+4]
01030> *%-----
01031> ADD HYD IDsum=[ 6 ], NHYD=["HIPO6"], IDs to add=[5+2]
01032> *%-----
01033> *
01034> * SUB-AREA No. 4
01035> *%-----
01036> CALIB STANDHYD ID=[ 7 ], NHYD=["HIPO7"], 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), SLEPP=[1.5] (%),
LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (min)
Impervious surfaces: IAImp=[1.57] (mm), SLP=[0.7] (%)
LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min)
RAINFALL=[ , , , ] (mm/hr), END=-1
01044> *%-----
01045> *
01046> *
01047> * SUB-AREA No. 5
01048> *%-----
01049> 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
01050> *%-----
01051> *
01052> *%-----
01053> *
01054> ADD HYD IDsum=[ 9 ], NHYD=["HIPO8"], IDs to add=[6+7+8]
01055> *%-----
01056> *
01057> ROUTE RESERVOIR IDout=[ 10 ], NHYD=["HIP-POND"], IDin=[ 9 ],
RDT=[1.0] (min),
TABLE of ( OUTFLOW-STORAGE ) values
01058> ( cms ) - ( ha-m )
01059> [ 0.0 , 0.0 ]
01060> [ 0.048 , 0.0574 ]
01061> [ 0.054 , 0.2434 ]
01062> [ 0.059 , 0.5834 ]
01063> [ 0.062 , 0.8400 ]
01064> [ 0.064 , 1.1024 ]
01065> [ 0.147 , 1.3705 ]
01066> [ 0.280 , 1.6444 ]
01067> [ 0.472 , 1.9242 ]
01068> [ 0.724 , 2.2097 ]
01069> [ 0.937 , 2.5010 ]
01070> [ 1.262 , 2.7981 ]
01071> [ 1.404 , 3.1009 ]
01072> [ 1.532 , 3.4096 ]
01073> [ 1.650 , 3.7240 ]
01074> [ 2.409 , 4.0442 ]
01075> [ 3.689 , 4.3702 ]
01076> [ -1 , -1 ] (max twenty pts)
01077> *%-----
01078> *
01079> *%-----
01080> *

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01081 *
01082 *SUB-AREA No. 6
01083
01084 DESIGN NASHYD ID=[ 1 ], NHYD=["A3"], DT=[2.5]min, AREA=[2.7] (ha),
01085 DWF=[0] (cms), CNC=[76], TP=[0.80]hrs,
01086 RAINFALL=[ , , , ] (mm/hr), END=-1
01087 *
01088
01089 ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
01090 *
01091
01092 *****
01093 * CALCULATION OF 3HR - 1:50 YEAR STORM EVENT *
01094 *****
01095
01096 START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
01097 *
01098 [ ] <- storm filename, one per line for NSTORM time
01099
01100 CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
01101 ICASE=[1],
01102 A=[1569.580], B=[6.014], and C=[0.820],
01103
01104 DEFAULT VALUES ICASEdef=[1], read and print values
01105 DEFPAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
01106 *
01107 *****
01108 * ORGAWORLD FILE *
01109 *****
01110 *
01111 * SUB-AREA No. 1
01112
01113 CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
01114 XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
01115 SCS curve number CN=[81],
01116 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01117 LGP=[20] (m), MNP=[0.25], SCP=[0.0] (mi)
01118 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.52] (%),
01119 LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
01120 RAINFALL=[ , , , ] (mm/hr), END=-1
01121 *
01122
01123 * SUB-AREA No. 2
01124
01125 CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
01126 XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
01127 SCS curve number CN=[81],
01128 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01129 LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01130 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.50] (%),
01131 LGI=[204.34] (m), MNI=[0.03], SCI=[0.0] (min)
01132 RAINFALL=[ , , , ] (mm/hr), END=-1
01133 *
01134
01135 * SUB-AREA No. 3
01136
01137 CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
01138 XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01139 SCS curve number CN=[81],
01140 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01141 LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01142 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.51] (%),
01143 LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0] (min)
01144 RAINFALL=[ , , , ] (mm/hr), END=-1
01145 *
01146 ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
01147 *
01148 ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
01149 *
01150
01151 * SUB-AREA No. 4
01152
01153 CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
01154 XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01155 SCS curve number CN=[81],
01156 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
01157 LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
01158 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.52] (%),
01159 LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (min)
01160 RAINFALL=[ , , , ] (mm/hr), END=-1
01161 *
01162
01163 * SUB-AREA No. 5
01164
01165 CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
01166 XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01167 SCS curve number CN=[81],
01168 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01169 LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (mi)
01170 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
01171 LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (min)
01172 RAINFALL=[ , , , ] (mm/hr), END=-1
01173 *
01174 ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
01175 *
01176 ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
01177 *
01178
01179 ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
01180 RDT=[1.0] (min),
01181
01182 TABLE of ( OUTFLOW-STORAGE ) values
01183 ( cms ) - ( ha-m )
01184 [ 0.000, 0.0000 ]
01185 [ 0.008, 0.0656 ]
01186 [ 0.017, 0.1311 ]
01187 [ 0.033, 0.2623 ]
01188 [ 0.233, 0.3971 ]
01189 [ 0.337, 0.4731 ]
01190 [ 0.465, 0.5491 ]
01191 [ 0.531, 0.5871 ]
01192 [ 0.593, 0.6251 ]
01193 [ 0.654, 0.6631 ]
01194 [ 0.797, 0.7391 ]
01195 [ 0.950, 0.8274 ]
01196 [ 1.304, 0.9157 ]
01197 [ 1.880, 1.0040 ]
01198 [ 2.577, 1.0923 ]
01199 [ -1, -1 ] (max twenty pts)
01200 *****
01201 * Remaining Hawthorne Industrial Park *
01202 *****
01203 *
01204 * SUB-AREA No. 1
01205
01206 CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01207 XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01208 SCS curve number CN=[81],
01209 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01210 LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
01211 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.6] (%),
01212 LGI=[560] (m), MNI=[0.03], SCI=[0.0] (min)
01213 RAINFALL=[ , , , ] (mm/hr), END=-1
01214 *
01215 ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]

```

```

01216 *
01217 *
01218 * SUB-AREA No. 2
01219
01220 CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01221 XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01222 SCS curve number CN=[81],
01223 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01224 LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
01225 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.65] (%),
01226 LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min)
01227 RAINFALL=[ , , , ] (mm/hr), END=-1
01228 *
01229
01230 * SUB-AREA No. 3
01231
01232 CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
01233 XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01234 SCS curve number CN=[81],
01235 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01236 LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
01237 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.5] (%),
01238 LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min)
01239 RAINFALL=[ , , , ] (mm/hr), END=-1
01240 *
01241 ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01242 *
01243 ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
01244 *
01245
01246 * SUB-AREA No. 4
01247
01248 CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
01249 XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01250 SCS curve number CN=[81],
01251 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
01252 LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (mi)
01253 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.7] (%),
01254 LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min)
01255 RAINFALL=[ , , , ] (mm/hr), END=-1
01256 *
01257
01258 *
01259 * SUB-AREA No. 5
01260
01261 DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5]min, AREA=[4.0] (ha),
01262 DWF=[ 0 ] (cms), CNC=[ 85 ], TP=[0.17]hrs,
01263 RAINFALL=[ , , , ] (mm/hr), END=-1
01264 *
01265
01266 ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
01267 *
01268
01269 ROUTE RESERVOIR IDout=[ 10 ], NHYD=["HIP-POND"], IDin=[ 9 ],
01270 RDT=[1.0] (min),
01271
01272 TABLE of ( OUTFLOW-STORAGE ) values
01273 ( cms ) - ( ha-m )
01274 [ 0.0, 0.0 ]
01275 [ 0.048, 0.0574 ]
01276 [ 0.054, 0.2434 ]
01277 [ 0.059, 0.5834 ]
01278 [ 0.062, 0.8400 ]
01279 [ 0.064, 1.1024 ]
01280 [ 0.147, 1.3705 ]
01281 [ 0.280, 1.6444 ]
01282 [ 0.472, 1.9242 ]
01283 [ 0.724, 2.2097 ]
01284 [ 0.937, 2.5010 ]
01285 [ 1.262, 2.7981 ]
01286 [ 1.404, 3.1009 ]
01287 [ 1.532, 3.4096 ]
01288 [ 1.650, 3.7240 ]
01289 [ 2.409, 4.0442 ]
01290 [ 3.689, 4.3702 ]
01291 [ -1, -1 ] (max twenty pts)
01292 *
01293
01294 * SUB-AREA No. 6
01295
01296 DESIGN NASHYD ID=[ 1 ], NHYD=["A3"], DT=[2.5]min, AREA=[2.7] (ha),
01297 DWF=[0] (cms), CNC=[76], TP=[0.80]hrs,
01298 RAINFALL=[ , , , ] (mm/hr), END=-1
01299 *
01300
01301 ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
01302 *
01303
01304 *****
01305 * CALCULATION OF 3HR - 1:100 YEAR STORM EVENT *
01306 *****
01307
01308 START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
01309 *
01310 [ ] <- storm filename, one per line for NSTORM time
01311
01312 CHICAGO STORM UNITS=[2], TD=[3.0] (hrs), TPRAT=[0.333], CSDT=[10.0] (min)
01313 ICASE=[1],
01314 A=[1735.680], B=[6.014], and C=[0.820],
01315
01316 DEFAULT VALUES ICASEdef=[1], read and print values
01317 DEFPAL_FILENAME=[V:\22973.DU\ENG\SWMHYMO\ORGA.VAL]
01318 *
01319 *****
01320 * ORGAWORLD FILE *
01321 *****
01322 *
01323 * SUB-AREA No. 1
01324
01325 CALIB STANDHYD ID=[ 1 ], NHYD=["010"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
01326 XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
01327 SCS curve number CN=[81],
01328 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01329 LGP=[20] (m), MNP=[0.25], SCP=[0.0] (mi)
01330 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.52] (%),
01331 LGI=[204.72] (m), MNI=[0.03], SCI=[0.0] (min)
01332 RAINFALL=[ , , , ] (mm/hr), END=-1
01333 *
01334
01335 * SUB-AREA No. 2
01336
01337 CALIB STANDHYD ID=[ 2 ], NHYD=["020"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
01338 XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
01339 SCS curve number CN=[81],
01340 Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
01341 LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01342 Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.50] (%),
01343 LGI=[204.34] (m), MNI=[0.03], SCI=[0.0] (min)
01344 RAINFALL=[ , , , ] (mm/hr), END=-1
01345 *
01346
01347 * SUB-AREA No. 3
01348
01349 CALIB STANDHYD ID=[ 3 ], NHYD=["030"], DT=[2.5] (min), AREA=[1.4] (ha),
01350 XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],

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01351> SCS curve number CN=[81],
01352> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.0] (%),
01353> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
01354> Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.51] (%),
01355> LGI=[225.63] (m), MNI=[0.03], SCI=[0.0]
01356> RAINFALL=[ , , , ] (mm/hr), END=-1
01357> *%-----|
01358> ADD HYD IDsum=[4], NHYD=["040"], IDs to add=[1+2]
01359> *%-----|
01360> ADD HYD IDsum=[5], NHYD=["050"], IDs to add=[3+4]
01361> *%-----|
01362> *
01363> * SUB-AREA No.4
01364>
01365> CALIB STANDHYD ID=[6], NHYD=["060"], DT=[2.5] (min), AREA=[0.89] (ha),
01366> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01367> SCS curve number CN=[81],
01368> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[0.7] (%),
01369> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
01370> Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.93] (%),
01371> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (
01372> RAINFALL=[ , , , ] (mm/hr), END=-1
01373> *%-----|
01374> *
01375> * SUB-AREA No.5
01376>
01377> CALIB STANDHYD ID=[ 7 ], NHYD=["070"], DT=[2.5] (min), AREA=[2.66] (ha),
01378> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
01379> SCS curve number CN=[81],
01380> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01381> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (mi
01382> Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.61] (%),
01383> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (
01384> RAINFALL=[ , , , ] (mm/hr), END=-1
01385> *%-----|
01386> ADD HYD IDsum=[8], NHYD=["080"], IDs to add=[6+7]
01387> *%-----|
01388> ADD HYD IDsum=[9], NHYD=["090"], IDs to add=[5+8]
01389> *%-----|
01390>
01391> ROUTE RESERVOIR IDout=[10], NHYD=["POND"], IDin=[9],
01392> RDT=[1.0] (min),
01393> TABLE of ( OUTFLOW-STORAGE ) values
01394> (cms) - (ha-m)
01395> [ 0.008, 0.0000]
01396> [ 0.017, 0.1311]
01397> [ 0.093, 0.2831]
01398> [ 0.233, 0.3971]
01399> [ 0.337, 0.4731]
01400> [ 0.465, 0.5491]
01401> [ 0.531, 0.5871]
01402> [ 0.593, 0.6251]
01403> [ 0.654, 0.6631]
01404> [ 0.797, 0.7391]
01405> [ 0.850, 0.8274]
01406> [ 1.304, 0.9157]
01407> [ 1.880, 1.0040]
01408> [ 2.577, 1.0923]
01409> [ -1, -1 ] (max twenty pts)
01410>
01411>
01412> *****
01413> * Remaining Hawthorne Industrial Park *
01414> *****
01415> *
01416> * SUB-AREA No.1
01417>
01418> CALIB STANDHYD ID=[ 1 ], NHYD=["HIP01"], DT=[2.5] (min), AREA=[19.9] (ha),
01419> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01420> SCS curve number CN=[81],
01421> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01422> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m
01423> Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.6] (%),
01424> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min
01425> RAINFALL=[ , , , ] (mm/hr), END=-1
01426> *%-----|
01427> ADD HYD IDsum=[ 2 ], NHYD=["HIP02"], IDs to add=[10+1]
01428> *%-----|
01429> *
01430> * SUB-AREA No.2
01431>
01432> CALIB STANDHYD ID=[ 3 ], NHYD=["HIP03"], DT=[2.5] (min), AREA=[17] (ha),
01433> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01434> SCS curve number CN=[81],
01435> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01436> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m
01437> Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.65] (%),
01438> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min
01439> RAINFALL=[ , , , ] (mm/hr), END=-1
01440> *%-----|
01441> *
01442> * SUB-AREA No.3
01443>
01444> CALIB STANDHYD ID=[ 4 ], NHYD=["HIP04"], DT=[2.5] (min), AREA=[15.6] (ha),
01445> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01446> SCS curve number CN=[81],
01447> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01448> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m
01449> Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.5] (%),
01450> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min
01451> RAINFALL=[ , , , ] (mm/hr), END=-1
01452> *%-----|
01453> ADD HYD IDsum=[ 5 ], NHYD=["HIP05"], IDs to add=[3+4]
01454> *%-----|
01455> ADD HYD IDsum=[ 6 ], NHYD=["HIP06"], IDs to add=[5+2]
01456> *%-----|
01457> *
01458> * SUB-AREA No.4
01459>
01460> CALIB STANDHYD ID=[ 7 ], NHYD=["HIP07"], DT=[2.5] (min), AREA=[12.2] (ha),
01461> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
01462> SCS curve number CN=[81],
01463> Pervious surfaces: IAPer=[4.67] (mm), SLPP=[1.5] (%),
01464> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m
01465> Impervious surfaces: IAImp=[1.57] (mm), SLPI=[0.7] (%),
01466> LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min
01467> RAINFALL=[ , , , ] (mm/hr), END=-1
01468>
01469> *%-----|
01470> *
01471> * SUB-AREA No.5
01472>
01473> DESIGN NASHYD ID=[ 8 ], NHYD=["Pond-Block"], DT=[2.5] min, AREA=[4.0] (ha),
01474> DWF=[ 0 ] (cms), CN/C=[ 85 ], TP=[0.17] hrs,
01475> RAINFALL=[ , , , ] (mm/hr), END=-1
01476> *%-----|
01477> *
01478> ADD HYD IDsum=[ 9 ], NHYD=["HIP08"], IDs to add=[6+7+8]
01479> *%-----|
01480>
01481> ROUTE RESERVOIR IDout=[ 10 ], NHYD=["HIP-POND"], IDin=[ 9 ],
01482> RDT=[1.0] (min),
01483> TABLE of ( OUTFLOW-STORAGE ) values
01484> (cms) - (ha-m)
01485> [ 0.0, 0.0 ]

```

```

01486> [ 0.048, 0.0574 ]
01487> [ 0.054, 0.2434 ]
01488> [ 0.059, 0.5834 ]
01489> [ 0.062, 0.8400 ]
01490> [ 0.064, 1.1024 ]
01491> [ 0.147, 1.3705 ]
01492> [ 0.280, 1.6494 ]
01493> [ 0.472, 1.9242 ]
01494> [ 0.724, 2.2097 ]
01495> [ 0.937, 2.5010 ]
01496> [ 1.262, 2.7981 ]
01497> [ 1.404, 3.1009 ]
01498> [ 1.532, 3.4096 ]
01499> [ 1.650, 3.7240 ]
01500> [ 2.409, 4.0442 ]
01501> [ 3.689, 4.3702 ]
01502> [ -1, -1 ] (max twenty pts)
01503>
01504> *%-----|
01505> *
01506> * SUB-AREA No. 6
01507>
01508> DESIGN NASHYD ID = [1], NHYD=["A3"], DT=[2.5] min, AREA=[2.7] (ha),
01509> DWF=[0] (cms), CN/C=[76], TP=[0.80] hrs,
01510> RAINFALL=[ , , , ] (mm/hr), END=-1
01511> *%-----|
01512> *
01513> ADD HYD IDsum=[2], NHYD=["Ultimate"], IDs to add=[10+1]
01514> *%-----|
01515> *
01516> *
01517> *
01518> *
01519> FINISH

```

```

00001>
00002>
00003> SSSSS W W M M H H Y Y M M O O 999 999
00004> S W W W M M M H H Y Y M M O O 9 9 9 9
00005> SSSSS W W M M M H H H H Y Y M M M O O # 9 9 9 9 Ver. 4.02
00006> S W W M M H H Y M M M O O 9999 9999 July 1999
00007> SSSSS W W M M H H Y M M O O 9 9
00008> 9 9 9 9 # 418403
00009> StormWater Management Hydrologic Model 999 999
00010>
00011> *****
00012> ***** SWMHYMO-99 Ver/4.02 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
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00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhymo@jfsa.com *****
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00024> ***** Licensed user: J. L. Richards & Associates Limited *****
00025> ***** SERIAL#:418403 *****
00026> *****
00027> *****
00028> *****
00029> *****
00030> ***** PROGRAM ARRAY DIMENSIONS *****
00031> ***** Maximum value for ID numbers : 10 *****
00032> ***** Max. number of rainfall points: 15000 *****
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00134> *****
00135> *****

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00136> over (min) 10.00 30.00
00137> Storage Coeff. (min)= 10.80 (ii) 29.27 (iii)
00138> Unit Hyd. Tpeak (min)= 10.00 30.00
00139> Unit Hyd. peak (cms)= .11 .04
00140>
00141> PEAK FLOW (cms)= .16 .00
00142> TIME TO PEAK (hrs)= 1.29 1.75
00143> RUNOFF VOLUME (mm)= 23.43 5.17
00144> TOTAL RAINFALL (mm)= 25.00 25.00
00145> RUNOFF COEFFICIENT = .94 .21
00146>
00147> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00148> CN* = 81.0 Ia = Dep. Storage (Above)
00149> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00150> THAN THE STORAGE COEFFICIENT.
00151> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00152>
00153>
00154> 001:0005
00155> *
00156> * SUB-AREA No.2
00157>
00158> | CALIB STANDHYD | Area (ha)= 1.54
00159> | 02:02 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00160>
00161>
00162> IMPERVIOUS PERVIOUS (i)
00163> Surface Area (ha)= 1.42 .12
00164> Dep. Storage (mm)= 1.57 4.67
00165> Average Slope (%)= .50 1.00
00166> Length (m)= 244.34 5.00
00167> Mannings n = .030 .030
00168>
00168> Max. eff. Inten. (mm/hr)= 45.63 7.24
00169> over (min) 12.50 15.00
00170> Storage Coeff. (min)= 12.15 (ii) 14.15 (iii)
00171> Unit Hyd. Tpeak (min)= 12.50 15.00
00172> Unit Hyd. peak (cms)= .09 .08
00173>
00174> PEAK FLOW (cms)= .12 .00
00175> TIME TO PEAK (hrs)= 1.33 1.46
00176> RUNOFF VOLUME (mm)= 23.43 5.17
00177> TOTAL RAINFALL (mm)= 25.00 25.00
00178> RUNOFF COEFFICIENT = .94 .21
00179>
00180> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00181> CN* = 81.0 Ia = Dep. Storage (Above)
00182> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00183> THAN THE STORAGE COEFFICIENT.
00184> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00185>
00186>
00187>
00188>
00189> *
00190> * SUB-AREA No.3
00191>
00192> | CALIB STANDHYD | Area (ha)= 1.40
00193> | 03:03 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00194>
00195>
00196> IMPERVIOUS PERVIOUS (i)
00197> Surface Area (ha)= 1.36 .04
00198> Dep. Storage (mm)= 1.57 4.67
00199> Average Slope (%)= .51 1.00
00200> Length (m)= 225.63 5.00
00201> Mannings n = .030 .030
00202>
00202> Max. eff. Inten. (mm/hr)= 45.63 7.97
00203> over (min) 12.50 15.00
00204> Storage Coeff. (min)= 11.52 (ii) 13.44 (iii)
00205> Unit Hyd. Tpeak (min)= 12.50 12.50
00206> Unit Hyd. peak (cms)= .10 .09
00207>
00208> PEAK FLOW (cms)= .12 .00
00209> TIME TO PEAK (hrs)= 1.33 1.42
00210> RUNOFF VOLUME (mm)= 23.43 5.17
00211> TOTAL RAINFALL (mm)= 25.00 25.00
00212> RUNOFF COEFFICIENT = .94 .21
00213>
00213> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00214> CN* = 81.0 Ia = Dep. Storage (Above)
00215> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00216> THAN THE STORAGE COEFFICIENT.
00217> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00218>
00219>
00220>
00221>
00222> 001:0007
00223>
00223> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00224> (ha) (cms) (hrs) (mm) (cms)
00225> ID1 01:010 2.07 .158 1.29 20.51 .000
00226> +ID2 02:020 1.54 .121 1.33 21.97 .000
00227>
00228> SUM 04:040 3.61 .278 1.33 21.13 .000
00229>
00230> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00231>
00232>
00233>
00234>
00235>
00236>
00237>
00238>
00239>
00240>
00241>
00242>
00243>
00244> 001:0009
00245> *
00246> * SUB-AREA No.4
00247>
00248> | CALIB STANDHYD | Area (ha)= .89
00249> | 06:06 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00250>
00251>
00252> IMPERVIOUS PERVIOUS (i)
00253> Surface Area (ha)= .86 .03
00254> Dep. Storage (mm)= 1.57 4.67
00255> Average Slope (%)= .93 .70
00256> Length (m)= 164.82 40.00
00257> Mannings n = .030 .250
00258>
00258> Max. eff. Inten. (mm/hr)= 45.63 4.42
00259> over (min) 7.50 42.50
00260> Storage Coeff. (min)= 7.97 (ii) 41.62 (iii)
00261> Unit Hyd. Tpeak (min)= 7.50 42.50
00262> Unit Hyd. peak (cms)= .14 .03
00263>
00264> PEAK FLOW (cms)= .09 .00
00265> TIME TO PEAK (hrs)= 1.25 2.00
00266> RUNOFF VOLUME (mm)= 23.43 5.17
00267> TOTAL RAINFALL (mm)= 25.00 25.00
00268> RUNOFF COEFFICIENT = .94 .21
00269>
00270> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

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00271> CN* = 81.0 Ia = Dep. Storage (Above)
00272> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00273> THAN THE STORAGE COEFFICIENT.
00274> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00275>
00276>
00277> 001:0010-----
00278> * SUB-AREA No.5
00280>
00281> CALIB STANDHYD | Area (ha)= 2.66
00282> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00283>
00284> IMPERVIOUS PERVIOUS (i)
00285> Surface Area (ha)= 2.58 .08
00286> Dep. Storage (mm)= 1.57 4.67
00287> Average Slope (%)= .61 1.50
00288> Length (m)= 207.25 20.00
00289> Mannings n = .030 .250
00290> Max.eff.Inten.(mm/hr)= 45.63 5.66
00291> over (min) 10.00 27.50
00292> Storage Coeff. (min)= 10.37 (ii) 26.38 (ii)
00293> Unit Hyd. Tpeak (min)= 10.00 27.50
00294> Unit Hyd. peak (cms)= .11 .04
00295>
00296> *TOTALS*
00297> PEAK FLOW (cms)= .24 .00 .238 (iii)
00298> TIME TO PEAK (hrs)= 1.29 1.67 1.292
00299> RUNOFF VOLUME (mm)= 23.43 5.17 22.882
00300> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00301> RUNOFF COEFFICIENT = .94 .35 .915
00302>
00303> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00304> CN* = 81.0 Ia = Dep. Storage (Above)
00305> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00306> THAN THE STORAGE COEFFICIENT.
00307> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00308>
00309>
00310> 001:0011-----
00311> [ADD HYD (090)] | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00312> (ha) (cms) (hrs) (mm) (cms)
00313> ID1 06:060 .89 .089 1.25 22.88 .000
00314> +ID2 07:070 2.66 .238 1.29 22.88 .000
00315>
00316> SUM 08:080 3.55 .327 1.29 22.88 .000
00317>
00318> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00319>
00320>
00321>
00322> 001:0012-----
00323> [ADD HYD (090)] | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00324> (ha) (cms) (hrs) (mm) (cms)
00325> ID1 05:050 5.01 .396 1.33 21.62 .000
00326> +ID2 08:080 3.55 .327 1.29 22.88 .000
00327>
00328> SUM 09:090 8.56 .716 1.29 22.14 .000
00329>
00330> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00331>
00332>
00333>
00334> 001:0013-----
00335> [ROUTE RESERVOIR] Requested routing time step = 1.0 min.
00336> [IN:09:(090)]
00337> [OUT:10:(POND)]
00338> ===== OUTFLOW STORAGE TABLE =====
00339> OUTFLOW STORAGE OUTFLOW STORAGE
00340> (cms) (ha.m.) (cms) (ha.m.)
00341> .000 .000E+00 | .593 .625E+00
00342> .008 .656E+00 | .654 .663E+00
00343> .017 .131E+00 | .797 .739E+00
00344> .093 .283E+00 | .950 .827E+00
00345> .233 .397E+00 | 1.304 .915E+00
00346> .337 .473E+00 | 1.880 .100E+01
00347> .465 .549E+00 | 2.577 .109E+01
00348> .531 .587E+00 | .000 .000E+00
00349>
00350> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00351> (ha) (cms) (hrs) (mm)
00352> INFLOW<09:(090) 8.56 .716 1.292 22.143
00353> OUTFLOW<10:(POND) 8.56 .032 3.875 22.141
00354>
00355> PEAK FLOW REDUCTION [Qout/Qin] (%) = 4.470
00356> TIME SHIFT OF PEAK FLOW (min) = 155.00
00357> MAXIMUM STORAGE USED (ha.m.) = 1611E+00
00358>
00359>
00360> 001:0014-----
00361> *****
00362> * Remaining Hawthorne Industrial Park *
00363> *****
00364> * SUB-AREA No.1
00365>
00366> CALIB STANDHYD | Area (ha)= 19.90
00367> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00368>
00369> IMPERVIOUS PERVIOUS (i)
00370> Surface Area (ha)= 14.13 5.77
00371> Dep. Storage (mm)= 1.57 4.67
00372> Average Slope (%)= .60 1.50
00373> Length (m)= 580.00 100.00
00374> Mannings n = .030 .250
00375> Max.eff.Inten.(mm/hr)= 34.39 11.90
00376> over (min) 22.50 52.50
00377> Storage Coeff. (min)= 21.64 (ii) 52.88 (ii)
00378> Unit Hyd. Tpeak (min)= 22.50 52.50
00379> Unit Hyd. peak (cms)= .05 .02
00380>
00381> *TOTALS*
00382> PEAK FLOW (cms)= .60 .11 .642 (iii)
00383> TIME TO PEAK (hrs)= 1.50 2.13 1.542
00384> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00385> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00386> RUNOFF COEFFICIENT = .94 .35 .643
00387>
00388> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00389> CN* = 81.0 Ia = Dep. Storage (Above)
00390> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00391> THAN THE STORAGE COEFFICIENT.
00392> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00393>
00394>
00395>
00396> 001:0015-----
00397> [ADD HYD (HIP02)] | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00398> (ha) (cms) (hrs) (mm) (cms)
00399> ID1 10:POND 8.56 .032 3.88 22.14 .000
00400> +ID2 01:HIP01 19.90 .642 1.54 16.08 .000
00401>
00402> SUM 02:HIP02 28.46 .655 1.54 17.91 .000
00403>
00404> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00405>

00406>
00407>
00408> 001:0016-----
00409> * SUB-AREA No.2
00410>
00411> CALIB STANDHYD | Area (ha)= 17.00
00412> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00413>
00414> IMPERVIOUS PERVIOUS (i)
00415> Surface Area (ha)= 12.07 4.93
00416> Dep. Storage (mm)= 1.57 4.67
00417> Average Slope (%)= .65 1.50
00418> Length (m)= 450.00 100.00
00419> Mannings n = .030 .250
00420> Max.eff.Inten.(mm/hr)= 40.81 12.73
00421> over (min) 17.50 47.50
00422> Storage Coeff. (min)= 16.94 (ii) 47.35 (ii)
00423> Unit Hyd. Tpeak (min)= 17.50 47.50
00424> Unit Hyd. peak (cms)= .07 .02
00425>
00426> *TOTALS*
00427> PEAK FLOW (cms)= .60 .10 .625 (iii)
00428> TIME TO PEAK (hrs)= 1.42 2.00 1.458
00429> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00430> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00431> RUNOFF COEFFICIENT = .94 .35 .643
00432>
00433> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00434> CN* = 81.0 Ia = Dep. Storage (Above)
00435> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00436> THAN THE STORAGE COEFFICIENT.
00437> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00438>
00439>
00440>
00441> 001:0017-----
00442> * SUB-AREA No.3
00443>
00444> CALIB STANDHYD | Area (ha)= 15.60
00445> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00446>
00447> IMPERVIOUS PERVIOUS (i)
00448> Surface Area (ha)= 11.08 4.52
00449> Dep. Storage (mm)= 1.57 4.67
00450> Average Slope (%)= .50 1.50
00451> Length (m)= 600.00 100.00
00452> Mannings n = .030 .250
00453> Max.eff.Inten.(mm/hr)= 34.39 11.54
00454> over (min) 22.50 55.00
00455> Storage Coeff. (min)= 23.33 (ii) 54.55 (ii)
00456> Unit Hyd. Tpeak (min)= 22.50 55.00
00457> Unit Hyd. peak (cms)= .05 .02
00458>
00459> *TOTALS*
00460> PEAK FLOW (cms)= .45 .08 1.484 (iii)
00461> TIME TO PEAK (hrs)= 1.50 2.17 1.542
00462> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00463> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00464> RUNOFF COEFFICIENT = .94 .35 .643
00465>
00466> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00467> CN* = 81.0 Ia = Dep. Storage (Above)
00468> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00469> THAN THE STORAGE COEFFICIENT.
00470> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00471>
00472>
00473>
00474> 001:0018-----
00475> [ADD HYD (HIP05)] | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00476> (ha) (cms) (hrs) (mm) (cms)
00477> ID1 03:HIP03 17.00 .625 1.46 16.08 .000
00478> +ID2 04:HIP04 15.60 .484 1.54 16.08 .000
00479>
00480> SUM 05:HIP05 32.60 1.091 1.46 16.08 .000
00481>
00482> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00483>
00484>
00485>
00486> 001:0019-----
00487> [ADD HYD (HIP06)] | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00488> (ha) (cms) (hrs) (mm) (cms)
00489> ID1 05:HIP05 32.60 1.091 1.46 16.08 .000
00490> +ID2 02:HIP02 28.46 .655 1.54 17.91 .000
00491>
00492> SUM 06:HIP06 61.06 1.740 1.50 16.93 .000
00493>
00494> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00495>
00496>
00497>
00498> 001:0020-----
00499> * SUB-AREA No.4
00500>
00501> CALIB STANDHYD | Area (ha)= 12.20
00502> | 07:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00503>
00504> IMPERVIOUS PERVIOUS (i)
00505> Surface Area (ha)= 8.66 3.54
00506> Dep. Storage (mm)= 1.57 4.67
00507> Average Slope (%)= .70 1.50
00508> Length (m)= 210.00 100.00
00509> Mannings n = .030 .250
00510> Max.eff.Inten.(mm/hr)= 45.63 14.15
00511> over (min) 10.00 40.00
00512> Storage Coeff. (min)= 10.03 (ii) 39.18 (ii)
00513> Unit Hyd. Tpeak (min)= 10.00 40.00
00514> Unit Hyd. peak (cms)= .11 .03
00515>
00516> *TOTALS*
00517> PEAK FLOW (cms)= .57 .08 .585 (iii)
00518> TIME TO PEAK (hrs)= 1.29 1.88 1.292
00519> RUNOFF VOLUME (mm)= 23.43 8.74 16.085
00520> TOTAL RAINFALL (mm)= 25.00 25.00 24.999
00521> RUNOFF COEFFICIENT = .94 .35 .643
00522>
00523> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00524> CN* = 81.0 Ia = Dep. Storage (Above)
00525> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00526> THAN THE STORAGE COEFFICIENT.
00527> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00528>
00529>
00530>
00531> 001:0021-----
00532> * SUB-AREA No.5
00533>
00534> DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
00535> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00536> U.H. Tp(hrs)= .170
00537>
00538> Unit Hyd Qpeak (cms)= .899
00539>
00540>

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00541> PEAK FLOW (cms)= .077 (i)
00542> TIME TO PEAK (hrs)= 1.375
00543> RUNOFF VOLUME (mm)= 6.343
00544> TOTAL RAINFALL (mm)= 24.999
00545> RUNOFF COEFFICIENT = .254
00546>
00547> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00548>
00549>
00550> 001:0022-----
00551>
00552> | ADD HYD (HIP08 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00553> | (ha) (cms) (hrs) (mm) (cms)
00554> | ID1 06:HIP06 51.06 1.740 1.50 16.93 .000
00555> | +ID2 07:HIP07 12.20 .585 1.29 16.08 .000
00556> | +ID3 08:POND-B 4.00 .077 1.38 6.34 .000
00557>
00558> SUM 09:HIP08 77.26 2.227 1.46 16.25 .000
00559>
00560> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00561>
00562>
00563> 001:0023-----
00564>
00565> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00566> | IN:09: (HIP08 ) |
00567> | OUT:10: (HIP-PO) |
00568>
00569> ===== OUTFLOW STORAGE TABLE =====
00570> OUTFLOW STORAGE OUTFLOW STORAGE
00571> (cms) (ha.m.) (cms) (ha.m.)
00572> .003 0000E+00 | .724 2210E+01
00573> .048 5740E-01 | .937 2501E+01
00574> .054 2434E+00 | 1.262 2798E+01
00575> .059 5834E+00 | 1.404 3101E+01
00576> .062 8400E+00 | 1.532 3410E+01
00577> .064 1102E+01 | 1.650 3724E+01
00578> .147 1370E+01 | 2.409 4044E+01
00579> .280 1644E+01 | 3.689 4370E+01
00580> .472 1924E+01 | .000 0000E+00
00581>
00582> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00583> (ha) (cms) (hrs) (mm)
00584> INFLOW>09: (HIP08 ) 77.26 2.227 1.458 16.251
00585> OUTFLOW>10: (HIP-PO) 77.26 .063 5.431 16.251
00586>
00587> PEAK FLOW REDUCTION [Qout/Qin] (%) = 2.839
00588> TIME SHIFT OF PEAK FLOW (min) = 238.33
00589> MAXIMUM STORAGE USED (ha.m.) = 1001E+01
00590>
00591> 001:0024-----
00592> *SUB-AREA No. 6
00593>
00594> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
00595> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00596> | U.H. Tp (hrs)= .800
00597>
00598> Unit Hyd Qpeak (cms)= .129
00599>
00600> PEAK FLOW (cms)= .013 (i)
00601> TIME TO PEAK (hrs)= 2.292
00602> RUNOFF VOLUME (mm)= 4.110
00603> TOTAL RAINFALL (mm)= 24.999
00604> RUNOFF COEFFICIENT = .164
00605>
00606> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00607>
00608>
00609> 001:0025-----
00610>
00611> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00612> | (ha) (cms) (hrs) (mm) (cms)
00613> | ID1 10:HIP-PO 77.26 .063 5.43 16.25 .000
00614> | +ID2 01:A3 2.70 .013 2.29 4.11 .000
00615>
00616> SUM 02:Ultima 79.96 .073 2.50 15.84 .000
00617>
00618> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00619>
00620>
00621> 001:0026-----
00622> *****
00623> * CALCULATION OF 3HR - 1:2 YEAR STORM EVENT *
00624> *****
00625>
00626> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
00627> | Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
00628>
00629> TZERO = .00 hrs on 0
00630> METOUT = 2 (output = METRIC)
00631> NRUN = 001
00632> NSTORM = 0
00633>
00634> 001:0002-----
00635>
00636> | CHICAGO STORM | IDF curve parameters: A= 732.951
00637> | Ptotal= 31.86 mm | B= 6.199
00638> | C= .810
00639>
00640> used in: INTENSITY = A / (t + B)^C
00641>
00642> Duration of storm = 3.00 hrs
00643> Storm time step = 10.00 min
00644> Time to peak ratio = .33
00645>
00646> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00647> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00648> .17 2.815 | 1.00 76.805 | 1.83 5.095 | 2.67 2.684
00649> .33 3.498 | 1.17 24.079 | 2.00 4.291 | 2.83 2.463
00650> .50 4.687 | 1.33 12.364 | 2.17 3.718 | 3.00 2.279
00651> .67 7.305 | 1.50 8.324 | 2.33 3.288 |
00652> .83 16.209 | 1.67 6.303 | 2.50 2.953 |
00653>
00654>
00655> 001:0003-----
00656>
00657> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\ORGA.VAL
00658>
00659> | FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE -----
00660> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----|
00661>
00662> Horton's infiltration equation parameters:
00663> [F= 50.00 mm/hr] [P= 7.50 mm/hr] [DCAY= 2.00 /hr] [F= .00 mm]
00664> Parameters for PERVIOUS surfaces in STANDHYD:
00665> [Iaper= 4.67 mm] [LGP=40.00 mm] [MNI= .250]
00666> Parameters for IMPERVIOUS surfaces in STANDHYD:
00667> [Iaimp= 1.57 mm] [CL= 1.50] [MNI= .035]
00668> Parameters used in NASHYD:
00669> [Ia= 4.67 mm] [N= 3.00]
00670>
00671> 001:0004-----
00672>
00673> ***** ORGAWORLD FILE *****
00674>
00675> * SUB-AREA No.1
00676>
00677> | CALIB STANDHYD | Area (ha)= 2.07

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00678> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
00679>
00680> ===== IMPERVIOUS PERVIOUS (i) =====
00681> Surface Area (ha)= 1.74 .33
00682> Dep. Storage (mm)= 1.57 4.67
00683> Average Slope (%)= 1.52 1.00
00684> Length (m)= 204.72 20.00
00685> Mannings n = .030 .250
00686>
00687> Max.eff.Inten.(mm/hr)= 76.81 11.88
00688> over (min) 10.00 22.50
00689> Storage Coeff. (min)= 8.77 (ii) 22.21 (ii)
00690> Unit Hyd. Tpeak (min)= 10.00 22.50
00691> Unit Hyd. peak (cms)= .12 .05
00692>
00693> PEAK FLOW (cms)= .24 .01 *TOTALS*
00694> TIME TO PEAK (hrs)= 1.08 1.38 1.245 (iii)
00695> RUNOFF VOLUME (mm)= 30.29 8.52 26.807
00696> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00697> RUNOFF COEFFICIENT = .95 .27 .841
00698>
00699> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00700> CN* = 81.0 Ia = Dep. Storage (Above)
00701> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00702> THAN THE STORAGE COEFFICIENT.
00703> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00704>
00705> 001:0005-----
00706>
00707> * SUB-AREA No.2
00708>
00709> | CALIB STANDHYD | Area (ha)= 1.54
00710> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00711>
00712> ===== IMPERVIOUS PERVIOUS (i) =====
00713> Surface Area (ha)= 1.42 .12
00714> Dep. Storage (mm)= 1.57 4.67
00715> Average Slope (%)= .50 1.00
00716> Length (m)= 244.34 5.00
00717> Mannings n = .030 .030
00718>
00719> Max.eff.Inten.(mm/hr)= 76.81 15.07
00720> over (min) 10.00 12.50
00721> Storage Coeff. (min)= 9.87 (ii) 11.36 (ii)
00722> Unit Hyd. Tpeak (min)= 10.00 12.50
00723> Unit Hyd. peak (cms)= .11 .10
00724>
00725> PEAK FLOW (cms)= .19 .00 *TOTALS*
00726> TIME TO PEAK (hrs)= 1.08 1.17 1.083
00727> RUNOFF VOLUME (mm)= 30.29 8.52 28.548
00728> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00729> RUNOFF COEFFICIENT = .95 .27 .896
00730>
00731> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00732> CN* = 81.0 Ia = Dep. Storage (Above)
00733> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00734> THAN THE STORAGE COEFFICIENT.
00735> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00736>
00737> 001:0006-----
00738>
00739> * SUB-AREA No.3
00740>
00741> | CALIB STANDHYD | Area (ha)= 1.40
00742> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00743>
00744> ===== IMPERVIOUS PERVIOUS (i) =====
00745> Surface Area (ha)= 1.36 .04
00746> Dep. Storage (mm)= 1.57 4.67
00747> Average Slope (%)= .51 1.00
00748> Length (m)= 225.63 5.00
00749> Mannings n = .030 .030
00750>
00751> Max.eff.Inten.(mm/hr)= 76.81 16.59
00752> over (min) 10.00 10.00
00753> Storage Coeff. (min)= 9.35 (ii) 10.79 (ii)
00754> Unit Hyd. Tpeak (min)= 10.00 10.00
00755> Unit Hyd. peak (cms)= .12 .11
00756>
00757> PEAK FLOW (cms)= .18 .00 *TOTALS*
00758> TIME TO PEAK (hrs)= 1.08 1.13 1.083
00759> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00760> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00761> RUNOFF COEFFICIENT = .95 .27 .930
00762>
00763> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00764> CN* = 81.0 Ia = Dep. Storage (Above)
00765> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00766> THAN THE STORAGE COEFFICIENT.
00767> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00768>
00769>
00770> 001:0007-----
00771>
00772> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00773> | (ha) (cms) (hrs) (mm) (cms)
00774> | ID1 01:010 2.07 .245 1.08 26.81 .000
00775> | +ID2 02:020 1.54 .192 1.08 28.55 .000
00776>
00777> SUM 04:040 3.61 .436 1.08 27.55 .000
00778>
00779>
00780> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00781>
00782> 001:0008-----
00783>
00784> | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00785> | (ha) (cms) (hrs) (mm) (cms)
00786> | ID1 03:030 1.40 .186 1.08 29.64 .000
00787> | +ID2 04:040 3.61 .436 1.08 27.55 .000
00788>
00789> SUM 05:050 5.01 .623 1.08 28.13 .000
00790>
00791> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00792>
00793>
00794> 001:0009-----
00795>
00796> * SUB-AREA No.4
00797>
00798> | CALIB STANDHYD | Area (ha)= .89
00799> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00800>
00801> ===== IMPERVIOUS PERVIOUS (i) =====
00802> Surface Area (ha)= .86 .03
00803> Dep. Storage (mm)= 1.57 4.67
00804> Average Slope (%)= .93 .70
00805> Length (m)= 164.82 40.00
00806> Mannings n = .030 .250
00807>
00808> Max.eff.Inten.(mm/hr)= 76.81 10.24
00809> over (min) 7.50 30.00
00810> Storage Coeff. (min)= 6.47 (ii) 30.53 (ii)

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00811> Unit Hyd. Tpeak (min)= 7.50 30.00
00812> Unit Hyd. peak (cms)= .16 .04 *TOTALS*
00813> PEAK FLOW (cms)= .14 .00 1.39 (iii)
00815> TIME TO PEAK (hrs)= 1.04 1.54 1.042
00816> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00817> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00818> RUNOFF COEFFICIENT = .95 .27 .930
00819>
00820> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00821> CN* = 81.0 Ia = Dep. Storage (Above)
00822> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00823> THAN THE STORAGE COEFFICIENT.
00824> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00825>
00826>
00827> 001:0010
00828> * SUB-AREA No.5
00830>
00831> CALIB STANDHYD | Area (ha)= 2.66
00832> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00833>
00834> IMPERVIOUS PERVIOUS (i)
00835> Surface Area (ha)= 2.58 .08
00836> Dep. Storage (mm)= 1.57 4.67
00837> Average Slope (%)= .61 1.50
00838> Length (m)= 207.25 20.00
00839> Mannings n = .030 .250
00840>
00841> Max.eff.Inten.(mm/hr)= 76.81 12.71
00842> over (min) 7.50 20.00
00843> Storage Coeff. (min)= 8.42 (ii) 20.00 (ii)
00844> Unit Hyd. Tpeak (min)= 7.50 20.00
00845> Unit Hyd. peak (cms)= .14 .06
00846>
00847> *TOTALS*
00848> PEAK FLOW (cms)= .38 .00 .379 (iii)
00849> TIME TO PEAK (hrs)= 1.04 1.33 1.042
00850> RUNOFF VOLUME (mm)= 30.29 8.52 29.637
00851> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00852> RUNOFF COEFFICIENT = .95 .27 .930
00853>
00854> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00855> CN* = 81.0 Ia = Dep. Storage (Above)
00856> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00857> THAN THE STORAGE COEFFICIENT.
00858> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00859>
00860> 001:0011
00861>
00862> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00863> (ha) (cms) (hrs) (mm) (cms)
00864> ID1 06:060 8.89 .139 1.04 29.64 .000
00865> +ID2 07:070 2.66 .379 1.04 29.64 .000
00866> -----
00867> SUM 08:080 3.55 .518 1.04 29.64 .000
00868>
00869> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00870>
00871>
00872> 001:0012
00873> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00874> (ha) (cms) (hrs) (mm) (cms)
00875> ID1 05:050 5.01 .623 1.08 28.13 .000
00876> +ID2 08:080 3.55 .518 1.04 29.64 .000
00877> -----
00878> SUM 09:090 8.56 1.118 1.08 28.76 .000
00879>
00880> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00881>
00882>
00883> 001:0013
00884> ROUTE RESERVOIR Requested routing time step = 1.0 min.
00885> | IN>09: (090) |
00886> | OUT<10: (POND) |
00887>
00888> ===== OUTFLOW STORAGE TABLE =====
00889> OUTFLOW STORAGE | OUTFLOW STORAGE
00890> (cms) (ha.m.) | (cms) (ha.m.)
00891> .000 .0000E+00 | .593 .6251E+00
00892> .008 .6560E-01 | .654 .6631E+00
00893> .017 .1311E+00 | .797 .7391E+00
00894> .093 .2833E+00 | .950 .8274E+00
00895> .233 .3971E+00 | 1.304 .9157E+00
00896> .337 .4731E+00 | 1.880 .1004E+01
00897> .465 .5491E+00 | 2.577 .1092E+01
00898> .531 .5871E+00 | .000 .0000E+00
00899>
00900> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00901> (ha) (cms) (hrs) (mm)
00902> INFLOW >09: (090) 8.56 1.118 1.083 28.757
00903> OUTFLOW<10: (POND) 8.56 .056 3.000 28.754
00904>
00905> PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.030
00906> TIME SHIFT OF PEAK FLOW [min] = 115.00
00907> MAXIMUM STORAGE USED [ha.m.] = .2095E+00
00908>
00909>
00910> 001:0014
00911> *****
00912> * Remaining Hawthorne Industrial Park *
00913> *****
00914> *
00915> * SUB-AREA No.1
00916>
00917> CALIB STANDHYD | Area (ha)= 19.90
00918> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00919>
00920> IMPERVIOUS PERVIOUS (i)
00921> Surface Area (ha)= 14.13 5.77
00922> Dep. Storage (mm)= 1.57 4.67
00923> Average Slope (%)= .60 1.50
00924> Length (m)= 580.00 100.00
00925> Mannings n = .030 .250
00926>
00927> Max.eff.Inten.(mm/hr)= 54.21 23.06
00928> over (min) 17.50 42.50
00929> Storage Coeff. (min)= 18.04 (ii) 42.02 (ii)
00930> Unit Hyd. Tpeak (min)= 17.50 42.50
00931> Unit Hyd. peak (cms)= .06 .03
00932>
00933> *TOTALS*
00934> PEAK FLOW (cms)= .95 .21 1.020 (iii)
00935> TIME TO PEAK (hrs)= 1.21 1.71 1.250
00936> RUNOFF VOLUME (mm)= 30.29 13.34 21.814
00937> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00938> RUNOFF COEFFICIENT = .95 .42 .685
00939>
00940> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00941> CN* = 81.0 Ia = Dep. Storage (Above)
00942> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00943> THAN THE STORAGE COEFFICIENT.
00944> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00945>

00946> 001:0015
00947>
00948> | ADD HYD (HIP02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00949> (ha) (cms) (hrs) (mm) (cms)
00950> ID1 10:POND 8.56 .056 3.00 28.75 .000
00951> +ID2 01:HIP01 19.90 1.020 1.25 21.81 .000
00952> -----
00953> SUM 02:HIP02 28.46 1.039 1.25 23.90 .000
00954>
00955> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00956>
00957>
00958> 001:0016
00959> * SUB-AREA No.2
00961>
00962> CALIB STANDHYD | Area (ha)= 17.00
00963> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00964>
00965> IMPERVIOUS PERVIOUS (i)
00966> Surface Area (ha)= 12.07 4.93
00967> Dep. Storage (mm)= 1.57 4.67
00968> Average Slope (%)= .65 1.50
00969> Length (m)= 450.00 100.00
00970> Mannings n = .030 .250
00971>
00972> Max.eff.Inten.(mm/hr)= 59.23 25.04
00973> over (min) 15.00 37.50
00974> Storage Coeff. (min)= 14.60 (ii) 37.80 (ii)
00975> Unit Hyd. Tpeak (min)= 15.00 37.50
00976> Unit Hyd. peak (cms)= .08 .03
00977>
00978> *TOTALS*
00979> PEAK FLOW (cms)= .91 .19 .978 (iii)
00980> TIME TO PEAK (hrs)= 1.17 1.63 1.167
00981> RUNOFF VOLUME (mm)= 30.29 13.34 21.814
00982> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
00983> RUNOFF COEFFICIENT = .95 .42 .685
00984>
00985> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00986> CN* = 81.0 Ia = Dep. Storage (Above)
00987> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00988> THAN THE STORAGE COEFFICIENT.
00989> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00990>
00991> 001:0017
00992> * SUB-AREA No.3
00993>
00994> CALIB STANDHYD | Area (ha)= 15.60
00995> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00996>
00997> IMPERVIOUS PERVIOUS (i)
00998> Surface Area (ha)= 11.08 4.52
00999> Dep. Storage (mm)= 1.57 4.67
01000> Average Slope (%)= .50 1.50
01001> Length (m)= 600.00 100.00
01002> Mannings n = .030 .250
01003>
01004> Max.eff.Inten.(mm/hr)= 50.44 22.17
01005> over (min) 20.00 45.00
01006> Storage Coeff. (min)= 20.01 (ii) 44.37 (ii)
01007> Unit Hyd. Tpeak (min)= 20.00 45.00
01008> Unit Hyd. peak (cms)= .06 .03
01009>
01010> *TOTALS*
01011> PEAK FLOW (cms)= .69 .16 .753 (iii)
01012> TIME TO PEAK (hrs)= 1.25 1.79 1.292
01013> RUNOFF VOLUME (mm)= 30.29 13.34 21.814
01014> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
01015> RUNOFF COEFFICIENT = .95 .42 .685
01016>
01017> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01018> CN* = 81.0 Ia = Dep. Storage (Above)
01019> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01020> THAN THE STORAGE COEFFICIENT.
01021> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01022>
01023>
01024> 001:0018
01025> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01026> (ha) (cms) (hrs) (mm) (cms)
01027> ID1 03:HIP03 17.00 .978 1.17 21.81 .000
01028> +ID2 04:HIP04 15.60 .753 1.29 21.81 .000
01029> -----
01030> SUM 05:HIP05 32.60 1.698 1.21 21.81 .000
01031>
01032> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01033>
01034>
01035>
01036> 001:0019
01037>
01038> | ADD HYD (HIP06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01039> (ha) (cms) (hrs) (mm) (cms)
01040> ID1 05:HIP05 32.60 1.698 1.21 21.81 .000
01041> +ID2 02:HIP02 28.46 1.039 1.25 23.90 .000
01042> -----
01043> SUM 06:HIP06 61.06 2.733 1.21 22.79 .000
01044>
01045> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01046>
01047>
01048> 001:0020
01049> * SUB-AREA No.4
01050>
01051> CALIB STANDHYD | Area (ha)= 12.20
01052> | 07:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
01053>
01054> IMPERVIOUS PERVIOUS (i)
01055> Surface Area (ha)= 8.66 3.54
01056> Dep. Storage (mm)= 1.57 4.67
01057> Average Slope (%)= .70 1.50
01058> Length (m)= 210.00 100.00
01059> Mannings n = .030 .250
01060>
01061> Max.eff.Inten.(mm/hr)= 76.81 29.02
01062> over (min) 7.50 30.00
01063> Storage Coeff. (min)= 8.15 (ii) 30.01 (ii)
01064> Unit Hyd. Tpeak (min)= 7.50 30.00
01065> Unit Hyd. peak (cms)= .14 .04
01066>
01067> *TOTALS*
01068> PEAK FLOW (cms)= .91 .16 .941 (iii)
01069> TIME TO PEAK (hrs)= 1.04 1.50 1.042
01070> RUNOFF VOLUME (mm)= 30.29 13.34 21.814
01071> TOTAL RAINFALL (mm)= 31.86 31.86 31.860
01072> RUNOFF COEFFICIENT = .95 .42 .685
01073>
01074> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01075> CN* = 81.0 Ia = Dep. Storage (Above)
01076> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01077> THAN THE STORAGE COEFFICIENT.
01078> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01079>
01080>

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01081> 001:0021-----
01082> *
01083> *SUB-AREA No.5
01084> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
01085> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01086> | U.H. Tp(hrs)= .170
01087>
01088> Unit Hyd Qpeak (cms)= .899
01089>
01090> PEAK FLOW (cms)= .145 (i)
01091> TIME TO PEAK (hrs)= 1.167
01092> RUNOFF VOLUME (mm)= 10.266
01093> TOTAL RAINFALL (mm)= 31.860
01094> RUNOFF COEFFICIENT = .322
01095>
01096> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01097>
01098>
01099>
01100> 001:0022-----
01101>
01102> | ADD HYD (HIP08 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01103> | (ha) (cms) (hrs) (mm) (cms)
01104> | ID1 06:HIP06 61.06 2.733 1.21 22.79 .000
01105> | +ID2 07:HIP07 12.20 .941 1.04 21.81 .000
01106> | +ID3 08:Pond-B 4.00 .145 1.17 10.27 .000
01107>
01108> | SUM 09:HIP08 77.26 3.542 1.21 21.98 .000
01109>
01110> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01111>
01112>
01113> 001:0023-----
01114>
01115> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01116> | INP:09:10:10 |
01117> | OUT:10:(HIP-PO) |
01118>
01119> ===== OUTFLOW STORAGE TABLE =====
01120> OUTFLOW STORAGE OUTFLOW STORAGE
01121> (cms) (ha.m.) (cms) (ha.m.)
01122> .000 .000E+00 | .724 .2210E+01
01123> .048 .574E+01 | .937 .2501E+01
01124> .054 .2434E+00 | 1.262 .2798E+01
01125> .059 .5834E+00 | 1.404 .3101E+01
01126> .062 .8400E+00 | 1.532 .3410E+01
01127> .064 .1102E+01 | 1.650 .3724E+01
01128> .147 .1370E+01 | 2.409 .4044E+01
01129> .280 .1644E+01 | 3.689 .4370E+01
01130> .472 .1924E+01 | .000 .0000E+00
01131>
01132> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01133> (ha) (cms) (hrs) (mm)
01134> INFLOW >09: (HIP08 ) 77.26 3.542 1.208 21.985
01135> OUTFLOW <10: (HIP-PO) 77.26 .148 4.014 21.985
01136>
01137> PEAK FLOW REDUCTION [Qout/Qin] (%) = 4.179
01138> TIME SHIFT OF PEAK FLOW (min) = 268.33
01139> MAXIMUM STORAGE USED (ha.m.) = .1373E+01
01140>
01141> 001:0024-----
01142> *SUB-AREA No. 6
01143>
01144> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
01145> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01146> | U.H. Tp(hrs)= .800
01147>
01148> Unit Hyd Qpeak (cms)= .129
01149>
01150> PEAK FLOW (cms)= .024 (i)
01151> TIME TO PEAK (hrs)= 2.083
01152> RUNOFF VOLUME (mm)= 6.883
01153> TOTAL RAINFALL (mm)= 31.860
01154> RUNOFF COEFFICIENT = .216
01155>
01156> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01157>
01158>
01159> 001:0025-----
01160>
01161> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01162> | (ha) (cms) (hrs) (mm) (cms)
01163> | ID1 10:HIP-PO 77.26 .148 4.01 21.98 .000
01164> | +ID2 01:A3 2.70 .024 2.08 6.88 .000
01165>
01166> | SUM 02:Ultima 79.96 .156 3.65 21.47 .000
01167>
01168> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01169>
01170>
01171> 001:0026-----
01172> *****
01173> * CALCULATION OF 3HR - 1.5 YEAR STORM EVENT *
01174> *****
01175>
01176> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
01177> | ZERO = .00 hrs on 0 Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
01178> | METOUT= 2 (output = METRIC)
01180> | NRUN = 001
01181> | NSTORM= 0
01182>
01183> 001:0002-----
01184>
01185> | CHICAGO STORM | IDF curve parameters: A= 998.071
01186> | Ptotal= 42.51 mm | B= 6.053
01187> | C= .814
01188> used in: INTENSITY = A / (t + B)^C
01189>
01190> Duration of storm = 3.00 hrs
01191> Storm time step = 10.00 min
01192> Time to peak ratio = .33
01193>
01194> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01195> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01196> .17 3.682 | 1.00 31.133 | 1.83 6.689 | 2.67 3.510
01197> .33 6.582 | 1.17 35.037 | 2.00 5.628 | 2.83 3.220
01198> .50 6.151 | 1.33 16.337 | 2.17 4.872 | 3.00 2.978
01199> .67 9.614 | 1.50 10.965 | 2.33 4.305 |
01200> .83 24.170 | 1.67 8.287 | 2.50 3.864 |
01201>
01202>
01203> 001:0003-----
01204>
01205> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\ORGA.VAL
01206> | ICASEd= (read and print data)
01207> | ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
01208> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 ---
01209>
01210> Horton's infiltration equation parameters:
01211> [F= 50.00 mm/hr] [F= 7.50 mm/hr] [DCAX= 2.00 /hr] [F= .00 mm]
01212> Parameters for IMPERVIOUS surfaces in STANDHYD:
01213> [Ia= 4.67 mm] [LIG= 40.00 mm] [MNI= .250]
01214> Parameters for IMPERVIOUS surfaces in STANDHYD:
01215> [Ia= 1.57 mm] [LI= 1.50] [MNI= .035]
01216> Parameters used in NASHYD:

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01216> [Ia= 4.67 mm] [N= 3.00]
01217>
01218> 001:0004-----
01219> *****
01220> * ORGAWORLD FILE *
01221> *****
01222> *
01223> * SUB-AREA No.1
01224>
01225> | CALIB STANDHYD | Area (ha)= 2.07
01226> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
01227>
01228> IMPERVIOUS PERVIOUS (i)
01229> Surface Area (ha)= 1.74 .33
01230> Dep. Storage (mm)= 1.57 4.67
01231> Average Slope (%)= .52 1.00
01232> Length (m)= 204.72 20.00
01233> Mannings n = .030
01234>
01235> Max.eff.Inten.(mm/hr)= 104.19 24.26
01236> over (min)= 7.50 17.50
01237> Storage Coeff. (min)= 7.76 (ii) 17.96 (ii)
01238> Unit Hyd. Tpeak (min)= 7.50 17.50
01239> Unit Hyd. peak (cms)= .15 .06
01240>
01241> PEAK FLOW (cms)= .36 .01 *TOTALS*
01242> TIME TO PEAK (hrs)= 1.04 1.25 (iii)
01243> RUNOFF VOLUME (mm)= 40.94 14.70 36.745
01244> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01245> RUNOFF COEFFICIENT = .96 .35 .864
01246>
01247> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01248> CN* = 81.0 Ia = Dep. Storage (Above)
01249> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01250> THAN THE STORAGE COEFFICIENT.
01251> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01252>
01253>
01254> 001:0005-----
01255> * SUB-AREA No.2
01256>
01257> | CALIB STANDHYD | Area (ha)= 1.54
01258> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
01259>
01260> IMPERVIOUS PERVIOUS (i)
01261> Surface Area (ha)= 1.42 .12
01262> Dep. Storage (mm)= 1.57 4.67
01263> Average Slope (%)= .50 1.00
01264> Length (m)= 244.34 5.00
01265> Mannings n = .030
01266>
01267> Max.eff.Inten.(mm/hr)= 104.19 31.02
01268> over (min)= 7.50 10.00
01269> Storage Coeff. (min)= 8.73 (ii) 9.85 (ii)
01270> Unit Hyd. Tpeak (min)= 7.50 10.00
01271> Unit Hyd. peak (cms)= .14 .11
01272>
01273> PEAK FLOW (cms)= .28 .01 *TOTALS*
01274> TIME TO PEAK (hrs)= 1.04 1.13 (iii)
01275> RUNOFF VOLUME (mm)= 40.94 14.70 38.845
01276> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01277> RUNOFF COEFFICIENT = .96 .35 .914
01278>
01279> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01280> CN* = 81.0 Ia = Dep. Storage (Above)
01281> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01282> THAN THE STORAGE COEFFICIENT.
01283> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01284>
01285>
01286> 001:0006-----
01287> * SUB-AREA No.3
01288>
01289> | CALIB STANDHYD | Area (ha)= 1.40
01290> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01291>
01292> IMPERVIOUS PERVIOUS (i)
01293> Surface Area (ha)= 1.36 .04
01294> Dep. Storage (mm)= 1.57 4.67
01295> Average Slope (%)= .51 1.00
01296> Length (m)= 225.63 5.00
01297> Mannings n = .030
01298>
01299> Max.eff.Inten.(mm/hr)= 104.19 31.02
01300> over (min)= 7.50 10.00
01301> Storage Coeff. (min)= 8.28 (ii) 9.39 (ii)
01302> Unit Hyd. Tpeak (min)= 7.50 10.00
01303> Unit Hyd. peak (cms)= .14 .12
01304>
01305> PEAK FLOW (cms)= .27 .00 *TOTALS*
01306> TIME TO PEAK (hrs)= 1.04 1.13 (iii)
01307> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
01308> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01309> RUNOFF COEFFICIENT = .96 .35 .945
01310>
01311> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01312> CN* = 81.0 Ia = Dep. Storage (Above)
01313> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01314> THAN THE STORAGE COEFFICIENT.
01315> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01316>
01317>
01318>
01319>
01320> 001:0007-----
01321>
01322> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01323> | (ha) (cms) (hrs) (mm) (cms)
01324> | ID1 01:010 2.07 .362 1.04 36.75 .000
01325> | +ID2 02:020 1.54 .283 1.04 38.84 .000
01326>
01327> | SUM 04:040 3.61 .645 1.04 37.64 .000
01328>
01329> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01330>
01331>
01332> 001:0008-----
01333>
01334> | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01335> | (ha) (cms) (hrs) (mm) (cms)
01336> | ID1 03:030 1.40 .274 1.04 40.16 .000
01337> | +ID2 04:040 3.61 .645 1.04 37.64 .000
01338>
01339> | SUM 05:050 5.01 .918 1.04 38.34 .000
01340>
01341> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01342>
01343>
01344> 001:0009-----
01345> * SUB-AREA No.4
01346>
01347> | CALIB STANDHYD | Area (ha)= .89
01348> | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
01349>
01350>

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01351> IMPERVIOUS PERVIOUS (i)
 01352> Surface Area (ha)= .86 .03
 01353> Dep. Storage (mm)= 1.57 4.67
 01354> Average Slope (%)= .93 .70
 01355> Length (m)= 164.82 40.00
 01356> Mannings n = .030 .250
 01357>
 01358> Max.eff.Inten.(mm/hr)= 104.19 20.32
 01359> over (min) 5.00 25.00
 01360> Storage Coeff. (min)= 5.72 (ii) 24.02 (ii)
 01361> Unit Hyd. Tpeak (min)= 5.00 25.00
 01362> Unit Hyd. peak (cms)= .20 .05
 01363>
 01364> PEAK FLOW (cms)= .20 .00 *TOTALS*
 01365> TIME TO PEAK (hrs)= 1.00 1.36 1.000 (iii)
 01366> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
 01367> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
 01368> RUNOFF COEFFICIENT = .96 .35 .945
 01369>
 01370> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 01371> CN* = 81.0 Ia = Dep. Storage (Above)
 01372> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 01373> THAN THE STORAGE COEFFICIENT.
 01374> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 01375>
 01376>
 01377> 001:0010
 01378> * SUB-AREA No.5
 01379>
 01380> CALIB STANDHYD | Area (ha)= 2.66
 01382> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
 01383>
 01384> IMPERVIOUS PERVIOUS (i)
 01385> Surface Area (ha)= 2.58 .08
 01386> Dep. Storage (mm)= 1.57 4.67
 01387> Average Slope (%)= .61 1.50
 01388> Length (m)= 207.25 20.00
 01389> Mannings n = .030 .250
 01390>
 01391> Max.eff.Inten.(mm/hr)= 104.19 24.26
 01392> over (min) 7.50 17.50
 01393> Storage Coeff. (min)= 7.45 (ii) 16.40 (ii)
 01394> Unit Hyd. Tpeak (min)= 7.50 17.50
 01395> Unit Hyd. peak (cms)= .15 .07
 01396>
 01397> PEAK FLOW (cms)= .54 .00 *TOTALS*
 01398> TIME TO PEAK (hrs)= 1.04 1.25 1.042 (iii)
 01399> RUNOFF VOLUME (mm)= 40.94 14.70 40.157
 01400> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
 01401> RUNOFF COEFFICIENT = .96 .35 .945
 01402>
 01403> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 01404> CN* = 81.0 Ia = Dep. Storage (Above)
 01405> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 01406> THAN THE STORAGE COEFFICIENT.
 01407> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 01408>
 01409>
 01410> 001:0011
 01411>
 01412> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 01413> | (ha) (cms) (hrs) (mm) (cms) (cms)
 01414> | ID1 06:060 | .89 .205 1.00 40.16 .000
 01415> | +ID2 07:070 | 2.66 .538 1.04 40.16 .000
 01416> |-----|-----|-----|-----|-----|-----|
 01417> | SUM 08:080 | 3.55 .733 1.04 40.16 .000
 01418>
 01419> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 01420>
 01421>
 01422> 001:0012
 01423>
 01424> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 01425> | (ha) (cms) (hrs) (mm) (cms) (cms)
 01426> | ID1 05:050 | 5.01 .918 1.04 38.34 .000
 01427> | +ID2 08:080 | 3.55 .733 1.04 40.16 .000
 01428> |-----|-----|-----|-----|-----|-----|
 01429> | SUM 09:090 | 8.56 1.651 1.04 39.10 .000
 01430>
 01431> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 01432>
 01433>
 01434> 001:0013
 01435>
 01436> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
 01437> | IN>09:(090) | |
 01438> | OUT<10:(POND) | |
 01439> |-----|-----|-----|-----|-----|-----|
 01440> | OUTFLOW STORAGE | OUTFLOW STORAGE |
 01441> | (cms) (ha.m.) | (cms) (ha.m.) |
 01442> | .000 .000E+00 | .593 .625E+00 |
 01443> | .008 .656E+01 | .654 .663E+00 |
 01444> | .017 .131E+00 | .797 .739E+00 |
 01445> | .093 .283E+00 | .950 .827E+00 |
 01446> | .233 .397E+00 | 1.304 .915E+00 |
 01447> | .337 .473E+00 | 1.880 .100E+01 |
 01448> | .465 .549E+00 | 2.577 .109E+01 |
 01449> | .531 .587E+00 | .000 .000E+00 |
 01450>
 01451> ROUTING RESULTS AREA QPEAK TPEAK R.V.
 01452> | INFLOW>09:(090) | (ha) (cms) (hrs) (mm)
 01453> | OUTFLOW<10:(POND) | 8.56 1.651 1.042 39.096
 01454> |-----|-----|-----|-----|
 01455> | PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.413
 01456> | TIME SHIFT OF PEAK FLOW (min)= 95.00
 01457> | MAXIMUM STORAGE USED (ha.m.)=.2756E+00
 01458>
 01459>
 01460> 001:0014
 01461> *****
 01462> * Remaining Hawthorne Industrial Park *
 01463> *****
 01464>
 01465> * SUB-AREA No.1
 01466>
 01467> CALIB STANDHYD | Area (ha)= 19.90
 01468> | 01:HIF01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 01469>
 01470> IMPERVIOUS PERVIOUS (i)
 01471> Surface Area (ha)= 14.13 5.77
 01472> Dep. Storage (mm)= 1.57 4.67
 01473> Average Slope (%)= .60 1.50
 01474> Length (m)= 580.00 100.00
 01475> Mannings n = .030 .250
 01476>
 01477> Max.eff.Inten.(mm/hr)= 80.14 42.65
 01478> over (min) 15.00 35.00
 01479> Storage Coeff. (min)= 15.43 (ii) 34.18 (ii)
 01480> Unit Hyd. Tpeak (min)= 15.00 35.00
 01481> Unit Hyd. peak (cms)= .07 .03
 01482>
 01483> PEAK FLOW (cms)= 1.41 .40 *TOTALS*
 01484> TIME TO PEAK (hrs)= 1.17 1.54 1.208 (iii)
 01485> RUNOFF VOLUME (mm)= 40.94 21.31 31.126

01486> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
 01487> RUNOFF COEFFICIENT = .96 .50 .732
 01488>
 01489> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 01490> CN* = 81.0 Ia = Dep. Storage (Above)
 01491> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 01492> THAN THE STORAGE COEFFICIENT.
 01493> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 01494>
 01495>
 01496> 001:0015
 01497>
 01498> | ADD HYD (HIF02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 01499> | (ha) (cms) (hrs) (mm) (cms) (cms)
 01500> | ID1 10:POND | 8.56 .089 2.63 39.09 .000
 01501> | +ID2 01:HIF01 | 19.90 1.572 1.21 31.13 .000
 01502> |-----|-----|-----|-----|-----|-----|
 01503> | SUM 02:HIF02 | 28.46 1.615 1.21 33.52 .000
 01504>
 01505> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 01506>
 01507>
 01508> 001:0016
 01509> * SUB-AREA No.2
 01510>
 01511> CALIB STANDHYD | Area (ha)= 17.00
 01513> | 03:HIF03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 01514>
 01515> IMPERVIOUS PERVIOUS (i)
 01516> Surface Area (ha)= 12.07 4.93
 01517> Dep. Storage (mm)= 1.57 4.67
 01518> Average Slope (%)= .65 1.50
 01519> Length (m)= 450.00 100.00
 01520> Mannings n = .030 .250
 01521>
 01522> Max.eff.Inten.(mm/hr)= 89.76 47.48
 01523> over (min) 12.50 30.00
 01524> Storage Coeff. (min)= 12.36 (ii) 30.32 (ii)
 01525> Unit Hyd. Tpeak (min)= 12.50 30.00
 01526> Unit Hyd. peak (cms)= .09 .04
 01527>
 01528> PEAK FLOW (cms)= 1.36 .37 *TOTALS*
 01529> TIME TO PEAK (hrs)= 1.13 1.46 1.167 (iii)
 01530> RUNOFF VOLUME (mm)= 40.94 21.31 31.126
 01531> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
 01532> RUNOFF COEFFICIENT = .96 .50 .732
 01533>
 01534> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 01535> CN* = 81.0 Ia = Dep. Storage (Above)
 01536> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 01537> THAN THE STORAGE COEFFICIENT.
 01538> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 01539>
 01540>
 01541> 001:0017
 01542> * SUB-AREA No.3
 01543>
 01544> CALIB STANDHYD | Area (ha)= 15.60
 01546> | 04:HIF04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 01547>
 01548> IMPERVIOUS PERVIOUS (i)
 01549> Surface Area (ha)= 11.08 4.52
 01550> Dep. Storage (mm)= 1.57 4.67
 01551> Average Slope (%)= .60 1.50
 01552> Length (m)= 600.00 100.00
 01553> Mannings n = .030 .250
 01554>
 01555> Max.eff.Inten.(mm/hr)= 73.27 42.65
 01556> over (min) 17.50 35.00
 01557> Storage Coeff. (min)= 17.24 (ii) 35.98 (ii)
 01558> Unit Hyd. Tpeak (min)= 17.50 35.00
 01559> Unit Hyd. peak (cms)= .07 .03
 01560>
 01561> PEAK FLOW (cms)= 1.03 .30 *TOTALS*
 01562> TIME TO PEAK (hrs)= 1.21 1.54 1.176 (iii)
 01563> RUNOFF VOLUME (mm)= 40.94 21.31 31.126
 01564> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
 01565> RUNOFF COEFFICIENT = .96 .50 .732
 01566>
 01567> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 01568> CN* = 81.0 Ia = Dep. Storage (Above)
 01569> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 01570> THAN THE STORAGE COEFFICIENT.
 01571> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 01572>
 01573>
 01574> 001:0018
 01575>
 01576> | ADD HYD (HIF05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 01577> | (ha) (cms) (hrs) (mm) (cms) (cms)
 01578> | ID1 03:HIF03 | 17.00 1.504 1.17 31.13 .000
 01579> | +ID2 04:HIF04 | 15.60 1.176 1.25 31.13 .000
 01580> |-----|-----|-----|-----|-----|-----|
 01581> | SUM 05:HIF05 | 32.60 2.621 1.17 31.13 .000
 01582>
 01583> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 01584>
 01585> 001:0019
 01587>
 01588> | ADD HYD (HIF06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 01589> | (ha) (cms) (hrs) (mm) (cms) (cms)
 01590> | ID1 05:HIF05 | 32.60 2.621 1.17 31.13 .000
 01591> | +ID2 02:HIF02 | 28.46 1.615 1.21 33.52 .000
 01592> |-----|-----|-----|-----|-----|-----|
 01593> | SUM 06:HIF06 | 61.06 4.222 1.17 32.24 .000
 01594>
 01595> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 01596>
 01597>
 01598> 001:0020
 01599> * SUB-AREA No.4
 01600>
 01601> CALIB STANDHYD | Area (ha)= 12.20
 01603> | 07:HIF07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 01604>
 01605> IMPERVIOUS PERVIOUS (i)
 01606> Surface Area (ha)= 8.66 3.54
 01607> Dep. Storage (mm)= 1.57 4.67
 01608> Average Slope (%)= .70 1.50
 01609> Length (m)= 210.00 100.00
 01610> Mannings n = .030 .250
 01611>
 01612> Max.eff.Inten.(mm/hr)= 104.19 52.96
 01613> over (min) 7.50 25.00
 01614> Storage Coeff. (min)= 7.21 (ii) 24.40 (ii)
 01615> Unit Hyd. Tpeak (min)= 7.50 25.00
 01616> Unit Hyd. peak (cms)= .15 .05
 01617>
 01618> PEAK FLOW (cms)= 1.28 .31 *TOTALS*
 01619> TIME TO PEAK (hrs)= 1.04 1.38 1.375 (iii)
 01620> RUNOFF VOLUME (mm)= 40.94 21.31 31.126

01621> TOTAL RAINFALL (mm)= 42.51 42.51 42.514
01622> RUNOFF COEFFICIENT = .96 .50 .732
01623>
01624> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01625> CN* = 81.0 Ia = Dep. Storage (Above)
01626> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01627> THAN THE STORAGE COEFFICIENT.
01628> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01631> 001:0021-----
01632> *
01633> *SUB-AREA No.5
01634> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
01635> | 08:Pcond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01637> | U.H. Tp(hrs)= .170
01638>
01639> Unit Hyd Tpeak (cms)= .899
01640>
01641> PEAK FLOW (cms)= 2.60 (i)
01642> TIME TO PEAK (hrs)= 1.167
01643> RUNOFF VOLUME (mm)= 17.325
01644> TOTAL RAINFALL (mm)= 42.514
01645> RUNOFF COEFFICIENT = .408
01646>
01647> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01649> 001:0022-----
01651> | ADD HYD (HIP08) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01652> | (ha) (cms) (hrs) (mm) (cms)
01653> ID1 06:HIP06 61.06 4.222 1.17 32.24 .000
01654> +ID2 07:HIP07 12.20 1.375 1.04 31.13 .000
01655> +ID3 08:Pcond-B 4.00 2.60 1.17 17.32 .000
01656>
01657> SUM 09:HIP08 77.26 5.545 1.17 31.29 .000
01658>
01659> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01663> 001:0023-----
01664> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01665> | IN-OP: (HIP08) |
01666> | OUT<10: (HIP-PO) |

OUTFLOW STORAGE	OUTFLOW STORAGE	OUTFLOW STORAGE
(cms)	(ha.m.)	(cms)
0.000	.000E+00	.724
.048	.374E+01	.250E+01
.054	.2434E+00	1.262
.059	.5834E+00	1.404
.062	.8400E+00	1.532
.064	.1102E+01	1.650
.147	.1370E+01	2.409
.280	.1644E+01	3.689
.472	.1924E+01	.000

01679> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01680> (ha) (cms) (hrs) (mm)
01681> INFLOW >09: (HIP08) 77.26 5.545 1.167 31.292
01682> OUTFLOW<10: (HIP-PO) 77.26 .435 3.389 31.292
01683>
01684> PEAK FLOW REDUCTION (Qout/Qin) (%) = 7.850
01685> TIME SHIFT OF PEAK FLOW (min) = 133.33
01686> MAXIMUM STORAGE USED (ha.m.) = 1871E+01

01689> 001:0024-----
01691> *
01692> *SUB-AREA No. 6
01693> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
01694> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
01695> | U.H. Tp(hrs)= .800
01696>
01697> Unit Hyd Tpeak (cms)= .129
01698>
01699> PEAK FLOW (cms)= .044 (i)
01700> TIME TO PEAK (hrs)= 2.042
01701> RUNOFF VOLUME (mm)= 12.131
01702> TOTAL RAINFALL (mm)= 42.514
01703> RUNOFF COEFFICIENT = .285
01704>
01705> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01709> 001:0025-----
01710> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01711> | (ha) (cms) (hrs) (mm) (cms)
01712> ID1 10:HIP-PO 77.26 .435 3.39 31.29 .000
01713> +ID2 01:A3 2.70 .044 2.04 12.13 .000
01714>
01715> SUM 02:Ultima 79.96 .457 3.29 30.65 .000
01716>
01717> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01723> 001:0026-----
01724> * CALCULATION OF 3HR - 1:10 YEAR STORM EVENT *
01725> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
01726> | TZERO = .00 hrs on 0 Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
01727> | METOUT= 2 (output = METRIC)
01728> | NSTORM= 0
01729>
01730> used in: INTENSITY = A / (t + B)^C
01731> Duration of storm = 3.00 hrs
01732> Storm time step = 10.00 min
01733> 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		

01734> 001:0002-----
01735> | CHICAGO STORM | IDF curve parameters: A=1174.184
01736> | Ptotal= 49.50 mm | B= 6.81
01737> | C= .816
01738> used in: INTENSITY = A / (t + B)^C
01739> Duration of storm = 3.00 hrs
01740> Storm time step = 10.00 min
01741> Time to peak ratio = .33

01756> ----- ICASEdv = 1 (read and print data)
01757> FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
01758> ----- PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 ----
01759> Horton's infiltration equation parameters:
01760> [Fw= 50.00 mm/hr] [Fw= 7.50 mm/hr] [DCAV= 2.00 /hr] [F= .00 mm]
01761> Parameters for PERVIOUS surfaces in STANDHYD:
01762> [IAPER= 4.67 mm] [LGP=40.00 m] [MNI= .250]
01763> Parameters for IMPERVIOUS surfaces in STANDHYD:
01764> [IAlmp= 1.57 mm] [CLI= 1.50] [MNI= .035]
01765> Parameters used in NASHYD:
01766> [Ia= 4.67 mm] [N= 3.00]

01768> 001:0004-----
01769> *
01770> * ORGAWORLD FILE *
01771> *
01772> *
01773> * SUB-AREA No.1
01774> | CALIB STANDHYD | Area (ha)= 2.07
01775> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn. (%)= 84.00
01776>
01777> IMPERVIOUS PERVIOUS (i)
01778> Surface Area (ha)= 1.74 .33
01779> Dep. Storage (mm)= 1.57 4.67
01780> Average Slope (%)= 1.52 1.00
01781> Length (m)= 204.72 20.00
01782> Mannings n = .030 .250
01783>
01784> Max.eff.Inten.(mm/hr)= 122.14 34.69
01785> over (min) 7.50 15.00
01786> Storage Coeff. (min)= 7.28 (ii) 16.04 (iii)
01787> Unit Hyd. Tpeak (min)= 7.50 15.00
01788> Unit Hyd. peak (cms)= .15 .07
01789>
01790> PEAK FLOW (cms)= .43 .02 *TOTALS*
01791> TIME TO PEAK (hrs)= 1.04 1.21 .437 (iii)
01792> RUNOFF VOLUME (mm)= 47.93 19.25 43.345
01793> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01794> RUNOFF COEFFICIENT = .97 .39 .876
01795>
01796> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01797> CN* = 81.0 Ia = Dep. Storage (Above)
01798> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01799> THAN THE STORAGE COEFFICIENT.
01800> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01803> 001:0005-----
01804> *
01805> * SUB-AREA No.2
01806> | CALIB STANDHYD | Area (ha)= 1.54
01807> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn. (%)= 92.00
01808>
01809> IMPERVIOUS PERVIOUS (i)
01810> Surface Area (ha)= 1.42 .12
01811> Dep. Storage (mm)= 1.57 4.67
01812> Average Slope (%)= .50 1.00
01813> Length (m)= 244.34 5.00
01814> Mannings n = .030 .030
01815>
01816> Max.eff.Inten.(mm/hr)= 122.14 42.32
01817> over (min) 7.50 10.00
01818> Storage Coeff. (min)= 8.20 (ii) 9.18 (iii)
01819> Unit Hyd. Tpeak (min)= 7.50 10.00
01820> Unit Hyd. peak (cms)= .14 .12 *TOTALS*
01821> PEAK FLOW (cms)= .33 .01 .341 (iii)
01822> TIME TO PEAK (hrs)= 1.04 1.13 1.042
01823> RUNOFF VOLUME (mm)= 47.93 19.25 45.640
01824> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01825> RUNOFF COEFFICIENT = .97 .39 .922
01826>
01827> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01828> CN* = 81.0 Ia = Dep. Storage (Above)
01829> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01830> THAN THE STORAGE COEFFICIENT.
01831> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01837> 001:0006-----
01838> *
01839> * SUB-AREA No.3
01840> | CALIB STANDHYD | Area (ha)= 1.40
01841> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn. (%)= 97.00
01842>
01843> IMPERVIOUS PERVIOUS (i)
01844> Surface Area (ha)= 1.36 .04
01845> Dep. Storage (mm)= 1.57 4.67
01846> Average Slope (%)= .51 1.00
01847> Length (m)= 225.63 5.00
01848> Mannings n = .030 .030
01849>
01850> Max.eff.Inten.(mm/hr)= 122.14 48.16
01851> over (min) 7.50 7.50
01852> Storage Coeff. (min)= 7.77 (ii) 8.70 (iii)
01853> Unit Hyd. Tpeak (min)= 7.50 7.50
01854> Unit Hyd. peak (cms)= .15 .14 *TOTALS*
01855> PEAK FLOW (cms)= .33 .00 .329 (iii)
01856> TIME TO PEAK (hrs)= 1.04 1.08 1.042
01857> RUNOFF VOLUME (mm)= 47.93 19.25 47.074
01858> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
01859> RUNOFF COEFFICIENT = .97 .39 .951
01860>
01861> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01862> CN* = 81.0 Ia = Dep. Storage (Above)
01863> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01864> THAN THE STORAGE COEFFICIENT.
01865> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01870> 001:0007-----
01871> | ADD HYD (040) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01872> | (ha) (cms) (hrs) (mm) (cms)
01873> ID1 01:010 2.07 .437 1.04 43.35 .000
01874> +ID2 02:020 1.54 .341 1.04 45.64 .000
01875>
01876> SUM 04:040 3.61 .778 1.04 44.32 .000
01877>
01878> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

01883> 001:0008-----
01884> | ADD HYD (050) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01885> | (ha) (cms) (hrs) (mm) (cms)
01886> ID1 03:030 1.40 .329 1.04 47.07 .000
01887> +ID2 04:040 3.61 .778 1.04 44.32 .000
01888>
01889> SUM 05:050 5.01 1.107 1.04 45.09 .000
01890>

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02161> Max.eff.inten.(mm/hr)= 122.14 72.53
02162> over (min) 7.50 22.50
02163> Storage Coeff. (min)= 6.77 (ii) 21.93 (ii)
02164> Unit Hyd. Tpeak (min)= 7.50 22.50
02165> Unit Hyd. peak (cms)= .16 .05
02166>
02167>
02168> PEAK FLOW (cms)= 1.54 .42 *TOTALS*
02169> TIME TO PEAK (hrs)= 1.04 1.33 1.042 (iii)
02170> RUNOFF VOLUME (mm)= 47.93 26.92
02171> TOTAL RAINFALL (mm)= 49.50 49.50 49.505
02172> RUNOFF COEFFICIENT = .97 .54 .756
02173>
02174> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02175> CN* = 81.0 Ia = Dep. Storage (Above)
02176> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02177> THAN THE STORAGE COEFFICIENT.
02178> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02179>
-----
02181> 001:0021
02182> *
02183> *SUB-AREA No.5
02184>
02185> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
02186> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02187> | U.H. Tp (hrs)= .170
02188>
02189> Unit Hyd Qpeak (cms)= .899
02190>
02191> PEAK FLOW (cms)= .345 (i)
02192> TIME TO PEAK (hrs)= 1.167
02193> RUNOFF VOLUME (mm)= 22.420
02194> TOTAL RAINFALL (mm)= 49.505
02195> RUNOFF COEFFICIENT = .453
02196>
02197> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02198>
02199>
-----
02200> 001:0022
02201>
02202> | ADD HYD (HIP08 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02203> | ID1 06:HIP06 | (ha) (cms) (hrs) (mm) (cms)
02204> | ID2 07:HIP07 | 61.06 5.358 1.17 38.61 .000
02205> | ID3 08:Pond-B | 4.00 .345 1.17 22.42 .000
02206>
02207>
02208> SUM 09:HIP08 77.26 7.016 1.17 37.59 .000
02209>
02210> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02211>
02212>
02213> 001:0023
02214>
02215> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02216> | IN:09:(HIP08 ) |
02217> | OUT:10:(HIP-PO) |
02218>
02219> ===== OUTFLOW STORAGE TABLE =====
02220> OUTFLOW STORAGE OUTFLOW STORAGE
02221> (cms) (ha.m.) (cms) (ha.m.)
02222> .000 .000E+00 | .724 .2210E+01
02223> .048 .5740E-01 | .937 .2501E+01
02224> .054 .2434E+00 | 1.262 .2798E+01
02225> .059 .5834E+00 | 1.404 .3101E+01
02226> .062 .8400E+00 | 1.532 .3410E+01
02227> .064 .1102E+01 | 1.650 .3724E+01
02228> .147 .1370E+01 | 2.409 .4044E+01
02229> .280 .1644E+01 | 3.689 .4370E+01
02230> .472 .1924E+01 | .000 .0000E+00
02231>
02232> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02233> (ha) (cms) (hrs) (mm)
02234> INFLOW >09: (HIP08 ) 77.26 7.016 1.167 37.588
02235> OUTFLOW<10: (HIP-PO) 77.26 .696 3.208 37.588
02236>
02237> PEAK FLOW REDUCTION [Qout/Qin] (%) = 9.919
02238> TIME SHIFT OF PEAK FLOW (min) = 122.50
02239> MAXIMUM STORAGE USED (ha.m.) = .2178E+01
02240>
02241>
02242> 001:0024
02243> *
02244> *SUB-AREA No. 6
02245> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
02246> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02247> | U.H. Tp (hrs)= .800
02248>
02249> Unit Hyd Qpeak (cms)= .129
02250>
02251> PEAK FLOW (cms)= .059 (i)
02252> TIME TO PEAK (hrs)= 2.000
02253> RUNOFF VOLUME (mm)= 16.075
02254> TOTAL RAINFALL (mm)= 49.505
02255> RUNOFF COEFFICIENT = .325
02256>
02257> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02258>
02259>
-----
02260> 001:0025
02261> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02262> | ID1 10:HIP-PO | (ha) (cms) (hrs) (mm) (cms)
02263> | ID2 01:A3 | 77.26 .696 3.21 37.59 .000
02264> | SUM D2:Ultima | 2.70 .059 2.00 16.08 .000
02265>
02266>
02267>
02268> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02269>
02270>
-----
02271> 001:0026
02272> *****
02273> * CALCULATION OF 3HR - 1:25 YEAR STORM EVENT *
02274> *****
02275> | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
02276> | Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\
02277>
02278> TZERO = .00 hrs on 0
02279> METOUT= 2 (output = METRIC)
02280> NRUN = 001
02281> NSTORM= 0
02282>
02283> 001:0002
02284>
02285> | CHICAGO STORM | IDF curve parameters: A=1402.884
02286> | Ptotal= 58.23 mm | B= 6.018
02287> | C= .819
02288> used in: INTENSITY = A / (t + B)^C
02289>
02290> Duration of storm = 3.00 hrs
02291> Storm time step = 10.00 min
02292> Time to peak ratio = .33
02293>
02294> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02295> mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr

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02296> .17 4.934 | 1.00 144.693 | 1.83 9.014 | 2.67 4.701
02297> .33 6.152 | 1.17 43.904 | 2.00 7.571 | 2.83 4.310
02298> .50 8.282 | 1.33 22.224 | 2.17 6.544 | 3.00 3.983
02299> .67 13.006 | 1.50 14.852 | 2.33 5.776 |
02300> .83 33.041 | 1.67 11.192 | 2.50 5.179 |
02301>
02302>
02303> 001:0003
02304>
02305> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHYM-1\ORGA.VAL
02306> | ICAServ= 1 (read and print data)
02307> | Filetitle= ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE
02308> | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60
02309>
02310> Horton's infiltration equation parameters:
02311> [F= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCA]= 2.00 /hr] [F= .00 mm]
02312> Parameters for PERVIOUS surfaces in STANDHYD:
02313> [IAPER= 4.67 mm] [LGP=40.00 m] [MNP=.250]
02314> Parameters for IMPERVIOUS surfaces in STANDHYD:
02315> [IAlmp= 1.57 mm] [CLI= 1.50] [MNI=.035]
02316> Parameters used in NASHYD:
02317> [Ia= 4.67 mm] [N= 3.00]
02318>
02319> 001:0004
02320> *****
02321> * ORGAWORD FILE *****
02322> *
02323> * SUB-AREA No.1
02324>
02325> | CALIB STANDHYD | Area (ha)= 2.07
02326> | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
02327>
02328> IMPERVIOUS PERVIOUS (i)
02329> Surface Area (ha)= 1.74 .33
02330> Dep. Storage (mm)= 1.57 4.67
02331> Average Slope (%)= .52 1.00
02332> Length (m)= 204.72 20.00
02333> Mannings n = .030 .250
02334>
02335> Max.eff.Inten.(mm/hr)= 144.69 47.07
02336> over (min) 7.50 15.00
02337> Storage Coeff. (min)= 6.81 (ii) 14.56 (ii)
02338> Unit Hyd. Tpeak (min)= 7.50 15.00
02339> Unit Hyd. peak (cms)= .16 .08
02340>
02341> PEAK FLOW (cms)= .52 .03 *TOTALS*
02342> TIME TO PEAK (hrs)= 1.04 1.21 .532 (iii)
02343> RUNOFF VOLUME (mm)= 56.66 25.35 1.042
02344> TOTAL RAINFALL (mm)= 58.23 58.23 51.647
02345> RUNOFF COEFFICIENT = .97 .44 58.226
02346> .887
02347>
02348> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02349> CN* = 81.0 Ia = Dep. Storage (Above)
02350> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02351> THAN THE STORAGE COEFFICIENT.
02352> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02353>
-----
02354> 001:0005
02355> *
02356> * SUB-AREA No.2
02357>
02358> | CALIB STANDHYD | Area (ha)= 1.54
02359> | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
02360>
02361> IMPERVIOUS PERVIOUS (i)
02362> Surface Area (ha)= 1.42 .12
02363> Dep. Storage (mm)= 1.57 4.67
02364> Average Slope (%)= .50 1.00
02365> Length (m)= 244.34 5.00
02366> Mannings n = .030 .030
02367>
02368> Max.eff.Inten.(mm/hr)= 144.69 65.19
02369> over (min) 7.50 7.50
02370> Storage Coeff. (min)= 7.66 (ii) 8.49 (ii)
02371> Unit Hyd. Tpeak (min)= 7.50 7.50
02372> Unit Hyd. peak (cms)= .15 .14
02373>
02374> PEAK FLOW (cms)= .40 .01 *TOTALS*
02375> TIME TO PEAK (hrs)= 1.04 1.08 .418 (iii)
02376> RUNOFF VOLUME (mm)= 56.66 25.35 1.042
02377> TOTAL RAINFALL (mm)= 58.23 58.23 54.152
02378> RUNOFF COEFFICIENT = .97 .44 58.226
02379> .930
02380>
02381> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02382> CN* = 81.0 Ia = Dep. Storage (Above)
02383> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02384> THAN THE STORAGE COEFFICIENT.
02385> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02386>
-----
02387> 001:0006
02388> *
02389> * SUB-AREA No.3
02390>
02391> | CALIB STANDHYD | Area (ha)= 1.40
02392> | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
02393>
02394> IMPERVIOUS PERVIOUS (i)
02395> Surface Area (ha)= 1.36 .04
02396> Dep. Storage (mm)= 1.57 4.67
02397> Average Slope (%)= .51 1.00
02398> Length (m)= 225.63 5.00
02399> Mannings n = .030 .030
02400>
02401> Max.eff.Inten.(mm/hr)= 144.69 65.19
02402> over (min) 7.50 7.50
02403> Storage Coeff. (min)= 7.26 (ii) 8.09 (ii)
02404> Unit Hyd. Tpeak (min)= 7.50 7.50
02405> Unit Hyd. peak (cms)= .15 .14
02406>
02407> PEAK FLOW (cms)= .40 .00 *TOTALS*
02408> TIME TO PEAK (hrs)= 1.04 1.08 .400 (iii)
02409> RUNOFF VOLUME (mm)= 56.66 25.35 55.717
02410> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02411> RUNOFF COEFFICIENT = .97 .44 58.226
02412> .957
02413>
02414> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02415> CN* = 81.0 Ia = Dep. Storage (Above)
02416> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02417> THAN THE STORAGE COEFFICIENT.
02418> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02419>
-----
02420> 001:0007
02421>
02422> | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02423> | ID1 01:010 | (ha) (cms) (hrs) (mm) (cms)
02424> | ID2 02:020 | 2.07 .532 1.04 51.65 .000
02425> | SUM 04:040 | 1.54 .418 1.04 54.15 .000
02426>
02427>
02428>
02429>
02430> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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02431> 001:0008-----
02432> | CALIB STANDHYD | Area (ha)= .89 | Dir. Conn.(%)= 97.00
02433> | ADD HYD (050) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02434> | ID1 03:030 | (ha) (cms) (hrs) (mm) (mm) (cms)
02435> | +ID2 04:040 | 3.61 .950 1.04 52.72 .000
02436> | ID1 03:030 | 1.40 .400 1.04 55.72 .000
02437> | +ID2 04:040 | 3.61 .950 1.04 52.72 .000
02438> | SUM 05:050 | 5.01 1.350 1.04 53.55 .000
02439> -----
02440> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02441> -----
02442> 001:0009-----
02443> * SUB-AREA No.4
02444> | CALIB STANDHYD | Area (ha)= .89 | Dir. Conn.(%)= 97.00
02445> | 06:060 DT= 2.50 | Total Imp(%)= 97.00
02446> -----
02447> IMPERVIOUS PERVIOUS (i)
02448> Surface Area (ha)= .86 .03
02449> Dep. Storage (mm)= 1.57 4.67
02450> Average Slope (%)= .93 .70
02451> Length (m)= 164.82 40.00
02452> Mannings n = .030 .250
02453> -----
02454> Max. eff. Inten. (mm/hr)= 144.69 44.12
02455> over (min)= 5.00 17.50
02456> Storage Coeff. (min)= 5.02 (ii) 18.44 (ii)
02457> Unit Hyd. Tpeak (min)= 5.00 (ii) 17.50 (ii)
02458> Unit Hyd. peak (cms)= .22 .06
02459> -----
02460> *TOTALS*
02461> PEAK FLOW (cms)= .30 .00 2.96 (iii)
02462> TIME TO PEAK (hrs)= 1.00 1.25 1.000
02463> RUNOFF VOLUME (mm)= 56.66 25.35 55.717
02464> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02465> RUNOFF COEFFICIENT = .97 .44 .957
02466> -----
02467> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02468> CN* = 81.0 Ia = Dep. Storage (Above)
02469> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02470> THAN THE STORAGE COEFFICIENT.
02471> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02472> -----
02473> 001:0010-----
02474> * SUB-AREA No.5
02475> | CALIB STANDHYD | Area (ha)= 2.66 | Dir. Conn.(%)= 97.00
02476> | 07:070 DT= 2.50 | Total Imp(%)= 97.00
02477> -----
02478> IMPERVIOUS PERVIOUS (i)
02479> Surface Area (ha)= 2.56 .08
02480> Dep. Storage (mm)= 1.57 4.67
02481> Average Slope (%)= .61 1.50
02482> Length (m)= 207.25 20.00
02483> Mannings n = .030 .250
02484> -----
02485> Max. eff. Inten. (mm/hr)= 144.69 51.33
02486> over (min)= 7.50 12.50
02487> Storage Coeff. (min)= 6.54 (ii) 13.16 (ii)
02488> Unit Hyd. Tpeak (min)= 7.50 12.50
02489> Unit Hyd. peak (cms)= .16 .09
02490> -----
02491> *TOTALS*
02492> PEAK FLOW (cms)= .78 .01 .783 (iii)
02493> TIME TO PEAK (hrs)= 1.04 1.17 1.042
02494> RUNOFF VOLUME (mm)= 56.66 25.35 55.717
02495> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02496> RUNOFF COEFFICIENT = .97 .44 .957
02497> -----
02498> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02499> CN* = 81.0 Ia = Dep. Storage (Above)
02500> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02501> THAN THE STORAGE COEFFICIENT.
02502> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02503> -----
02504> 001:0011-----
02505> | ADD HYD (080) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02506> | ID1 06:060 | (ha) (cms) (hrs) (mm) (mm) (cms)
02507> | +ID2 07:070 | 2.66 .783 1.04 55.72 .000
02508> | SUM 08:080 | 3.55 1.060 1.04 55.72 .000
02509> -----
02510> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02511> -----
02512> 001:0012-----
02513> | ADD HYD (090) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02514> | ID1 05:050 | (ha) (cms) (hrs) (mm) (mm) (cms)
02515> | +ID2 08:080 | 3.55 1.060 1.04 55.72 .000
02516> | SUM 09:090 | 8.56 2.410 1.04 54.45 .000
02517> -----
02518> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02519> -----
02520> 001:0013-----
02521> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02522> | IN>09: (090) |
02523> | OUT<10: (POND) |
02524> ===== OUTFLOW STORAGE TABLE =====
02525> OUTFLOW STORAGE | OUTFLOW STORAGE
02526> (cms) (ha.m.) | (cms) (ha.m.)
02527> .000 .0000E+00 | .593 .6251E+00
02528> .008 .6560E-01 | .654 .6631E+00
02529> .017 .1311E+00 | .797 .7391E+00
02530> .093 .2831E+00 | .950 .8274E+00
02531> .233 .3971E+00 | 1.304 .9157E+00
02532> .337 .4731E+00 | 1.860 .1004E+01
02533> .465 .5491E+00 | 2.577 .1092E+01
02534> .531 .5871E+00 | .000 .0000E+00
02535> -----
02536> ROUTING RESULTS AREA OPEAK TPEAK R.V.
02537> (ha) (cms) (hrs) (mm) (mm) (cms)
02538> INFLOW >09: (090) 8.56 2.410 1.042 54.451
02539> OUTFLOW <10: (POND) 8.56 .189 2.056 54.449
02540> -----
02541> PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.938
02542> TIME SHIFT OF PEAK FLOW (min) = 60.83
02543> MAXIMUM STORAGE USED (ha.m.) = .3612E+00
02544> -----
02545> 001:0014-----
02546> * Remaining Hawthorne Industrial Park *
02547> * * * * *
02548> * SUB-AREA No.1

02566> 001:0015-----
02567> | ADD HYD (HIP02) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02568> | 01:HIP01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
02569> -----
02570> IMPERVIOUS PERVIOUS (i)
02571> Surface Area (ha)= 14.13 5.77
02572> Dep. Storage (mm)= 1.57 4.67
02573> Average Slope (%)= .60 1.50
02574> Length (m)= 580.00 100.00
02575> Mannings n = .030 .250
02576> -----
02577> Max. eff. Inten. (mm/hr)= 124.54 81.98
02578> over (min)= 12.50 27.50
02579> Storage Coeff. (min)= 12.93 (ii) 27.37 (ii)
02580> Unit Hyd. Tpeak (min)= 12.50 27.50
02581> Unit Hyd. peak (cms)= .09 .04
02582> -----
02583> *TOTALS*
02584> PEAK FLOW (cms)= 2.16 .77 2.548 (iii)
02585> TIME TO PEAK (hrs)= 1.13 1.42 1.167
02586> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02587> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02588> RUNOFF COEFFICIENT = .97 .59 .780
02589> -----
02590> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02591> CN* = 81.0 Ia = Dep. Storage (Above)
02592> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02593> THAN THE STORAGE COEFFICIENT.
02594> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02595> -----
02596> 001:0016-----
02597> * SUB-AREA No.2
02598> | CALIB STANDHYD | Area (ha)= 17.00 | Dir. Conn.(%)= 50.00
02599> | 03:HIP03 DT= 2.50 | Total Imp(%)= 71.00
02600> -----
02601> IMPERVIOUS PERVIOUS (i)
02602> Surface Area (ha)= 12.07 4.93
02603> Dep. Storage (mm)= 1.57 4.67
02604> Average Slope (%)= .65 1.50
02605> Length (m)= 450.00 100.00
02606> Mannings n = .030 .250
02607> -----
02608> Max. eff. Inten. (mm/hr)= 144.69 87.13
02609> over (min)= 10.00 25.00
02610> Storage Coeff. (min)= 10.21 (ii) 24.30 (ii)
02611> Unit Hyd. Tpeak (min)= 10.00 25.00
02612> Unit Hyd. peak (cms)= .11 .05
02613> -----
02614> *TOTALS*
02615> PEAK FLOW (cms)= 2.10 .71 2.398 (iii)
02616> TIME TO PEAK (hrs)= 1.08 1.38 1.125
02617> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02618> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02619> RUNOFF COEFFICIENT = .97 .59 .780
02620> -----
02621> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02622> CN* = 81.0 Ia = Dep. Storage (Above)
02623> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02624> THAN THE STORAGE COEFFICIENT.
02625> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02626> -----
02627> 001:0017-----
02628> * SUB-AREA No.3
02629> | CALIB STANDHYD | Area (ha)= 15.60 | Dir. Conn.(%)= 50.00
02630> | 04:HIP04 DT= 2.50 | Total Imp(%)= 71.00
02631> -----
02632> IMPERVIOUS PERVIOUS (i)
02633> Surface Area (ha)= 11.08 4.52
02634> Dep. Storage (mm)= 1.57 4.67
02635> Average Slope (%)= .50 1.50
02636> Length (m)= 600.00 100.00
02637> Mannings n = .030 .250
02638> -----
02639> Max. eff. Inten. (mm/hr)= 111.10 77.71
02640> over (min)= 15.00 30.00
02641> Storage Coeff. (min)= 14.59 (ii) 29.34 (ii)
02642> Unit Hyd. Tpeak (min)= 15.00 30.00
02643> Unit Hyd. peak (cms)= .08 .04
02644> -----
02645> *TOTALS*
02646> PEAK FLOW (cms)= 1.57 .57 1.679 (iii)
02647> TIME TO PEAK (hrs)= 1.17 1.46 1.208
02648> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02649> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02650> RUNOFF COEFFICIENT = .97 .59 .780
02651> -----
02652> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02653> CN* = 81.0 Ia = Dep. Storage (Above)
02654> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02655> THAN THE STORAGE COEFFICIENT.
02656> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02657> -----
02658> 001:0018-----
02659> | ADD HYD (HIP05) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02660> | ID1 03:HIP03 | (ha) (cms) (hrs) (mm) (mm) (cms)
02661> | +ID2 04:HIP04 | 15.60 1.879 1.21 45.44 .000
02662> | SUM 05:HIP05 | 32.60 4.157 1.13 45.44 .000
02663> -----
02664> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02665> -----
02666> 001:0019-----
02667> * SUB-AREA No.4
02668> | ADD HYD (HIP06) | ID: NHYD AREA OPEAK TPEAK R.V. DWF
02669> | ID1 05:HIP05 | (ha) (cms) (hrs) (mm) (mm) (cms)
02670> | +ID2 02:HIP02 | 28.46 2.622 1.17 48.15 .000
02671> | SUM 06:HIP06 | 61.06 6.741 1.17 46.70 .000
02672> -----
02673> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02674> -----
02675> 001:0020-----
02676> * SUB-AREA No.4

02701> CALIB STANDHYD | Area (ha)= 12.20
02702> 07:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
02703>
02704> IMPERVIOUS PERVIOUS (i)
02705> Surface Area (ha)= 8.66 3.54
02706> Dep. Storage (mm)= 1.57 4.67
02707> Average Slope (%)= .70 1.50
02708> Length (m)= 210.00 100.00
02709> Mannings n = .030 .250
02710>
02711> Max. eff. Inten. (mm/hr)= 144.69 101.36
02712> over (min)= 7.50 20.00
02713> Storage Coeff. (min)= 6.32 (ii) 19.58 (ii)
02714> Unit Hyd. Tpeak (min)= 7.50 20.00
02715> Unit Hyd. peak (cms)= .17 .06
02716> *TOTALS*
02717> PEAK FLOW (cms)= 1.86 .59 2.109 (iii)
02718> TIME TO PEAK (hrs)= 1.04 1.29 1.042
02719> RUNOFF VOLUME (mm)= 56.66 34.22 45.437
02720> TOTAL RAINFALL (mm)= 58.23 58.23 58.226
02721> RUNOFF COEFFICIENT = .97 .59 .780
02722> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02723> CN* = 81.0 Ia = Dep. Storage (Above)
02724> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02725> THAN THE STORAGE COEFFICIENT.
02726> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02727> 001:0021
02728> *SUB-AREA No.5
02729> DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
02730> 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02731> U.H. Tp (hrs)= .170
02732>
02733> Unit Hyd Qpeak (cms)= .899
02734> PEAK FLOW (cms)= .459 (i)
02735> TIME TO PEAK (hrs)= 1.167
02736> RUNOFF VOLUME (mm)= 29.155
02737> TOTAL RAINFALL (mm)= 58.226
02738> RUNOFF COEFFICIENT = .501
02739> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02740> 001:0022
02741> ADD HYD (HIP08) | ID: NHYD AREA APEAK TPEAK R.V. DWF
02742> ID1 06:HIP06 61.06 6.741 1.17 46.70 .000
02743> +ID2 07:HIP07 12.20 2.109 1.04 45.44 .000
02744> +ID3 08:Pond-B 4.00 .459 1.17 29.15 .000
02745> SUM 09:HIP08 77.26 8.998 1.13 45.59 .000
02746>
02747> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

02748> 001:0023
02749> ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02750> IN-09: (HIP08)
02751> OUT-10: (HIP-PO)
02752> ===== OUTFLOW STORAGE TABLE =====
02753> OUTFLOW STORAGE OUTFLOW STORAGE
02754> (cms) (ha.m.) | (cms) (ha.m.)
02755> .000 .000E+00 | .724 .2210E+01
02756> .048 .5740E+01 | 1.937 .2501E+01
02757> .054 .2434E+00 | 1.262 .2798E+01
02758> .059 .5834E+00 | 1.404 .3101E+01
02759> .062 .8400E+00 | 1.532 .3410E+01
02760> .064 .1102E+01 | 1.650 .3724E+01
02761> .147 .1370E+01 | 2.409 .4042E+01
02762> .280 .1644E+01 | 3.689 .4370E+01
02763> .472 .1924E+01 | .000 .0000E+00
02764>
02765> ROUTING RESULTS AREA APEAK TPEAK R.V.
02766> (ha) (cms) (hrs) (mm)
02767> INFLOW:09: (HIP08) 77.26 8.998 1.125 45.591
02768> OUTFLOW:10: (HIP-PO) 77.26 1.004 3.083 45.591
02769>
02770> PEAK FLOW REDUCTION [Qout/ Qin] (%) = 11.160
02771> TIME SHIFT OF PEAK FLOW (min) = 117.50
02772> MAXIMUM STORAGE USED (ha.m.) = 2562E+01
02773>
02774> 001:0024
02775> *SUB-AREA No. 6
02776> DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
02777> 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
02778> U.H. Tp (hrs)= .800
02779> Unit Hyd Qpeak (cms)= .129
02780> PEAK FLOW (cms)= .079 (i)
02781> TIME TO PEAK (hrs)= 2.000
02782> RUNOFF VOLUME (mm)= 21.442
02783> TOTAL RAINFALL (mm)= 58.226
02784> RUNOFF COEFFICIENT = .368
02785> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02786> 001:0025
02787> ADD HYD (Ultima) | ID: NHYD AREA APEAK TPEAK R.V. DWF
02788> ID1 10:HIP-PO 77.26 1.004 3.08 45.59 .000
02789> +ID2 01:A3 2.70 .079 2.00 21.44 .000
02790> SUM 02:Ultima 79.96 1.051 3.01 44.78 .000
02791>
02792> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

02793> 001:0026
02794> ***** CALCULATION OF 3HR - 1:50 YEAR STORM EVENT *****
02795> *****
02796> *****
02797> *****
02798> *****
02799> *****
02800> *****

02801> 001:0027
02802> START | Project dir.: V:\20983.DU\ENG\FINALS-\SWHYM-1\
02803> Rainfall dir.: V:\20983.DU\ENG\FINALS-\SWHYM-1\
02804> TZERO = .00 hrs on 0
02805> METOUT = 2 (output = METRIC)
02806> NRUN = 001
02807> NSTORM = 0
02808>
02809> 001:0002
02810> CHICAGO STORM | IDF curve parameters: A=1569.580

02836> | Total= 64.81 mm | B= 6.014
02837> C= .820
02838> used in: INTENSITY = A / (t + B)^C
02839>
02840> Duration of storm = 3.00 hrs
02841> Storm time step = 10.00 min
02842> Time to peak ratio = .33
02843>
02844> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02845> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02846> .17 5.467 | 1.00 161.471 | 1.83 10.000 | 2.67 5.209
02847> .33 6.820 | 1.17 48.876 | 2.00 8.397 | 2.83 4.774
02848> .50 9.187 | 1.33 24.704 | 2.17 7.256 | 3.00 4.412
02849> .67 14.441 | 1.50 16.495 | 2.33 6.403 |
02850> .83 36.764 | 1.67 12.422 | 2.50 5.740 |
02851>
02852>
02853> 001:0003
02854>
02855> | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-\SWHYM-1\ORGA.VAL
02856> I CASEBY = 1 (read and print data)
02857> FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
02858> ----- PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 60 -----
02859> Horton's infiltration equation parameters:
02860> [P= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAV= 2.00 /hr] [P= .00 mm]
02861> Parameters for PERVIOUS surfaces in STANDHYD:
02862> [IAPER= 4.67 mm] [LPG= 40.00 m] [MNI= .250]
02863> Parameters for IMPERVIOUS surfaces in STANDHYD:
02864> [IAlmp= 1.57 mm] [CLI= 1.50] [MNI= .035]
02865> Parameters used in NASHYD:
02866> [Ia= 4.67 mm] [N= 3.00]
02867>
02868> 001:0004
02869> *****
02870> * ORGAWORLD FILE *
02871> *****
02872> *
02873> * SUB-AREA No.1
02874>
02875> CALIB STANDHYD | Area (ha)= 2.07 Dir. Conn.(%)= 84.00
02876> 01:010 DT= 2.50 | Total Imp(%)= 84.00
02877>
02878> IMPERVIOUS PERVIOUS (i)
02879> Surface Area (ha)= 1.74 .33
02880> Dep. Storage (mm)= 1.57 4.67
02881> Average Slope (%)= .52 1.00
02882> Length (m)= 204.72 20.00
02883> Mannings n = .030 .250
02884>
02885> Max. eff. Inten. (mm/hr)= 161.47 62.27
02886> over (min)= 7.50 20.00
02887> Storage Coeff. (min)= 6.51 (ii) 19.58 (ii)
02888> Unit Hyd. Tpeak (min)= 7.50 20.00
02889> Unit Hyd. peak (cms)= .16 .09
02890> *TOTALS*
02891> PEAK FLOW (cms)= .59 .03 1.609 (iii)
02892> TIME TO PEAK (hrs)= 1.04 1.29 1.042
02893> RUNOFF VOLUME (mm)= 63.24 30.21 57.952
02894> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02895> RUNOFF COEFFICIENT = .98 .47 .894
02896>
02897> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02898> CN* = 81.0 Ia = Dep. Storage (Above)
02899> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02900> THAN THE STORAGE COEFFICIENT.
02901> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02902>
02903>
02904> 001:0005
02905> * SUB-AREA No. 2
02906> CALIB STANDHYD | Area (ha)= 1.54 Dir. Conn.(%)= 92.00
02907> 02:020 DT= 2.50 | Total Imp(%)= 92.00
02908>
02909> IMPERVIOUS PERVIOUS (i)
02910> Surface Area (ha)= 1.42 .12
02911> Dep. Storage (mm)= 1.57 4.67
02912> Average Slope (%)= .50 1.00
02913> Length (m)= 244.34 5.00
02914> Mannings n = .030 .030
02915>
02916> Max. eff. Inten. (mm/hr)= 161.47 78.73
02917> over (min)= 7.50 20.00
02918> Storage Coeff. (min)= 7.33 (ii) 8.10 (ii)
02919> Unit Hyd. Tpeak (min)= 7.50 7.50
02920> Unit Hyd. peak (cms)= .15 .14
02921> *TOTALS*
02922> PEAK FLOW (cms)= .46 .02 .475 (iii)
02923> TIME TO PEAK (hrs)= 1.04 1.08 1.042
02924> RUNOFF VOLUME (mm)= 63.24 30.21 60.594
02925> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02926> RUNOFF COEFFICIENT = .98 .47 .935
02927>
02928> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02929> CN* = 81.0 Ia = Dep. Storage (Above)
02930> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02931> THAN THE STORAGE COEFFICIENT.
02932> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

02933> 001:0006
02934> * SUB-AREA No.3
02935> CALIB STANDHYD | Area (ha)= 1.40 Dir. Conn.(%)= 97.00
02936> 03:030 DT= 2.50 | Total Imp(%)= 97.00
02937>
02938> IMPERVIOUS PERVIOUS (i)
02939> Surface Area (ha)= 1.36 .04
02940> Dep. Storage (mm)= 1.57 4.67
02941> Average Slope (%)= .51 1.00
02942> Length (m)= 225.63 5.00
02943> Mannings n = .030 .030
02944>
02945> Max. eff. Inten. (mm/hr)= 161.47 78.73
02946> over (min)= 7.50 7.50
02947> Storage Coeff. (min)= 6.95 (ii) 7.72 (ii)
02948> Unit Hyd. Tpeak (min)= 7.50 7.50
02949> Unit Hyd. peak (cms)= .16 .15
02950> *TOTALS*
02951> PEAK FLOW (cms)= 1.45 .01 1.451 (iii)
02952> TIME TO PEAK (hrs)= 1.04 1.08 1.042
02953> RUNOFF VOLUME (mm)= 63.24 30.21 62.245
02954> TOTAL RAINFALL (mm)= 64.81 64.81 64.806
02955> RUNOFF COEFFICIENT = .98 .47 .960
02956>
02957> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02958> CN* = 81.0 Ia = Dep. Storage (Above)
02959> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02960> THAN THE STORAGE COEFFICIENT.
02961> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Table with columns: ID, ADD HYD, ID: NHYD, AREA, QPEAK, TPEAK, R.V., DWF. Rows 02971 to 02977.

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Table with columns: ID, ADD HYD, ID: NHYD, AREA, QPEAK, TPEAK, R.V., DWF. Rows 02982 to 02988.

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Table with columns: ID, CALIB STANDHYD, Area, Total Imp, Dir. Conn. Rows 02992 to 02998.

Table with columns: Surface Area, Dep. Storage, Average Slope, Length, Mannings n. Rows 03002 to 03007.

Table with columns: Max. eff. Inten., Storage Coeff., Unit Hyd. Tpeak, Unit Hyd. peak. Rows 03008 to 03012.

Table with columns: PEAK FLOW, TIME TO PEAK, RUNOFF VOLUME, TOTAL RAINFALL, RUNOFF COEFFICIENT. Rows 03013 to 03018.

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

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

Table with columns: ID, CALIB STANDHYD, Area, Total Imp, Dir. Conn. Rows 03022 to 03028.

Table with columns: Surface Area, Dep. Storage, Average Slope, Length, Mannings n. Rows 03032 to 03037.

Table with columns: Max. eff. Inten., Storage Coeff., Unit Hyd. Tpeak, Unit Hyd. peak. Rows 03038 to 03042.

Table with columns: PEAK FLOW, TIME TO PEAK, RUNOFF VOLUME, TOTAL RAINFALL, RUNOFF COEFFICIENT. Rows 03043 to 03048.

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

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

Table with columns: ID, ADD HYD, ID: NHYD, AREA, QPEAK, TPEAK, R.V., DWF. Rows 03052 to 03058.

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Table with columns: ID, ADD HYD, ID: NHYD, AREA, QPEAK, TPEAK, R.V., DWF. Rows 03062 to 03068.

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Table with columns: ID, ADD HYD, ID: NHYD, AREA, QPEAK, TPEAK, R.V., DWF. Rows 03072 to 03078.

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Table with columns: ROUTING RESULTS, AREA, QPEAK, TPEAK, R.V. Rows 03100 to 03105.

Table with columns: ID, TIME SHIFT OF PEAK FLOW, MAXIMUM STORAGE USED. Rows 03106 to 03111.

Table with columns: ID, CALIB STANDHYD, Area, Total Imp, Dir. Conn. Rows 03114 to 03119.

Table with columns: Surface Area, Dep. Storage, Average Slope, Length, Mannings n. Rows 03121 to 03126.

Table with columns: Max. eff. Inten., Storage Coeff., Unit Hyd. Tpeak, Unit Hyd. peak. Rows 03127 to 03132.

Table with columns: PEAK FLOW, TIME TO PEAK, RUNOFF VOLUME, TOTAL RAINFALL, RUNOFF COEFFICIENT. Rows 03133 to 03138.

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

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

Table with columns: ID, ADD HYD (HIPO2), ID: NHYD, AREA, QPEAK, TPEAK, R.V., DWF. Rows 03142 to 03148.

Table with columns: ID, CALIB STANDHYD, Area, Total Imp, Dir. Conn. Rows 03152 to 03158.

Table with columns: Surface Area, Dep. Storage, Average Slope, Length, Mannings n. Rows 03162 to 03167.

Table with columns: Max. eff. Inten., Storage Coeff., Unit Hyd. Tpeak, Unit Hyd. peak. Rows 03168 to 03172.

Table with columns: PEAK FLOW, TIME TO PEAK, RUNOFF VOLUME, TOTAL RAINFALL, RUNOFF COEFFICIENT. Rows 03173 to 03178.

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

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

Table with columns: ID, CALIB STANDHYD, Area, Total Imp, Dir. Conn. Rows 03182 to 03188.

Table with columns: Surface Area, Dep. Storage, Average Slope, Length, Mannings n. Rows 03192 to 03197.

Table with columns: Max. eff. Inten., Storage Coeff., Unit Hyd. Tpeak, Unit Hyd. peak. Rows 03198 to 03202.

Table with columns: PEAK FLOW, TIME TO PEAK, RUNOFF VOLUME, TOTAL RAINFALL, RUNOFF COEFFICIENT. Rows 03203 to 03208.

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

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

03781> SUM 05:HIP05 32.60 5.767 1.13 58.02 .000
 03782>
 03783> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03784>
 03785>-----
 03786> 001:0019
 03787> | ADD HYD (HIP05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03788> | (ha) (cms) (hrs) (mm) (cms)
 03789> ID1 05:HIP05 32.60 5.767 1.13 58.02 .000
 03790> +ID2 02:HIP02 28.46 3.554 1.17 60.91 .000
 03791>-----
 03792> SUM 06:HIP06 61.06 9.239 1.13 59.36 .000
 03793>
 03794> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03795>
 03796>
 03797>-----
 03798> 001:0020
 03799> *
 03800> * SUB-AREA No. 4
 03801>-----

03802> | CALIB STANDHYD | Area (ha)= 12.20
 03803> | DT:HIP07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
 03804>-----
 03805> IMPERVIOUS PERVIOUS (i)
 03806> Surface Area (ha)= 8.66 3.54
 03807> Dep. Storage (mm)= 1.57 4.67
 03808> Average Slope (%)= .70 1.50
 03809> Length (m)= 210.00 100.00
 03810> Mannings n = .030 .250
 03811>
 03812> Max. eff. Inten. (mm/hr)= 178.56 146.17
 03813> over (min)= 5.00 17.50
 03814> Storage Coeff. (min)= 5.81 (ii) 17.27 (ii)
 03815> Unit Hyd. Tpeak (min)= 5.00 17.50
 03816> Unit Hyd. peak (cms)= .20 .07
 03817>-----
 03818> *TOTALS*
 03819> PEAK FLOW (cms)= 2.46 .87 2.793 (iii)
 03820> TIME TO PEAK (hrs)= 1.00 1.25
 03821> RUNOFF VOLUME (mm)= 70.09 45.94 58.015
 03822> TOTAL RAINFALL (mm)= 71.66 71.66 71.665
 03823> RUNOFF COEFFICIENT = .98 .64 .810

03824> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 03825> CN* = 81.0 Ia = Dep. Storage (Above)
 03826> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 03827> THAN THE STORAGE COEFFICIENT.
 03828> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03829>
 03830>-----
 03831> 001:0021
 03832>-----
 03833> *SUB-AREA No. 5
 03834>-----

03835> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
 03836> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
 03837> | U.H. Tp(hrs)= .170
 03838>-----
 03839> Unit Hyd Qpeak (cms)= .899
 03840>
 03841> PEAK FLOW (cms)= .649 (i)
 03842> TIME TO PEAK (hrs)= 1.125
 03843> RUNOFF VOLUME (mm)= 40.139
 03844> TOTAL RAINFALL (mm)= 71.665
 03845> RUNOFF COEFFICIENT = .560
 03846>
 03847> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03848>
 03849>-----
 03850> 001:0022
 03851>-----

03852> | ADD HYD (HIP08) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03853> | (ha) (cms) (hrs) (mm) (cms)
 03854> ID1 06:HIP06 61.06 9.239 1.13 59.36 .000
 03855> +ID2 07:HIP07 12.20 2.793 1.04 58.02 .000
 03856> +ID3 08:Pond-B 4.00 .649 1.13 40.14 .000
 03857>-----
 03858> SUM 09:HIP08 77.26 12.109 1.13 58.16 .000
 03859>
 03860> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03861>
 03862>-----
 03863> 001:0023
 03864>-----

03865> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
 03866> | IN>09: (HIP08) |
 03867> | OUT<10: (HIP-PO) |
 03868>-----
 03869> OUTFLOW STORAGE | OUTFLOW STORAGE
 03870> (cms) (ha.m.) | (cms) (ha.m.)
 03871> .000 .0000E+00 | .724 .2210E+01
 03872> .048 .5740E-01 | .937 .2501E+01
 03873> .054 .2434E+00 | 1.262 .2798E+01
 03874> .059 .5834E+00 | 1.404 .3101E+01
 03875> .062 .8400E+00 | 1.532 .3410E+01
 03876> .064 .1102E+01 | 1.650 .3724E+01
 03877> .147 .1370E+01 | 2.409 .4044E+01
 03878> .280 .1644E+01 | 3.689 .4370E+01
 03879> .472 .1924E+01 | .000 .0000E+00
 03880>-----
 03881> ROUTING RESULTS AREA QPEAK TPEAK R.V.
 03882> (ha) (cms) (hrs) (mm)
 03883> INFLOW >09: (HIP08) 77.26 12.109 1.125 58.156
 03884> OUTFLOW <10: (HIP-PO) 77.26 1.432 2.889 58.156
 03885>-----
 03886> PEAK FLOW REDUCTION [Qout/Qin] (%) = 11.826
 03887> TIME SHIFT OF PEAK FLOW (min) = 105.83
 03888> MAXIMUM STORAGE USED (ha.m.) = .3168E+01
 03889>-----
 03890> 001:0024
 03891> *
 03892> *SUB-AREA No. 6
 03893>-----

03894> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
 03895> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
 03896> | U.H. Tp(hrs)= .800
 03897>-----
 03898> Unit Hyd Qpeak (cms)= .129
 03899>
 03900> PEAK FLOW (cms)= .114 (i)
 03901> TIME TO PEAK (hrs)= 1.958
 03902> RUNOFF VOLUME (mm)= 30.490
 03903> TOTAL RAINFALL (mm)= 71.665
 03904> RUNOFF COEFFICIENT = .425
 03905>
 03906> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
 03907>
 03908>-----
 03909> 001:0025
 03910>-----

03911> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
 03912> | (ha) (cms) (hrs) (mm) (cms)
 03913> ID1 10:HIP-PO 77.26 1.432 2.89 58.16 .000
 03914> +ID2 01:A3 2.70 .114 1.96 30.49 .000
 03915>-----

03916> SUM 02:Ultima 79.96 1.515 2.57 57.22 .000
 03917>
 03918> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 03919>
 03920>-----
 03921> 001:0026
 03922> FINISH
 03923>-----
 03924> *****
 03925> WARNINGS / ERRORS / NOTES
 03926>-----
 03927> Simulation ended on 2009-05-15 at 08:45:24
 03928>-----
 03929>
 03930>

APPENDIX 'I'

**MINISTRY OF THE ENVIRONMENT
CERTIFICATE OF APPROVAL
EXISTING SETTLING PONDS**

NK



Ministry of the Environment
Ministère de l'Environnement



CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 6924-5YWQ3U

R. W. Tomlinson Limited
5597 Power Road, R.R. No. 6
Gloucester, Ontario
K1G 3N4

Site Location: Tomlinson Property, east side of Hawthorne Road
Lot 26 & 27, Concession VI
Ottawa City

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of sewage works for the collection, transmission, treatment and disposal of excess wash plant wash water, consisting of the following:

- 410 millimeter pipeline extending from the wash plant, located on the Rideau Road Quarry #1 site, to the settling ponds;
- three (3) settling ponds, in series, Cell #1 having an effective volume of 3,275 cubic metres (and an operating freeboard of 0.6 metres), Cell #2 having an effective volume of 2,347 cubic metres (and an operating freeboard of 0.6 metres) and Cell #3 having an effective volume of 1,154 cubic metres (and an operating freeboard of 0.6 metres), including temporary floating pumping station in Cell #1, floating recycle pumping station in Cell #2, baffle in Cell #2 and mixing manhole between Cell #2 and Cell #3 (if required), with an overflow discharge from Cell #3 to the roadside ditch along Hawthorne Road;
- all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works;

all in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Ronald Tomlinson of R. W. Tomlinson Limited dated March 8, 2004;
2. Report on Application for Industrial Sewage Works Approval under Section 53 of the Ontario Water Resources Act, R.W. Tomlinson Limited, Aggregate Wash Water Management Associated with Rideau Road Quarry No. 1, Geographic City of Gloucester, City of Ottawa, Ontario prepared by Golder Associates, dated March 2004; and

3. Letter and attachments dated May 11, 2004 from Nural Kuyucak and K. Marentette of Golder Associates to Randy Chin of the Ministry of the Environment.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means R. W. Tomlinson Limited and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

(1) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

(2) Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner or operating authority, or both;

(b) change of address of Owner or operating authority or address of new owner or operating

authority;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Partnerships Registration Act*; and

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the *Corporations Informations Act* shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this certificate, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition will refer to this certificate's number.

3. 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:

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

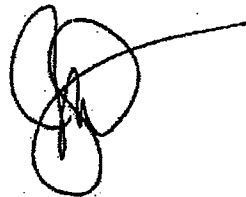
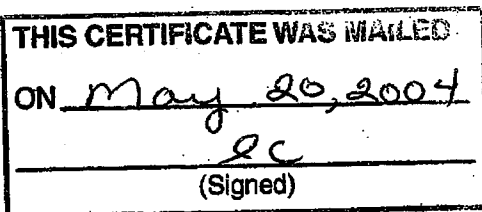
The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* 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



Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

RC/

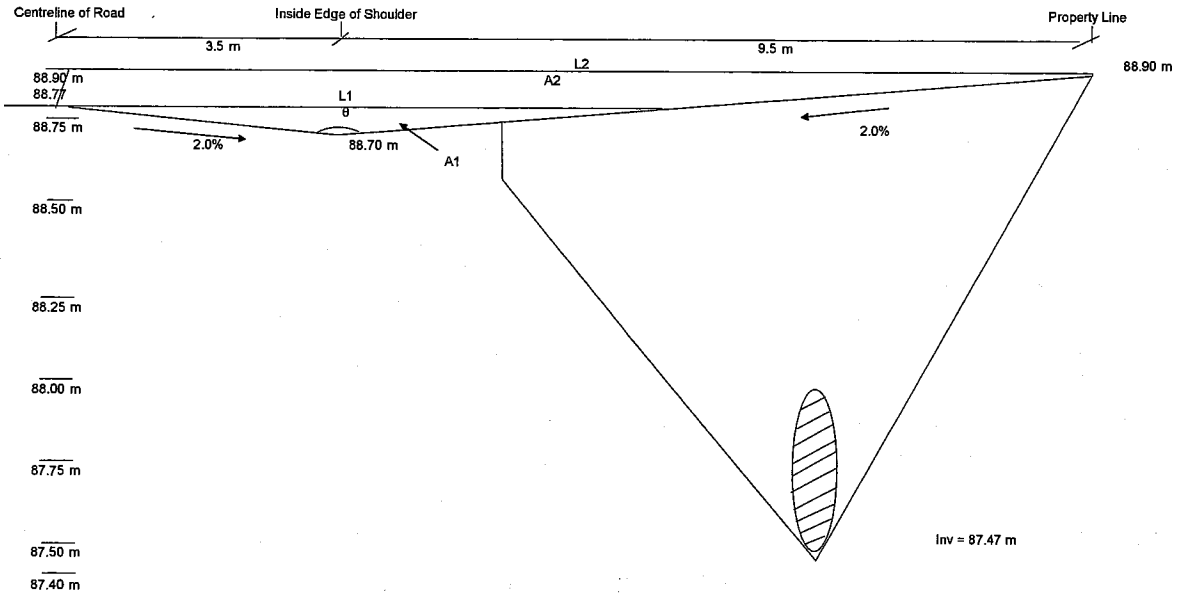
c: District Manager, MOE Ottawa
Nural Kuyucak, Golder Associates Ltd. ✓

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
B: 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: $Q = C \times L \times H^{1.5}$ $C = 1.84$ $L' = L1 - (0.1 \times n \times h)$, where n= no. of end contractions use $h = 88.77 - 88.7 = 0.07$ m $h = 0.07$ m $L' = 6.99$ m $Q_{A1} = 0.24$ m ³ /s	Using the Rectangular Weir Equation to Estimate the Flow Thru A2: $Q = C \times L \times H^{1.5}$ $C = 1.84$ $L' = L3 - (0.1 \times n \times h)$, where n= no. of end contractions use $h = 88.9 - 88.77 = 0.13$ m $h = 0.13$ m $L3 = (L1 + L2) / 2 = 10$ m (Avg. Length) $L' = 9.97$ m $Q_{A2} = 0.86$ m ³ /s

1:100 year Peak Flow Rate of 3.0 m³/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 m³/s (From Culvert Sizing Nomograph 27B-27C)

Total flow above culvert = $Q_{A1} + Q_{A2} = 0.24$ m³/s + 0.86 m³/s = 1.10 m³/s

Therefore, Total Flow = 1.9 m³/s + 1.1 m³/s

= 3.0 m³/s

= 1:100 year Peak Flow Rate

APPENDIX 'K'

**SWMHYMO INPUT AND OUTPUT FILES
(July 1, 1979 Historical Storm Event)**

```
00001> 2 Metric units
00002> *****
00003> # Project Name : Hawthorne Industrial Park Project Number: [20983] *
00004> # Date : January, 2009
00005> # Revised : N/A
00006> # Developed by : Mark Buchanan, E.I.T.
00007> # Reviewed by : Guy Forget, P.Eng.
00008> # Company : J.L. Richards & Associates Limited
00009> # License # : 4618403
00010> *****
00011> *
00012> *
00013> *****
00014> # FILENAME: V:\20983.DUEN\G\SMHYMO\20983PST.DAT
00015> # FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
00016> # OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE *
00017> *****
00018> *
00019> *****
00020> # SMHYMO FILE DEVELOPED TO INVESTIGATE FLOOD FLOWS OF THE
00021> # PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00022> *****
00023> *****
00024> *****
00025> # HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *
00026> # FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
00027> *****
00028> *****
00029> # CALCULATION OF JULY 1st 1979 STORM EVENT *
00030> *****
00031> *****
00032> START TZERO=[0.0], METOUT=[2], NSTORM=[0], NRUN=[0]
00033> # [ ] <- storm filename, one per line for NSTORM time
00034> STORM_FILENAME=[\"JUL_1_79.STM\"]
00035> *****
00036> # DBDEFAULT VALUES ICAStDef=[1], read and print values
00037> DEVAL_FILENAME=[V:\22973.DUEN\G\SMHYMO\"ORGA.VAL\"]
00038> *****
00039> *****
00040> *****
00041> # ORGAWORLD FILE
00042> *****
00043> *
00044> # SUB-AREA No.1
00045> *
00046> CALIB STANDHYD ID=[ 1 ], NHYD=[\"010\"], DT=[2.5] (min), AREA=[ 2.07 ] (ha),
00047> XIMP=[0.84], TIMP=[0.84], DWF=[0.0] (cms), LOSS=[2],
00048> SCS curve number CN=[81],
00049> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00050> LGP=[20] (m), MNP=[ 0.25 ], SCP=[0.0] (m)
00051> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.52] (%),
00052> LGI=[204.72] (m), MNI=[0.03], SCI=[0.0]
00053> RAINFALL=[ , , , ] (mm/hr), END=-1
00054> *****
00055> *
00056> # SUB-AREA No.2
00057> *
00058> CALIB STANDHYD ID=[ 2 ], NHYD=[\"020\"], DT=[2.5] (min), AREA=[ 1.54 ] (ha),
00059> XIMP=[0.92], TIMP=[0.92], DWF=[0.0] (cms), LOSS=[2],
00060> SCS curve number CN=[81],
00061> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00062> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (m),
00063> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.50] (%),
00064> LGI=[244.34] (m), MNI=[0.03], SCI=[0.0]
00065> RAINFALL=[ , , , ] (mm/hr), END=-1
00066> *****
00067> *
00068> # SUB-AREA No.3
00069> *
00070> CALIB STANDHYD ID=[ 3 ], NHYD=[\"030\"], DT=[2.5] (min), AREA=[1.41] (ha),
00071> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00072> SCS curve number CN=[81],
00073> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.0] (%),
00074> LGP=[5] (m), MNP=[0.03], SCP=[0.0] (min),
00075> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.51] (%),
00076> LGI=[ 225.63 ] (m), MNI=[0.03], SCI=[0.0]
00077> RAINFALL=[ , , , ] (mm/hr), END=-1
00078> *****
00079> # ADD HYD IDsum=[4], NHYD=[ \"040\" ], IDs to add=[1+2]
00080> *****
00081> # ADD HYD IDsum=[5], NHYD=[ \"050\" ], IDs to add=[3+4]
00082> *****
00083> *
00084> # SUB-AREA No.4
00085> *
00086> CALIB STANDHYD ID=[6], NHYD=[\"060\"], DT=[2.5] (min), AREA=[0.89] (ha),
00087> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00088> SCS curve number CN=[81],
00089> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[0.7] (%),
00090> LGP=[40] (m), MNP=[0.25], SCP=[0.0] (min)
00091> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.93] (%),
00092> LGI=[164.82] (m), MNI=[0.03], SCI=[0.0] (
00093> RAINFALL=[ , , , ] (mm/hr), END=-1
00094> *****
00095> *
00096> # SUB-AREA No.5
00097> *
00098> CALIB STANDHYD ID=[ 7 ], NHYD=[\"070\"], DT=[2.5] (min), AREA=[2.66] (ha),
00099> XIMP=[0.97], TIMP=[0.97], DWF=[0.0] (cms), LOSS=[2],
00100> SCS curve number CN=[81],
00101> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00102> LGP=[20.0] (m), MNP=[0.25], SCP=[0.0] (m)
00103> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.61] (%),
00104> LGI=[207.25] (m), MNI=[0.03], SCI=[0.0] (
00105> RAINFALL=[ , , , ] (mm/hr), END=-1
00106> *****
00107> # ADD HYD IDsum=[8], NHYD=[ \"080\" ], IDs to add=[6+7]
00108> *****
00109> # ADD HYD IDsum=[9], NHYD=[ \"090\" ], IDs to add=[5+8]
00110> *****
00111> *
00112> # ROUTE RESERVOIR IDout=[10], NHYD=[\"POND\"], IDin=[9],
00113> RDT=[1.0] (min),
00114> TABLE of ( OUTFLOW-STORAGE ) values
00115> ( cms ) - ( ha-m )
00116> [ 0.000, 0.0000 ]
00117> [ 0.008, 0.0656 ]
00118> [ 0.017, 0.1311 ]
00119> [ 0.093, 0.2831 ]
00120> [ 0.223, 0.3971 ]
00121> [ 0.337, 0.4731 ]
00122> [ 0.465, 0.5491 ]
00123> [ 0.531, 0.5871 ]
00124> [ 0.593, 0.6251 ]
00125> [ 0.654, 0.6631 ]
00126> [ 0.797, 0.7391 ]
00127> [ 0.950, 0.8274 ]
00128> [ 1.304, 0.9157 ]
00129> [ 1.880, 1.0040 ]
00130> [ 2.577, 1.0923 ]
00131> [ -1, -1 ] (max twenty pts)
00132> *****
00133> *****
00134> # Remaining Hawthorne Industrial Park
00135> *****
```

```
00136> *
00137> # SUB-AREA No.1
00138> *
00139> CALIB STANDHYD ID=[ 1 ], NHYD=[\"HIP01\"], DT=[2.5] (min), AREA=[19.9] (ha),
00140> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00141> SCS curve number CN=[81],
00142> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00143> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00144> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.6] (%),
00145> LGI=[580] (m), MNI=[0.03], SCI=[0.0] (min
00146> RAINFALL=[ , , , ] (mm/hr), END=-1
00147> *****
00148> # ADD HYD IDsum=[ 2 ], NHYD=[\"HIP02\"], IDs to add=[10+1]
00149> *****
00150> *
00151> # SUB-AREA No.2
00152> *
00153> CALIB STANDHYD ID=[ 3 ], NHYD=[\"HIP03\"], DT=[2.5] (min), AREA=[17] (ha),
00154> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00155> SCS curve number CN=[81],
00156> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00157> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00158> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00159> LGI=[450] (m), MNI=[0.03], SCI=[0.0] (min
00160> RAINFALL=[ , , , ] (mm/hr), END=-1
00161> *****
00162> *
00163> # SUB-AREA No.3
00164> *
00165> CALIB STANDHYD ID=[ 4 ], NHYD=[\"HIP04\"], DT=[2.5] (min), AREA=[15.6] (ha),
00166> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00167> SCS curve number CN=[81],
00168> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00169> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00170> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.65] (%),
00171> LGI=[600] (m), MNI=[0.03], SCI=[0.0] (min
00172> RAINFALL=[ , , , ] (mm/hr), END=-1
00173> *****
00174> # ADD HYD IDsum=[ 5 ], NHYD=[\"HIP05\"], IDs to add=[3+4]
00175> *****
00176> # ADD HYD IDsum=[ 6 ], NHYD=[\"HIP06\"], IDs to add=[5+2]
00177> *****
00178> *
00179> # SUB-AREA No.4
00180> *
00181> CALIB STANDHYD ID=[ 7 ], NHYD=[\"HIP07\"], DT=[2.5] (min), AREA=[12.2] (ha),
00182> XIMP=[0.50], TIMP=[0.71], DWF=[0.0] (cms), LOSS=[2],
00183> SCS curve number CN=[81],
00184> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[1.5] (%),
00185> LGP=[100.0] (m), MNP=[0.25], SCP=[0.0] (m)
00186> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.7] (%),
00187> LGI=[210] (m), MNI=[0.03], SCI=[0.0] (min
00188> RAINFALL=[ , , , ] (mm/hr), END=-1
00189> *****
00190> *
00191> *
00192> # SUB-AREA No.5
00193> *
00194> DESIGN NASHYD ID=[ 8 ], NHYD=[\"Pond-Block\"], DT=[2.5] (min), AREA=[4.0] (ha),
00195> DWF=[0.0] (cms), CN/C=[ 95 ], TP=[0.17] hrs,
00196> RAINFALL=[ , , , ] (mm/hr), END=-1
00197> *****
00198> *
00199> # ADD HYD IDsum=[ 9 ], NHYD=[\"HIP08\"], IDs to add=[6+7+8]
00200> *****
00201> *
00202> # ROUTE RESERVOIR IDout=[ 10 ], NHYD=[\"HIP-POND\"], IDin=[ 9 ],
00203> RDT=[1.0] (min),
00204> TABLE of ( OUTFLOW-STORAGE ) values
00205> ( cms ) - ( ha-m )
00206> [ 0.0, 0.0 ]
00207> [ 0.048, 0.0574 ]
00208> [ 0.054, 0.2434 ]
00209> [ 0.059, 0.5834 ]
00210> [ 0.062, 0.8400 ]
00211> [ 0.064, 1.1024 ]
00212> [ 0.147, 1.3705 ]
00213> [ 0.280, 1.6444 ]
00214> [ 0.472, 1.9242 ]
00215> [ 0.724, 2.2097 ]
00216> [ 0.937, 2.5010 ]
00217> [ 1.262, 2.7981 ]
00218> [ 1.404, 3.1009 ]
00219> [ 1.532, 3.4096 ]
00220> [ 1.650, 3.7240 ]
00221> [ 2.409, 4.0442 ]
00222> [ 3.689, 4.3702 ]
00223> [ -1, -1 ] (max twenty pts)
00224> *****
00225> *
00226> *
00227> # SUB-AREA No. 6
00228> *
00229> DESIGN NASHYD ID = [1], NHYD=[\"A3\"], DT=[2.5] (min), AREA=[2.7] (ha),
00230> DWF=[0] (cms), CN/C=[76], TP=[0.60] hrs,
00231> RAINFALL=[ , , , ] (mm/hr), END=-1
00232> *****
00233> *
00234> # ADD HYD IDsum=[2], NHYD=[\"Ultimate\"], IDs to add=[10+1]
00235> *****
00236> *
00237> FINISH
00238> *
00239> *
00240> *
00241> *
00242> *
```



```

00001 *****
00002 *****
00003 SSSSS W W M M H H Y Y M M O O 999 999 *****
00004 W W M M H H Y Y M M O O 9 9 9 9 *****
00005 SSSSS W W M M H H H H Y Y M M O O ## 9 9 9 9 Ver. 4.02
00006 S W W M M H H Y M M O O 9999 9999 July 1999
00007 SSSSS W W M M H H Y M M O O 9 9 9 *****
00008 StormWater Management Hydrologic Model 9 9 9 # 418403
00009 *****
00010 *****
00011 *****
00012 *****
00013 ***** A single event and continuous hydrologic simulation model *****
00014 ***** based on the principles of HMO and its successors *****
00015 *****
00016 ***** OTHMO-83 and OTHMO-89 *****
00017 ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018 ***** Ottawa, Ontario: (613) 727-5199 *****
00019 ***** Gatineau, Quebec: (819) 243-6858 *****
00020 ***** E-Mail: swmhm@jfsa.com *****
00021 *****
00022 *****
00023 *****
00024 ***** Licensed user: J. L. Richards & Associates Limited *****
00025 ***** Ottawa SERIAL# 418403 *****
00026 *****
00027 *****
00028 *****
00029 ***** ***** PROGRAM ARRAY DIMENSIONS *****
00030 ***** Maximum value for: 10 *****
00031 ***** Max. number of rainfall points: 15000 *****
00032 ***** Max. number of flow points : 15000 *****
00033 *****
00034 *****
00035 *****
00036 ***** DETAILED OUTPUT *****
00037 *****
00038 ***** DATE: 2009-05-15 TIME: 09:03:53 RUN COUNTER: 000200 *****
00039 *****
00040 ***** * Input filename: V:\20983.DU\ENG\FINALS-1\SWMHM-1\July1979.dat *****
00041 ***** * Output filename: V:\20983.DU\ENG\FINALS-1\SWMHM-1\July1979.out *****
00042 ***** * Summary filename: V:\20983.DU\ENG\FINALS-1\SWMHM-1\July1979.sum *****
00043 ***** * User comments: *****
00044 ***** * 1: *****
00045 ***** * 2: *****
00046 ***** * 3: *****
00047 *****
00048 *****
00049 *****
00050 001:0001 *****
00051 *****
00052 ***** * Project Name : Hawthorne Industrial Park Project Number: [20983] *
00053 ***** * Date : January, 2009 *
00054 ***** * Revised : N/A *
00055 ***** * Developed by : Mark Buchanan, E.I.T. *
00056 ***** * Reviewed by : Guy Forget, P.Eng. *
00057 ***** * Company : J.L. Richards & Associates Limited *
00058 ***** * License # : 4418403 *
00059 *****
00060 *****
00061 *****
00062 *****
00063 ***** * FILENAME: V:\20983.DU\ENG\SWMHM\20983PST.DAT *
00064 ***** * FILE DEVELOPED FOR SITE PLAN APPLICATION AND DETAILED DESIGN *
00065 ***** * OF A FACILITY ASSOCIATED WITH THE OTTAWA COMPOSTING SITE *
00066 *****
00067 *****
00068 *****
00069 *****
00070 ***** * PROPOSED COMPOSTING SITE UNDER POST-DEVELOPMENT UNCONTROLLED CONDITIONS *
00071 *****
00072 *****
00073 ***** * HYDROLOGICAL ANALYSIS UNDER A 4 HR-25 MM STORM AND *
00074 ***** * FOR DESIGN STORMS OF 1:2, 5, 10, 25, 50, AND 100 YR *
00075 *****
00076 *****
00077 ***** * CALCULATION OF JULY 1st 1979 STORM EVENT *
00078 *****
00079 *****
00080 ***** | START | Project dir.: V:\20983.DU\ENG\FINALS-1\SWMHM-1\
00081 ***** | Rainfall dir.: V:\20983.DU\ENG\FINALS-1\SWMHM-1\
00082 ***** | TZERO = .00 hrs on 0
00083 ***** | MPOUT = 2 (output = METRIC)
00084 ***** | NWUN = 001
00085 ***** | NSTORM = 0
00086 *****
00087 *****
00088 *****
00089 ***** | READ FROM | Filename: V:\20983.DU\ENG\FINALS-1\SWMHM-1\JUL_1
00090 ***** | Ptotal= 88.86 mm | Comments: HISTORICAL STORM - JULY 1, 1979
00091 *****
00092 *****
00093 *****
00094 *****
00095 *****
00096 *****
00097 *****
00098 *****
00099 *****
00100 *****
00101 *****
00102 *****
00103 *****
00104 *****
00105 *****
00106 *****
00107 ***** | DEFAULT VALUES | Filename: V:\20983.DU\ENG\FINALS-1\SWMHM-1\ORGA.VAL
00108 ***** | ICASEdv = 1 (read and print data)
00109 ***** | FileTitle= ----- ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE -----
00110 ***** | PARAMETER VALUES MUST BE ENTERED AFTER COLUMN 50 -----
00111 ***** | Horton's infiltration equation parameters:
00112 ***** | [Fo= 50.00 mm/hr] [Fc= 7.50 mm/hr] [DCAY= 2.00 /hr] [E= .00 mm]
00113 ***** | Parameters for PERVIOUS surfaces in STANDHYD:
00114 ***** | [Iaper= 4.67 mm] [LQP=40.00 mm] [MNP= .250]
00115 ***** | Parameters for IMPERVIOUS surfaces in STANDHYD:
00116 ***** | [Irimp= 1.57 mm] [CII= 1.50] [MNI= .035]
00117 ***** | Parameters used in NASHDY:
00118 ***** | [Ia= 4.67 mm] [N= 3.00]
00119 *****
00120 *****
00121 *****
00122 ***** * ORGAWORLD FILE *
00123 *****
00124 *****
00125 ***** * SUB-AREA No.1 *****
00126 *****
00127 ***** | CALIB STANDHYD | Area (ha)= 2.07
00128 ***** | 01:010 DT= 2.50 | Total Imp(%)= 84.00 Dir. Conn.(%)= 84.00
00129 *****
00130 *****
00131 ***** | Surface Area (ha)= IMPERVIOUS PERVIOUS (i)
00132 ***** | Dep. Storage (mm)= 1.74 .33
00133 ***** | Average Slope (%)= 1.57 4.67
00134 ***** | Length (m)= 204.72 20.00
00135 ***** | Mannings n = .030 .250

```

```

00136 *****
00137 ***** Max.eff.Inten.(mm/hr)= 106.70 67.70
00138 ***** over (min)= 7.50 15.00
00139 ***** Storage Coeff. (min)= 7.69 (ii) 14.39 (ii)
00140 ***** Unit Hyd. Tpeak (min)= 7.50 15.00
00141 ***** Unit Hyd. peak (cms)= .15 .08
00142 *****
00143 ***** *TOTALS*
00144 ***** PEAK FLOW (cms)= .474 .05 (iii)
00145 ***** TIME TO PEAK (hrs)= 1.54 1.71 1.542
00146 ***** RUNOFF VOLUME (mm)= 87.29 49.30 81.209
00147 ***** TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00148 ***** RUNOFF COEFFICIENT = .98 .55 .914
00149 *****
00150 ***** (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00151 ***** CN* = 81.0 Ia = Dep. Storage (Above)
00152 ***** (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00153 ***** THAN THE STORAGE COEFFICIENT.
00154 ***** (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00155 *****
00156 *****
00157 *****
00158 ***** * SUB-AREA No.2 *****
00159 *****
00160 ***** | CALIB STANDHYD | Area (ha)= 1.54
00161 ***** | 02:020 DT= 2.50 | Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00
00162 *****
00163 ***** | IMPERVIOUS PERVIOUS (i)
00164 ***** | Surface Area (ha)= 1.42 .12
00165 ***** | Dep. Storage (mm)= 1.57 4.67
00166 ***** | Average Slope (%)= 1.50 1.00
00167 ***** | Length (m)= 244.34 5.00
00168 ***** | Mannings n = .030 .030
00169 *****
00170 ***** Max.eff.Inten.(mm/hr)= 106.70 74.64
00171 ***** over (min)= 7.50 10.00
00172 ***** Storage Coeff. (min)= 8.65 (ii) 9.44 (ii)
00173 ***** Unit Hyd. Tpeak (min)= 7.50 10.00
00174 ***** Unit Hyd. peak (cms)= .14 .12
00175 *****
00176 ***** PEAK FLOW (cms)= .35 .02 *TOTALS* (iii)
00177 ***** TIME TO PEAK (hrs)= 1.54 1.63 1.542
00178 ***** RUNOFF VOLUME (mm)= 87.29 49.30 84.248
00179 ***** TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00180 ***** RUNOFF COEFFICIENT = .98 .55 .948
00181 *****
00182 ***** (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00183 ***** CN* = 81.0 Ia = Dep. Storage (Above)
00184 ***** (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00185 ***** THAN THE STORAGE COEFFICIENT.
00186 ***** (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00187 *****
00188 *****
00189 *****
00190 *****
00191 ***** * SUB-AREA No.3 *****
00192 *****
00193 ***** | CALIB STANDHYD | Area (ha)= 1.40
00194 ***** | 03:030 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00195 *****
00196 ***** | IMPERVIOUS PERVIOUS (i)
00197 ***** | Surface Area (ha)= 1.36 .04
00198 ***** | Dep. Storage (mm)= 1.57 4.67
00199 ***** | Average Slope (%)= .51 1.00
00200 ***** | Length (m)= 225.63 5.00
00201 ***** | Mannings n = .030 .030
00202 *****
00203 ***** Max.eff.Inten.(mm/hr)= 106.70 74.64
00204 ***** over (min)= 7.50 10.00
00205 ***** Storage Coeff. (min)= 8.20 (ii) 8.98 (ii)
00206 ***** Unit Hyd. Tpeak (min)= 7.50 10.00
00207 ***** Unit Hyd. peak (cms)= .14 .12
00208 *****
00209 ***** PEAK FLOW (cms)= .34 .01 *TOTALS* (iii)
00210 ***** TIME TO PEAK (hrs)= 1.54 1.63 1.542
00211 ***** RUNOFF VOLUME (mm)= 87.29 49.30 86.147
00212 ***** TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00213 ***** RUNOFF COEFFICIENT = .98 .55 .970
00214 *****
00215 ***** (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00216 ***** CN* = 81.0 Ia = Dep. Storage (Above)
00217 ***** (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00218 ***** THAN THE STORAGE COEFFICIENT.
00219 ***** (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00220 *****
00221 *****
00222 *****
00223 *****
00224 ***** | ADD HYD (040 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00225 ***** | (ha) (cms) (hrs) (mm) (cms)
00226 ***** | ID1 01:010 | 2.07 476 1.54 81.21 .000
00227 ***** | +ID2 02:020 | 1.54 .367 1.54 84.25 .000
00228 ***** | -----
00229 ***** | SUM 04:040 | 3.61 .844 1.54 82.50 .000
00230 *****
00231 ***** NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00232 *****
00233 *****
00234 *****
00235 *****
00236 ***** | ADD HYD (050 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00237 ***** | (ha) (cms) (hrs) (mm) (cms)
00238 ***** | ID1 03:030 | 1.40 .344 1.54 86.15 .000
00239 ***** | +ID2 04:040 | 3.61 .844 1.54 82.50 .000
00240 ***** | -----
00241 ***** | SUM 05:050 | 5.01 1.188 1.54 83.52 .000
00242 *****
00243 ***** NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00244 *****
00245 *****
00246 *****
00247 *****
00248 ***** * SUB-AREA No.4 *****
00249 *****
00250 ***** | CALIB STANDHYD | Area (ha)= .89
00251 ***** | 06:060 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00252 *****
00253 ***** | IMPERVIOUS PERVIOUS (i)
00254 ***** | Surface Area (ha)= .86 .03
00255 ***** | Dep. Storage (mm)= 1.57 4.67
00256 ***** | Average Slope (%)= .93 .70
00257 ***** | Length (m)= 164.82 40.00
00258 ***** | Mannings n = .030 .250
00259 *****
00260 ***** Max.eff.Inten.(mm/hr)= 106.70 65.89
00261 ***** over (min)= 5.00 17.50
00262 ***** Storage Coeff. (min)= 5.67 (ii) 17.10 (ii)
00263 ***** Unit Hyd. Tpeak (min)= 5.00 17.50
00264 ***** Unit Hyd. peak (cms)= .21 .07
00265 *****
00266 ***** PEAK FLOW (cms)= .23 .00 *TOTALS* (iii)
00267 ***** TIME TO PEAK (hrs)= 1.50 1.75 1.500
00268 ***** RUNOFF VOLUME (mm)= 87.29 49.30 86.147
00269 ***** TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00270 ***** RUNOFF COEFFICIENT = .98 .55 .970

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00271> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00272> CN* = 81.0 Ia = Dep. Storage (Above)
00273> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00274> THAN THE STORAGE COEFFICIENT.
00275> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00276>
00277>
00278>
00279> 001:0010-----
00280> * SUB-AREA No.5
00281>
00282> | CALIB STANDHYD | Area (ha)= 2.66
00283> | 07:070 DT= 2.50 | Total Imp(%)= 97.00 Dir. Conn.(%)= 97.00
00284>
00285> IMPERVIOUS PERVIOUS (i)
00286> Surface Area (ha)= 2.58 .08
00287> Dep. Storage (mm)= 1.57 4.67
00288> Average Slope (%)= .61 1.50
00289> Length (m)= 207.25 20.00
00290> Mannings n = .030 .250
00291>
00292> Max. eff. Inten. (mm/hr)= 106.70 70.39
00293> over (min)= 7.50 12.50
00294> Storage Coeff. (min)= 7.39 (ii) 13.23 (ii)
00295> Unit Hyd. Tpeak (min)= 7.50 12.50
00296> Unit Hyd. peak (cms)= .15 .09
00297>
00298> PEAK FLOW (cms)= .65 .01 *TOTALS*
00299> TIME TO PEAK (hrs)= 1.54 1.67 .655 (iii)
00300> RUNOFF VOLUME (mm)= 87.29 49.30 86.147
00301> TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00302> RUNOFF COEFFICIENT = .98 .55 .970
00303>
00304> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00305> CN* = 81.0 Ia = Dep. Storage (Above)
00306> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00307> THAN THE STORAGE COEFFICIENT.
00308> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00309>
00310>
00311>
00312> 001:0011-----
00313> | ADD HYD (080) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00314> | (ha) (cms) (hrs) (mm) (cms)
00315> ID1 06:060 .89 .235 1.50 86.15 .000
00316> +ID2 07:070 2.66 .665 1.54 86.15 .000
00317> -----
00318> SUM 08:080 3.55 .896 1.54 86.15 .000
00319>
00320> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00321>
00322>
00323>
00324> 001:0012-----
00325> | ADD HYD (090) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00326> | (ha) (cms) (hrs) (mm) (cms)
00327> ID1 05:050 5.01 1.188 1.54 83.52 .000
00328> +ID2 08:080 3.55 .896 1.54 86.15 .000
00329> -----
00330> SUM 09:090 8.56 2.084 1.54 84.61 .000
00331>
00332> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00333>
00334>
00335>
00336> 001:0013-----
00337> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00338> | ID:0 (090) |
00339> | OUT<10: (POND) |
00340> ===== OUTFLOW STORAGE TABLE =====
00341> OUTFLOW STORAGE OUTFLOW STORAGE
00342> (cms) (ha.m.) (ha.m.)
00343> .000 .0000E+00 .593 .6251E+00
00344> .008 .6560E-01 .654 .6631E+00
00345> .017 .1311E+00 .797 .7921E+00
00346> .093 .2831E+00 .950 .8274E+00
00347> .233 .3971E+00 1.304 .9157E+00
00348> .337 .4731E+00 1.880 .1004E+01
00349> .465 .5491E+00 2.577 .1092E+01
00350> .531 .5871E+00 .000 .0000E+00
00351>
00352> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00353> INFLOW<05: (090) (ha) (cms) (hrs) (mm)
00354> 8.56 2.084 1.542 84.611
00355> OUTFLOW<10: (POND) 8.56 .496 2.123 84.607
00356>
00357> PEAK FLOW REDUCTION [Qout/Qin] (%) = 23.815
00358> TIME SHIFT OF PEAK FLOW (min) = 35.00
00359> MAXIMUM STORAGE USED (ha.m.) = .5671E+00
00360>
00361>
00362> 001:0014-----
00363> *****
00364> * Remaining Hawthorne Industrial Park *
00365> *****
00366> *
00367> * SUB-AREA No.1
00368>
00369> | CALIB STANDHYD | Area (ha)= 19.90
00370> | 01:H1P01 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00371>
00372> IMPERVIOUS PERVIOUS (i)
00373> Surface Area (ha)= 14.13 5.77
00374> Dep. Storage (mm)= 1.57 4.67
00375> Average Slope (%)= .60 1.50
00376> Length (m)= 580.00 100.00
00377> Mannings n = .030 .250
00378>
00379> Max. eff. Inten. (mm/hr)= 96.53 119.96
00380> over (min)= 15.00 27.50
00381> Storage Coeff. (min)= 14.32 (ii) 26.72 (ii)
00382> Unit Hyd. Tpeak (min)= 15.00 27.50
00383> Unit Hyd. peak (cms)= .08 .04
00384>
00385> PEAK FLOW (cms)= 2.14 1.33 *TOTALS*
00386> TIME TO PEAK (hrs)= 1.67 1.92 3.264 (iii)
00387> RUNOFF VOLUME (mm)= 87.29 61.48 74.386
00388> TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00389> RUNOFF COEFFICIENT = .98 .69 .837
00390>
00391> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00392> CN* = 81.0 Ia = Dep. Storage (Above)
00393> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00394> THAN THE STORAGE COEFFICIENT.
00395> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00396>
00397>
00398> 001:0015-----
00399>
00400> | ADD HYD (H1P02) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00401> | (ha) (cms) (hrs) (mm) (cms)
00402> ID1 10:POND 8.56 .496 2.13 84.61 .000
00403> +ID2 01:H1P01 19.90 3.264 1.71 74.39 .000
00404> -----
00405> SUM 02:H1P02 28.46 3.642 1.75 77.46 .000

00406>
00407> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00408>
00409>
00410> 001:0016-----
00411> *
00412> * SUB-AREA No.2
00413>
00414> | CALIB STANDHYD | Area (ha)= 17.00
00415> | 03:H1P03 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00416>
00417> IMPERVIOUS PERVIOUS (i)
00418> Surface Area (ha)= 12.07 4.93
00419> Dep. Storage (mm)= 1.57 4.67
00420> Average Slope (%)= .65 1.50
00421> Length (m)= 450.00 100.00
00422> Mannings n = .030 .250
00423>
00424> Max. eff. Inten. (mm/hr)= 100.60 125.35
00425> over (min)= 12.50 25.00
00426> Storage Coeff. (min)= 11.81 (ii) 23.99 (ii)
00427> Unit Hyd. Tpeak (min)= 12.50 25.00
00428> Unit Hyd. peak (cms)= .09 .05
00429>
00430> PEAK FLOW (cms)= 1.92 1.20 *TOTALS*
00431> TIME TO PEAK (hrs)= 1.63 1.88 2.923 (iii)
00432> RUNOFF VOLUME (mm)= 87.29 61.48 74.386
00433> TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00434> RUNOFF COEFFICIENT = .98 .69 .837
00435>
00436> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00437> CN* = 81.0 Ia = Dep. Storage (Above)
00438> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00439> THAN THE STORAGE COEFFICIENT.
00440> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00441>
00442>
00443> 001:0017-----
00444>
00445> * SUB-AREA No.3
00446>
00447> | CALIB STANDHYD | Area (ha)= 15.60
00448> | 04:H1P04 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00449>
00450> IMPERVIOUS PERVIOUS (i)
00451> Surface Area (ha)= 11.08 4.52
00452> Dep. Storage (mm)= 1.57 4.67
00453> Average Slope (%)= .50 1.50
00454> Length (m)= 600.00 100.00
00455> Mannings n = .030 .250
00456>
00457> Max. eff. Inten. (mm/hr)= 96.53 119.96
00458> over (min)= 15.00 27.50
00459> Storage Coeff. (min)= 15.44 (ii) 27.83 (ii)
00460> Unit Hyd. Tpeak (min)= 15.00 27.50
00461> Unit Hyd. peak (cms)= .07 .04
00462>
00463> PEAK FLOW (cms)= 1.64 1.03 *TOTALS*
00464> TIME TO PEAK (hrs)= 1.67 1.92 2.519 (iii)
00465> RUNOFF VOLUME (mm)= 87.29 61.48 74.386
00466> TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00467> RUNOFF COEFFICIENT = .98 .69 .837
00468>
00469> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00470> CN* = 81.0 Ia = Dep. Storage (Above)
00471> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00472> THAN THE STORAGE COEFFICIENT.
00473> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00474>
00475>
00476> 001:0018-----
00477> | ADD HYD (H1P05) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00478> | (ha) (cms) (hrs) (mm) (cms)
00479> ID1 03:H1P03 17.00 2.923 1.67 74.39 .000
00480> +ID2 04:H1P04 15.60 2.519 1.75 74.39 .000
00481> -----
00482> SUM 05:H1P05 32.60 5.435 1.71 74.39 .000
00483>
00484> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00485>
00486>
00487>
00488> 001:0019-----
00489> | ADD HYD (H1P06) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00490> | (ha) (cms) (hrs) (mm) (cms)
00491> ID1 05:H1P05 32.60 5.435 1.71 74.39 .000
00492> +ID2 02:H1P02 28.46 3.642 1.75 77.46 .000
00493> -----
00494> SUM 06:H1P06 61.06 9.050 1.74 75.82 .000
00495>
00496> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00497>
00498>
00499>
00500> 001:0020-----
00501> * SUB-AREA No.4
00502>
00503> | CALIB STANDHYD | Area (ha)= 12.20
00504> | 07:H1P07 DT= 2.50 | Total Imp(%)= 71.00 Dir. Conn.(%)= 50.00
00505>
00506> IMPERVIOUS PERVIOUS (i)
00507> Surface Area (ha)= 8.66 3.54
00508> Dep. Storage (mm)= 1.57 4.67
00509> Average Slope (%)= .70 1.50
00510> Length (m)= 210.00 100.00
00511> Mannings n = .030 .250
00512>
00513> Max. eff. Inten. (mm/hr)= 106.70 131.04
00514> over (min)= 7.50 20.00
00515> Storage Coeff. (min)= 7.14 (ii) 19.11 (ii)
00516> Unit Hyd. Tpeak (min)= 7.50 20.00
00517> Unit Hyd. peak (cms)= .15 .06
00518>
00519> PEAK FLOW (cms)= 1.56 .95 *TOTALS*
00520> TIME TO PEAK (hrs)= 1.54 1.79 2.287 (iii)
00521> RUNOFF VOLUME (mm)= 87.29 61.48 74.386
00522> TOTAL RAINFALL (mm)= 88.86 88.86 88.857
00523> RUNOFF COEFFICIENT = .98 .69 .837
00524>
00525> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00526> CN* = 81.0 Ia = Dep. Storage (Above)
00527> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00528> THAN THE STORAGE COEFFICIENT.
00529> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00530>
00531>
00532> 001:0021-----
00533> * SUB-AREA No.5
00534>
00535> | DESIGN NASHYD | Area (ha)= 4.00 Curve Number (CN)=85.00
00536> | 08:Pond-B DT= 2.50 | Ia (mm)= 4.670 % of Linear Res. (N)= 3.00
00537> U.H. Tp (hrs)= .170

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00541> Unit Hyd Qpeak (cms)= .899
00542>
00543> PEAK FLOW (cms)= .721 (i)
00544> TIME TO PEAK (hrs)= 1.667
00545> RUNOFF VOLUME (mm)= 54.937
00546> TOTAL RAINFALL (mm)= 88.857
00547> RUNOFF COEFFICIENT = .618
00548>
00549> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00550>
-----
00551>
00552> 001:0022-----
00553>
00554> | ADD HYD (HIP08 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00555> |-----|-----|-----|-----|-----|-----|
00556> | | (ha) (cms) (hrs) (mm) (cms)
00557> | ID1 06:HIP06 61.06 9.050 1.74 75.82 .000
00558> | +ID2 07:HIP07 12.20 2.287 1.58 74.39 .000
00559> | +ID3 08:Pond-B 4.00 .721 1.67 54.94 .000
00560> |-----|-----|-----|-----|-----|
00561> | SUM 09:HIP08 77.26 11.944 1.71 74.51 .000
00562>
00563> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00564>
-----
00565> 001:0023-----
00566>
00567> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00568> | IN>09: (HIP08 ) |
00569> |-----|-----|-----|-----|-----|
00570> | | OUTFLOW STORAGE OUTFLOW STORAGE
00571> | (cms) (ha.m.) | (cms) (ha.m.)
00572> | .000 .0000E+00 | .724 .2210E+01
00573> | .048 .5740E-01 | .937 .2501E+01
00574> | .054 .2454E+00 | 1.262 .2798E+01
00575> | .059 .5834E+00 | 1.404 .3101E+01
00576> | .062 .8400E+00 | 1.532 .3410E+01
00577> | .064 .1102E+01 | 1.650 .3724E+01
00578> | .147 .1370E+01 | 2.409 .4044E+01
00579> | .280 .1644E+01 | 3.689 .4370E+01
00580> | .472 .1924E+01 | .000 .0000E+00
00581>
00582> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00583> |-----|-----|-----|-----|
00584> | INFLOW >09: (HIP08 ) 77.26 11.944 1.708 74.508
00585> | OUTFLOW <10: (HIP-PO) 77.26 2.666 2.625 74.508
00586>
00587> PEAK FLOW REDUCTION [Qout/Qin] (%)= 22.321
00588> TIME SHIFT OF PEAK FLOW (min)= 55.00
00589> MAXIMUM STORAGE USED (ha.m.)=.4110E+01
00590>
-----
00591>
00592> 001:0024-----
00593> *
00594> *SUB-AREA No. 6
00595>
00596> | DESIGN NASHYD | Area (ha)= 2.70 Curve Number (CN)=76.00
00597> | 01:A3 DT= 2.50 | Ia (mm)= 4.670 # of Linear Res. (N)= 3.00
00598> | | U.H. Tp (hrs)= .800
00599>
00600> Unit Hyd Qpeak (cms)= .129
00601>
00602> PEAK FLOW (cms)= .180 (i)
00603> TIME TO PEAK (hrs)= 2.333
00604> RUNOFF VOLUME (mm)= 43.111
00605> TOTAL RAINFALL (mm)= 88.857
00606> RUNOFF COEFFICIENT = .485
00607>
00608> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00609>
-----
00610>
00611> 001:0025-----
00612>
00613> | ADD HYD (Ultima) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00614> |-----|-----|-----|-----|-----|
00615> | | (ha) (cms) (hrs) (mm) (cms)
00616> | ID1 10:HIP-PO 77.26 2.666 2.63 74.51 .000
00617> | +ID2 01:A3 2.70 .180 2.33 43.11 .000
00618> |-----|-----|-----|-----|-----|
00619> | SUM 02:Ultima 79.96 2.830 2.61 73.45 .000
00620>
00621> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00622>
-----
00623> 001:0026-----
00624> FINISH
00625>
00626> *****
00627> WARNINGS / ERRORS / NOTES
00628>
00629> Simulation ended on 2009-05-15 at 09:03:53
00630>
00631>
00632>

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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 m³ 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 Enhancement 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	<i>CBOD5</i> , Total Suspended Solids, Total Phosphorus, <i>E. Coli</i> , 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 access 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 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
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



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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OTTAWA OFFICE

C

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.

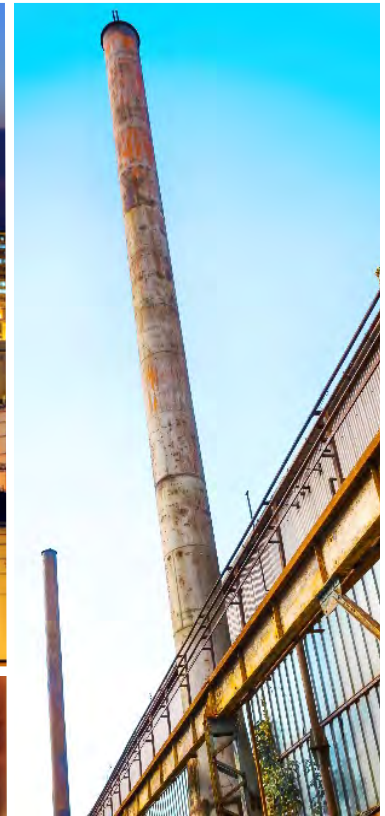




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1. Introduction

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 (m²) (50,000 square feet or s.f.) warehouse; a 1,860 m² (20,000 s.f.) cross-docks and 280 m² (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

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

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)	Potentiometric Elevation (masl)
			November 19, 2020	
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 m²/day (3193 gpd/ft) based on the drawdown and 46.4 m²/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
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 1×10^{-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).

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

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

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:

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

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 m²) 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



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



Nyle McIlveen, P.Eng.



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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.

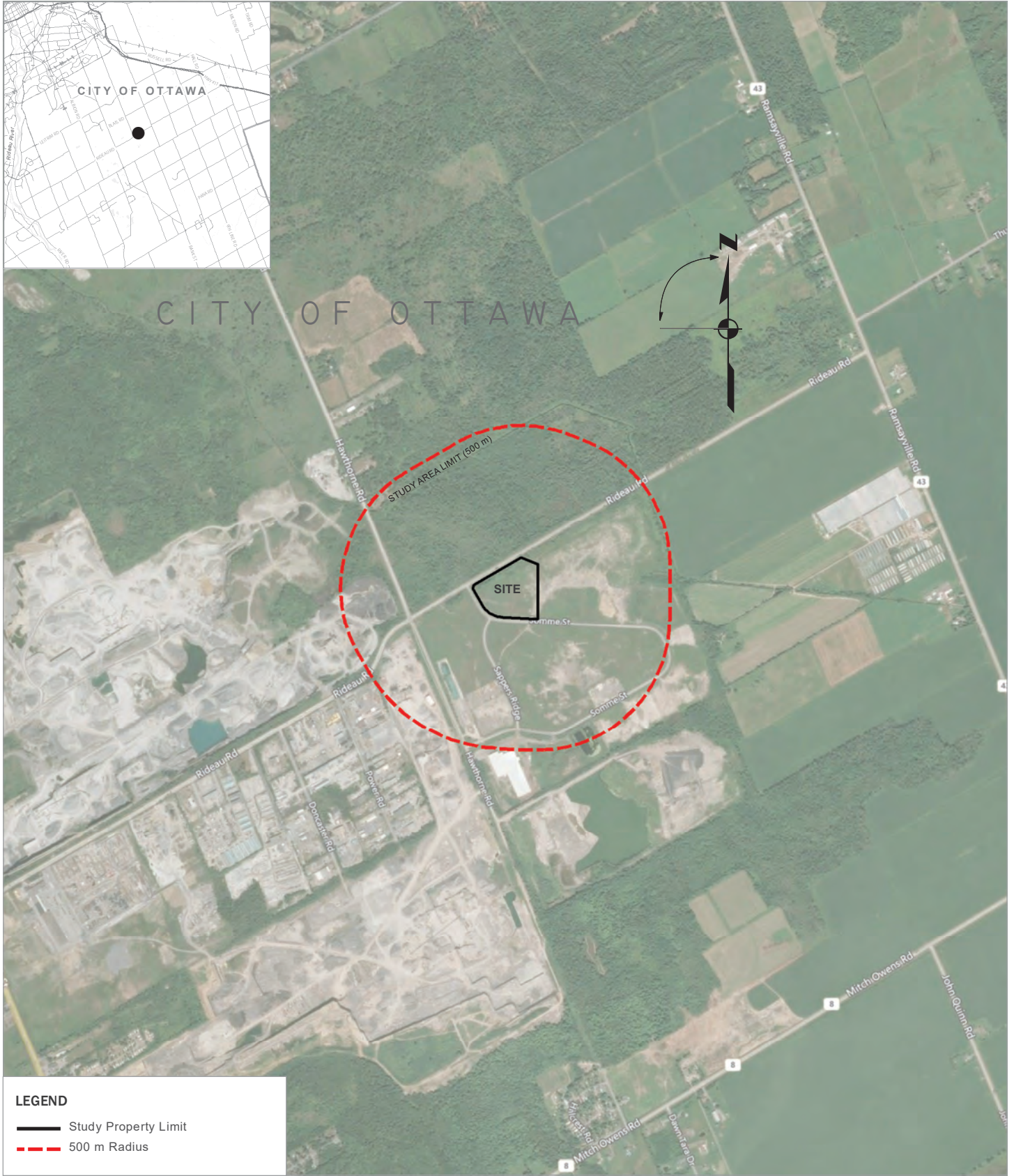
The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent 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



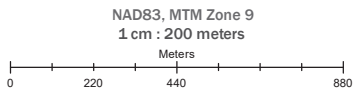
CITY OF OTTAWA



LEGEND

- Study Property Limit
- 500 m Radius

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

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

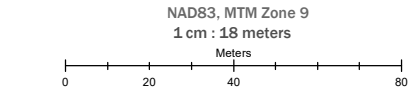
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**HYDROGEOLOGY ASSESSMENT
SITE LOCATION PLAN**

FIGURE 1



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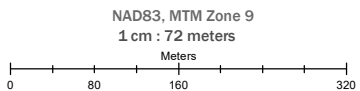
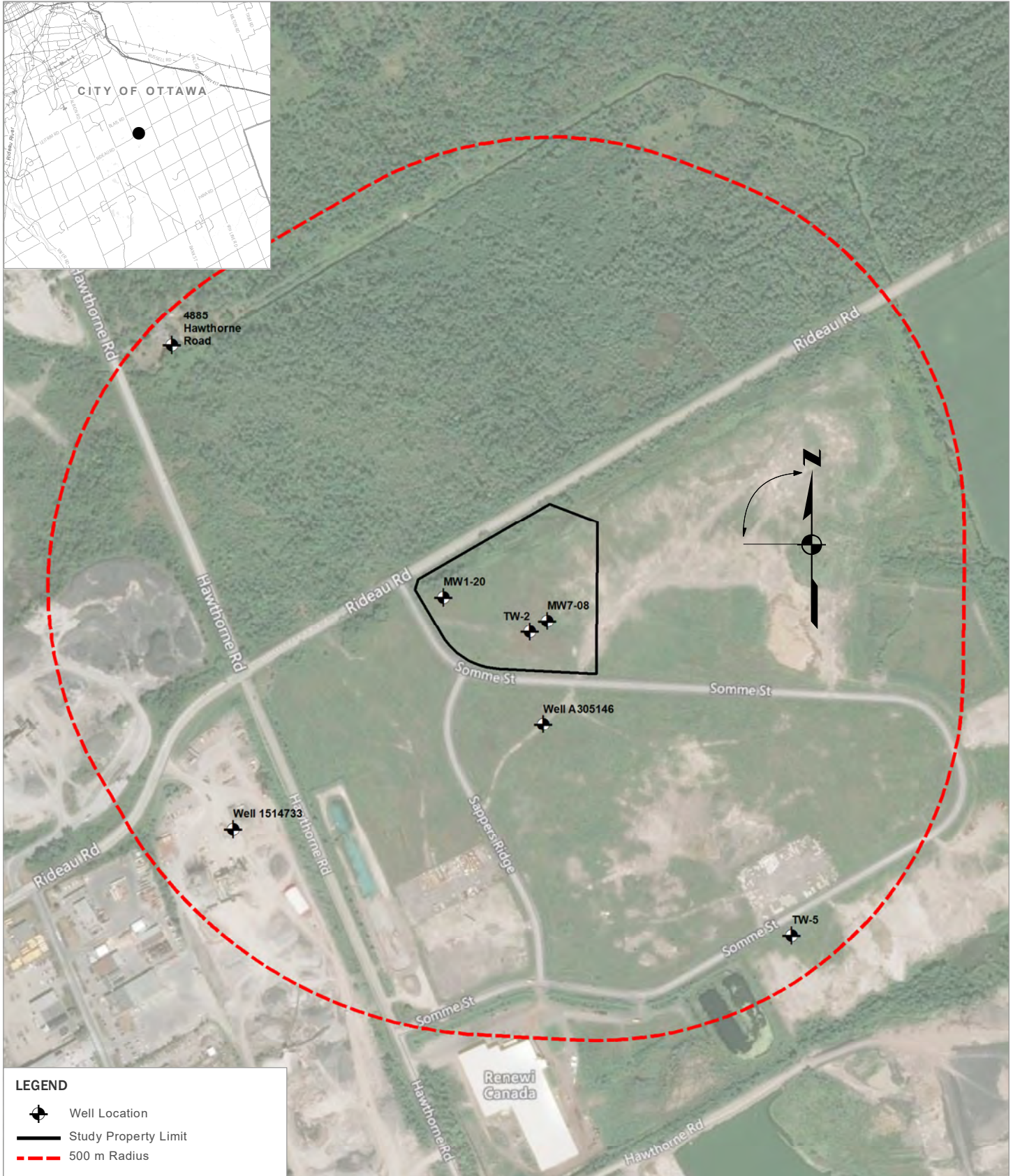
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**HYDROGEOLOGY ASSESSMENT
PRELIMINARY CONCEPT PLAN**

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

FIGURE 2

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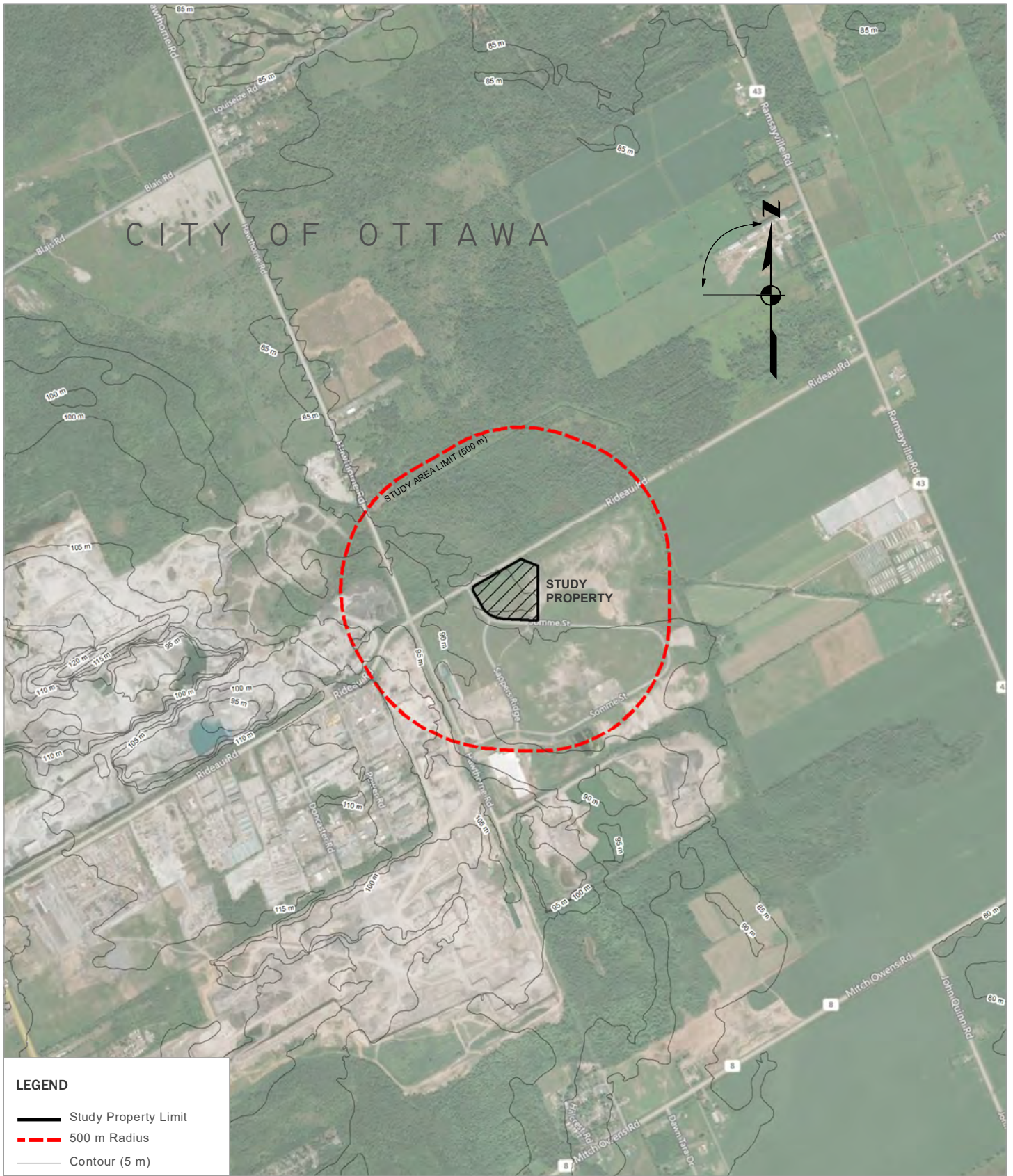
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**HYDROGEOLOGY ASSESSMENT
WELL LOCATION PLAN**

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

FIGURE 3

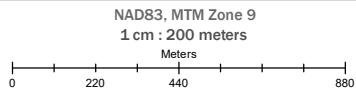
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LEGEND

- Study Property Limit
- 500 m Radius
- Contour (5 m)

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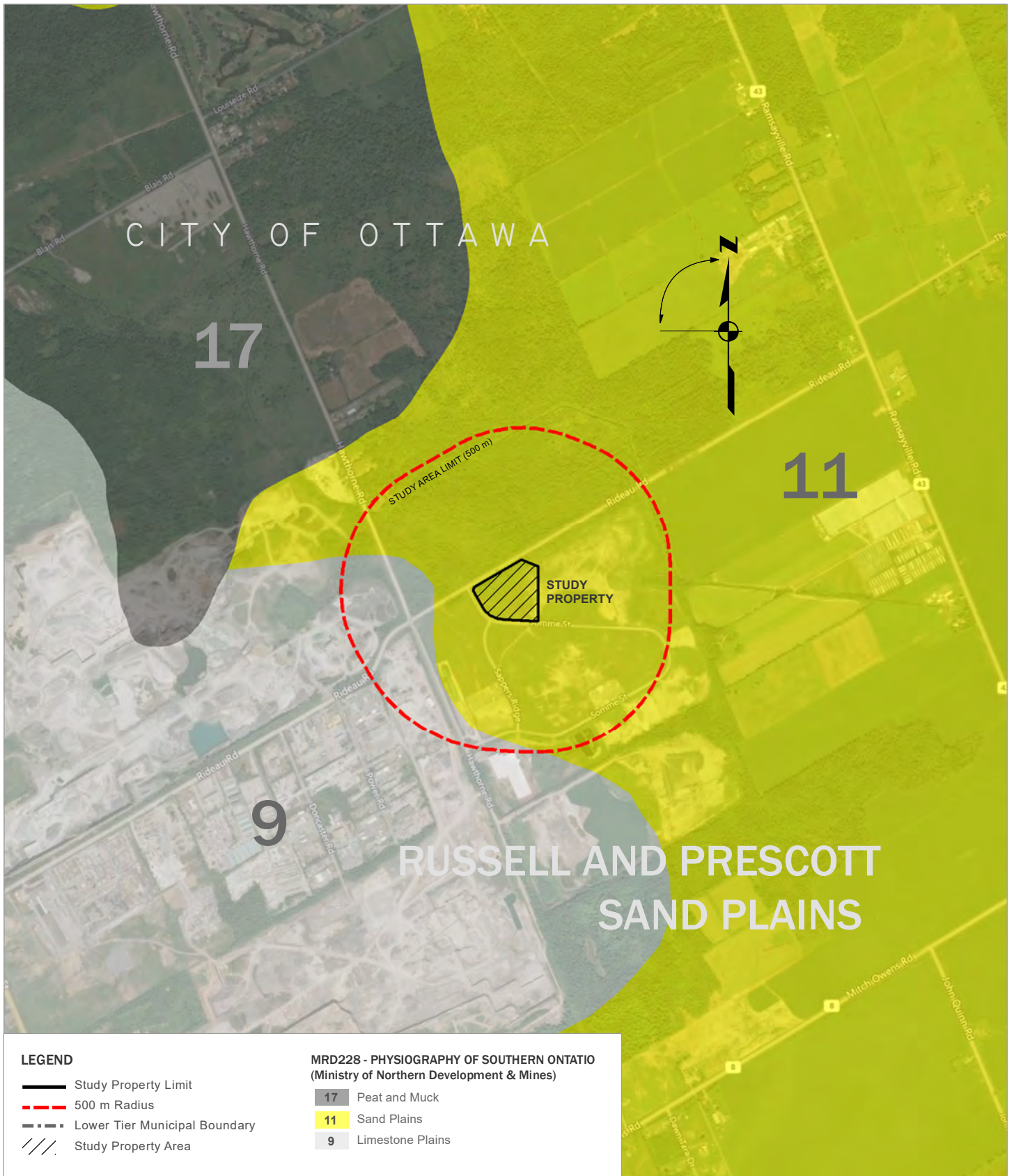
Consolidated Fastfrate (Ottawa) Holdings Inc.
RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

**HYDROGEOLOGY ASSESSMENT
REGIONAL TOPOGRAPHY**

Project No. 11220832
Revision No. -
Date Jan 21

FIGURE 4

Created by: Will Pridham



LEGEND

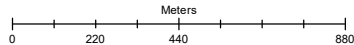
- Study Property Limit
- 500 m Radius
- Lower Tier Municipal Boundary
- Study Property Area

MRD228 - PHYSIOGRAPHY OF SOUTHERN ONTARIO
(Ministry of Northern Development & Mines)

- 17 Peat and Muck
- 11 Sand Plains
- 9 Limestone Plains

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NAD83, MTM Zone 9
1 cm : 200 meters



ATtribution STATEMENTS

- ▶ MRD228-REV. Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario, Ontario Geological Survey, Miscellaneous Release—Data 226.
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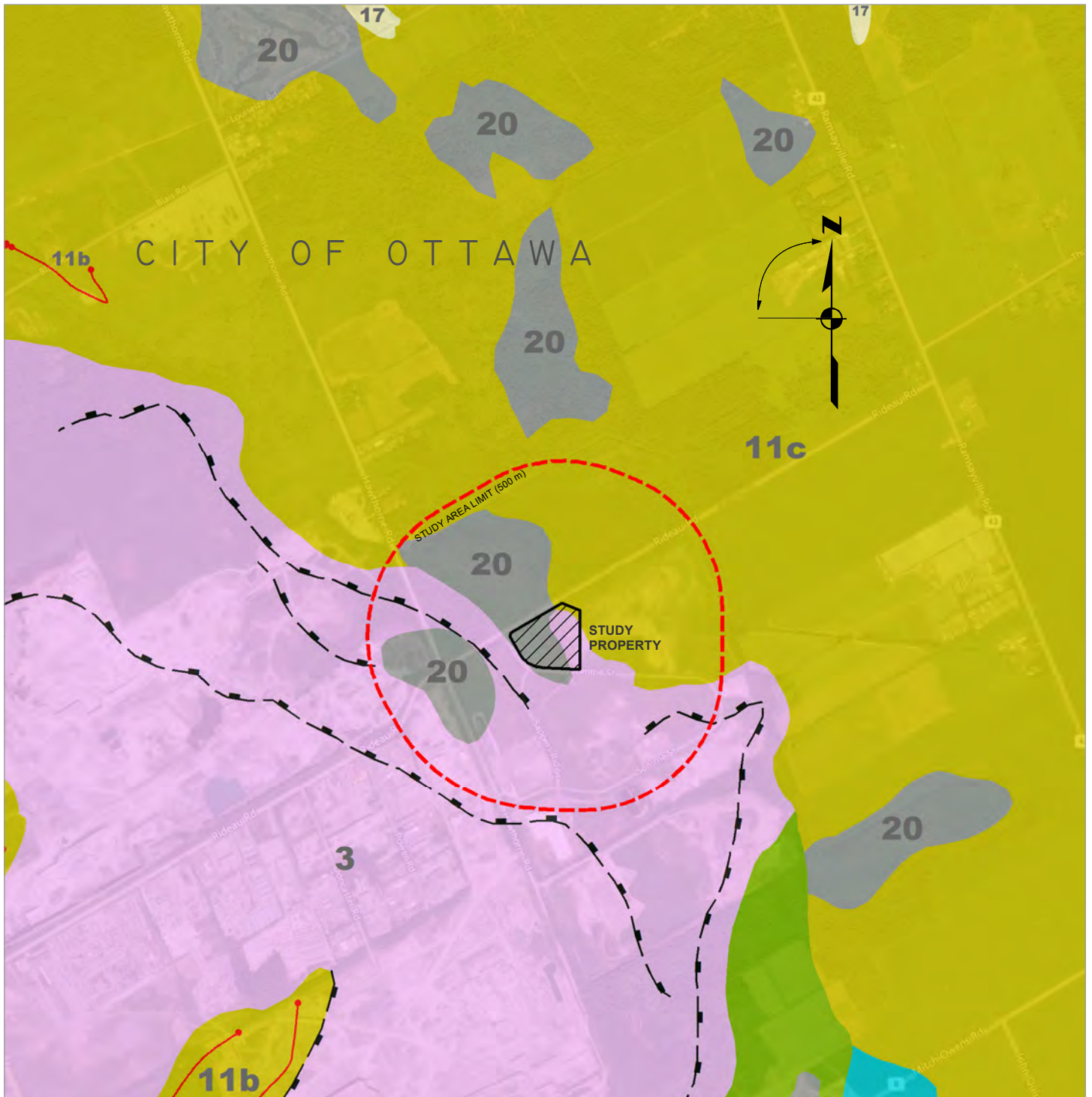
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ONTARIO

**HYDROGEOLOGY ASSESSMENT
PHYSIOGRAPHY**

Project No. 11220832
Revision No. -
Date Jan 21

FIGURE 5

Created by: Will Pridham



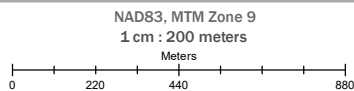
LEGEND

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

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

- | | |
|---|---|
| <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 11b Littoral deposits 11c Foreshore and basinal deposits | <ul style="list-style-type: none"> 10 Fine-textured glaciomarine deposits <ul style="list-style-type: none"> 10a Massive to well laminated 5b Till: Silty sand to sand-textured till on Precambrian terrain <ul style="list-style-type: none"> 5b Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain |
|---|---|

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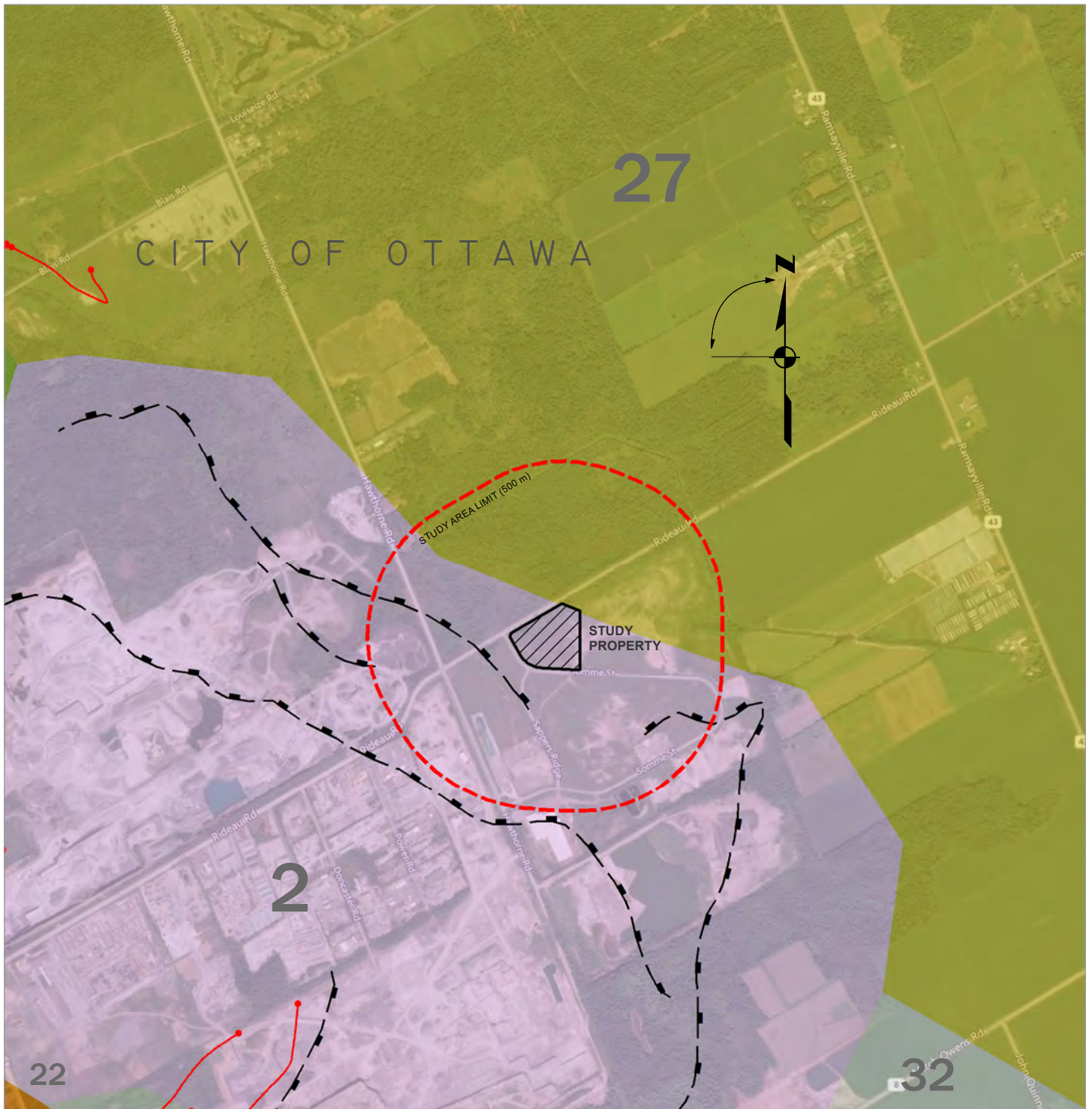
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CITY OF OTTAWA
ONTARIO

**HYDROGEOLOGY ASSESSMENT
SURFICIAL GEOLOGY**

Project No. 11220832
Revision No. -
Date Jan 21

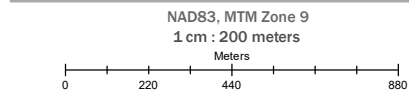
FIGURE 6

Created by: Will Pridham



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		22 Glaciofluvial ice-contact deposits: gravel and sand minor till includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits
	27 Glaciomarine and marine deposits: sand, gravelly sand and gravel nearshore and beach deposits		2 Bedrock: undifferentiated carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift

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- ▶ 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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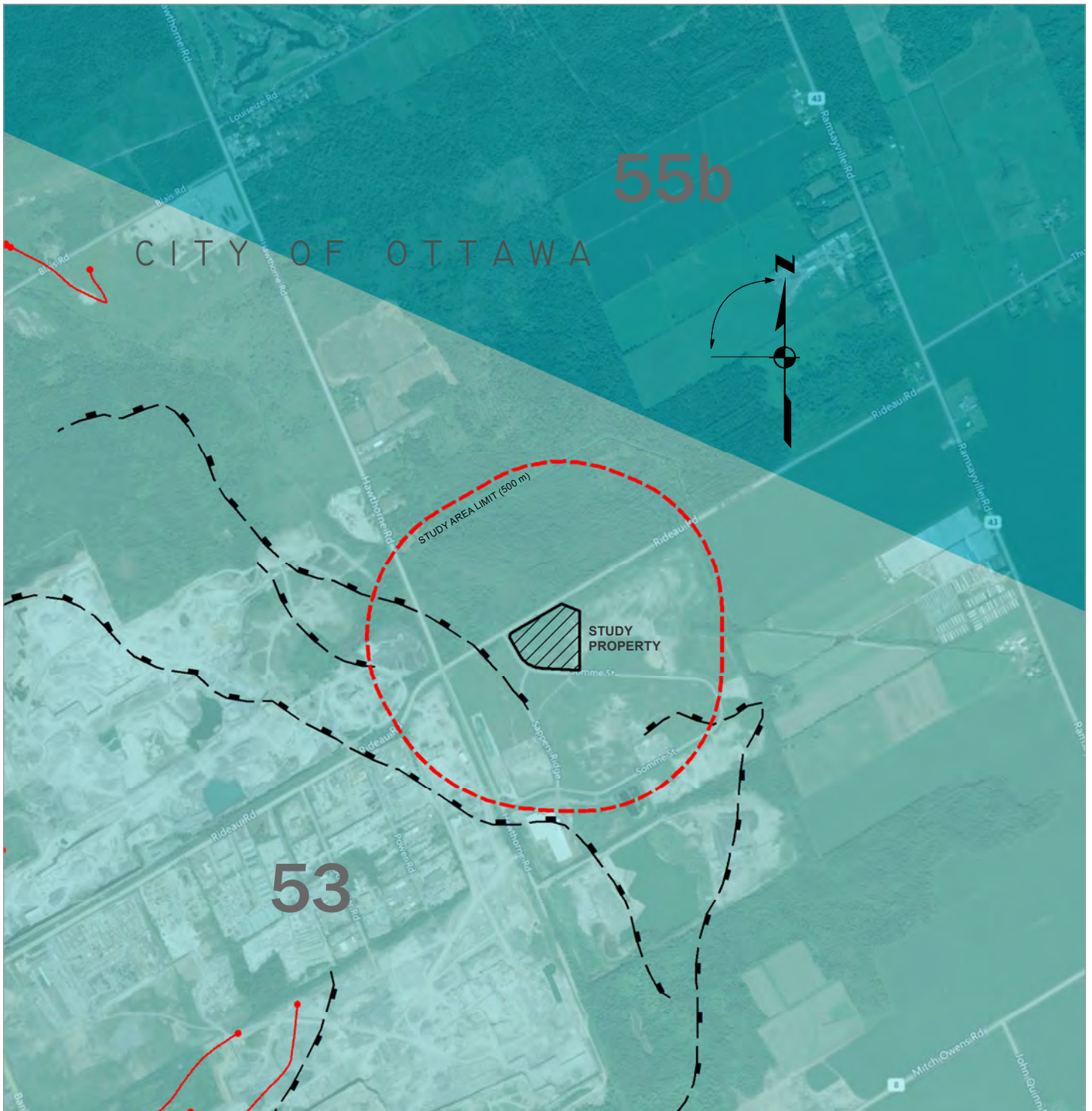
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ONTARIO

**HYDROGEOLOGY ASSESSMENT
QUATERNARY GEOLOGY**

Project No. 11220832
Revision No. -
Date Jan 2021

FIGURE 7

Created by: Will Pridham



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)

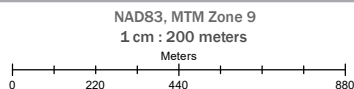
UPPER ORDOVICIAN

55 Shale, limestone, dolostone, siltstone

55b Georgian Bay Fm.; Blue Mountain Fm.; Billings Fm.; Collingwood Mb.; Eastview Mb.

53 Dolostone, sandstone: Beekmantown Gp.

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- ▶ 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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ONTARIO

**HYDROGEOLOGY ASSESSMENT
BEDROCK GEOLOGY**

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

FIGURE 8

Created by: Will Pridham

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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.





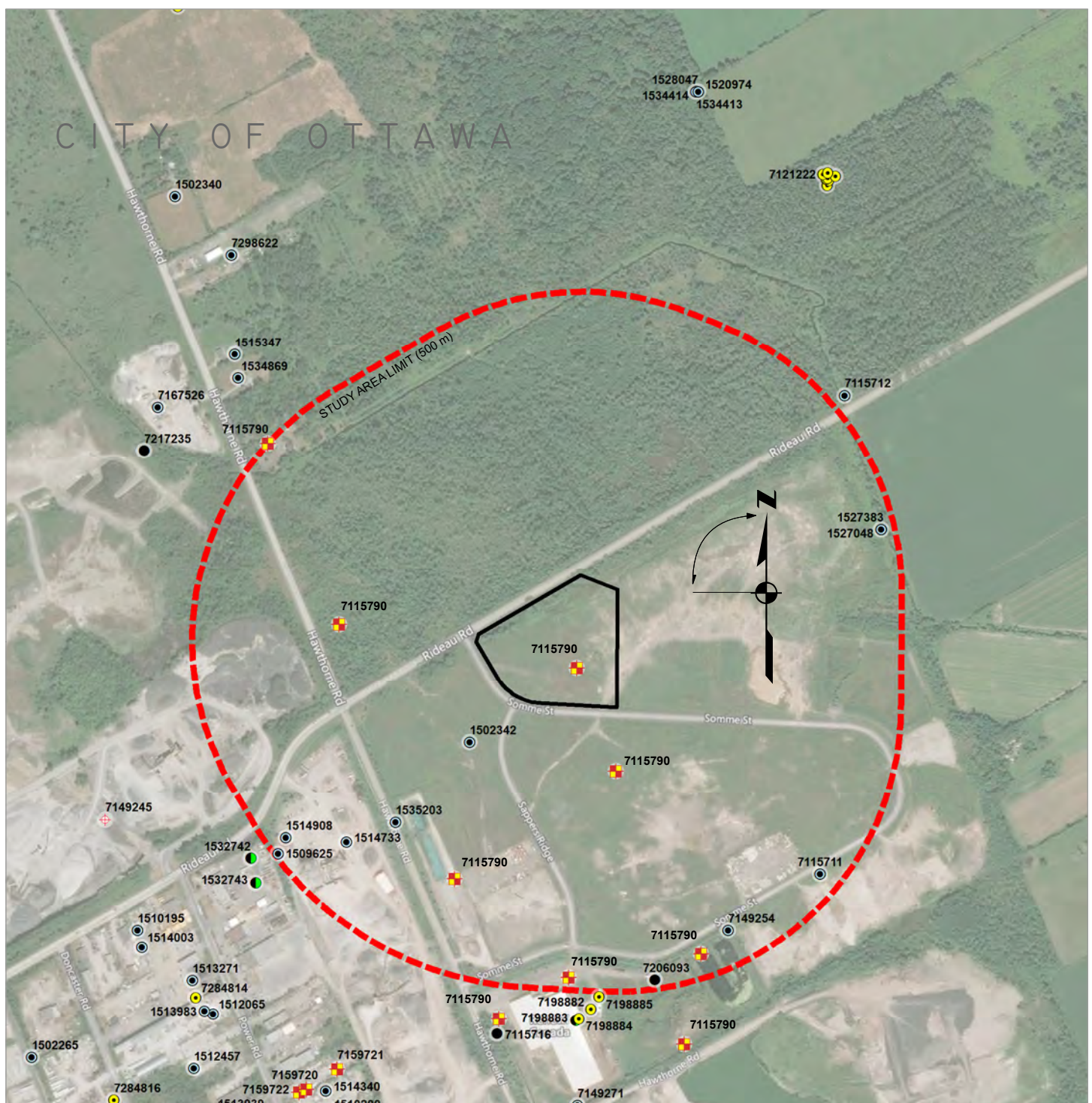
Photo 3 - Example of observation well (ID A305146) used during pumping test for monitoring of potential interference effects.



Appendix B

MECP Well Records

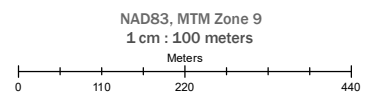
CITY OF OTTAWA



LEGEND

- | | | | | |
|----------------------|------------------------------------|--------------------------|------------------|--------------|
| Study Property Limit | Abandoned Monitoring and Test Hole | Alteration | Recharge Well | Water Supply |
| 500 m Radius | Abandoned-Other | Dewatering | Replacement Well | Other Status |
| | Abandoned-Quality | Monitoring and Test Hole | Test Hole | No Data |
| | Abandoned-Supply | Observation Wells | Unfinished | Not A Well |

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HYDROGEOLOGY ASSESSMENT MECP WATER WELLS

APPENDIX B

K:\GIS_PROJECTS\IGHDICA-

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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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
STEEL	14.29	12.19		-0.61

DEPTH IN METERS

FORMATION DETAILS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
	LIMESTONE	7.32		47.24
	FILL	0.00		2.44
GREY	CLAY	2.44		7.32

DEPTH IN METERS

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

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
STEEL	15.86	-0.45		6.40

FORMATION DETAILS

DEPTH IN METERS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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 <i>masl.</i>		
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
STEEL	15.86	-0.45		6.40

FORMATION DETAILS

DEPTH IN METERS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
STEEL	25.40			5.49
OPEN HOLE	22.86			58.52

DEPTH IN METERS

FORMATION DETAILS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
BROWN	SANDSTONE	0.00		15.85
GREY	QUARTZITE	15.85		21.95
WHITE	SANDSTONE	21.95		48.77
GREY	SANDSTONE	48.77		58.52

DEPTH IN METERS

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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
OPEN HOLE	22.86			58.52

DEPTH IN METERS

STEEL | 25.40 | 5.49

FORMATION DETAILS		DEPTH IN METERS	
<u>Colour</u>	<u>Material</u>	<u>Top</u>	<u>Bottom</u>
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	
<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	<u>Bottom</u>
OPEN HOLE	12.70		35.36
STEEL	12.70		5.49

FORMATION DETAILS		DEPTH IN METERS	
<u>Colour</u>	<u>Material</u>	<u>Top</u>	<u>Bottom</u>
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
OPEN HOLE		6.09		42.67
STEEL	15.88	0.00		6.70

FORMATION DETAILS

DEPTH IN METERS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
-----------------	----------------------	------------	---	---------------

FORMATION DETAILS

DEPTH IN METERS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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	Well ID:	7115790
Con:	CON 6 FROM RIDEAU RIVER	Borehole ID:	1002782572
Township:	GLOUCESTER	Completion Date:	7/15/2008
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:	85.10 <i>masl.</i>		
UTM:	18 E 456687 N 5017036	Long/Lat:	-75.552 , 45.305

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:			

CASING DETAILS

DEPTH IN METERS

H.S.A.

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
-----------------	----------------------	------------	---	---------------

FORMATION DETAILS

DEPTH IN METERS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
STEEL	12.70			8.23
OPEN HOLE	12.70			17.37

FORMATION DETAILS

DEPTH IN METERS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
	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

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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 **Well ID:** 7115790
Con: CON 6 FROM RIDEAU RIVER **Borehole ID:** 1002782590
Township: GLOUCESTER **Completion Date:** 7/15/2008
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 456206 N 5017303 **Long/Lat:** -75.559 , 45.308

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.

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
OPEN HOLE	15.24			30.48
STEEL	15.24			11.89

FORMATION DETAILS		DEPTH IN METERS		
<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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		
<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
STEEL	15.24			11.89
OPEN HOLE	15.24			30.48

FORMATION DETAILS		DEPTH IN METERS		
<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>DEPTH IN METERS</u>	
		<u>Top</u>	<u>Bottom</u>
OPEN HOLE	15.24		22.86
STEEL	15.24		9.45
OPEN HOLE	15.24		41.15

FORMATION DETAILS

<u>Colour</u>	<u>Material</u>	<u>DEPTH IN METERS</u>	
		<u>Top</u>	<u>Bottom</u>
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

<u>Material</u>	<u>Diameter (cm)</u>	<u>Top</u>	-	<u>Bottom</u>
STEEL	15.24			6.71
OPEN HOLE	15.24			30.48

DEPTH IN METERS

FORMATION DETAILS

<u>Colour</u>	<u>Material</u>	<u>Top</u>	-	<u>Bottom</u>
GREY	SANDSTONE	0.00		30.48

DEPTH IN METERS

1. PRINT ONLY IN SPACES PROVIDED

2. CHECK CORRECT BOX WHERE APPLICABLE

11

1527383

MUNICIPALITY 15002

CON. CON.

106

COUNTY OR DISTRICT: [redacted] TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: **Windsor** CON. BLOCK, TRACT, SURVEY ETC: **6** LOT: **26**

DATE COMPLETED: DAY **16** MO **8** YR **93**

Box 4208 stn. "E" Ottawa, Ontario K1S 5B2

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	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 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
88	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	NOT TESTED
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/4	1 <input checked="" type="checkbox"/> STEEL 2 <input checked="" type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	0	39
5 15/16	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		39	100

SCREEN

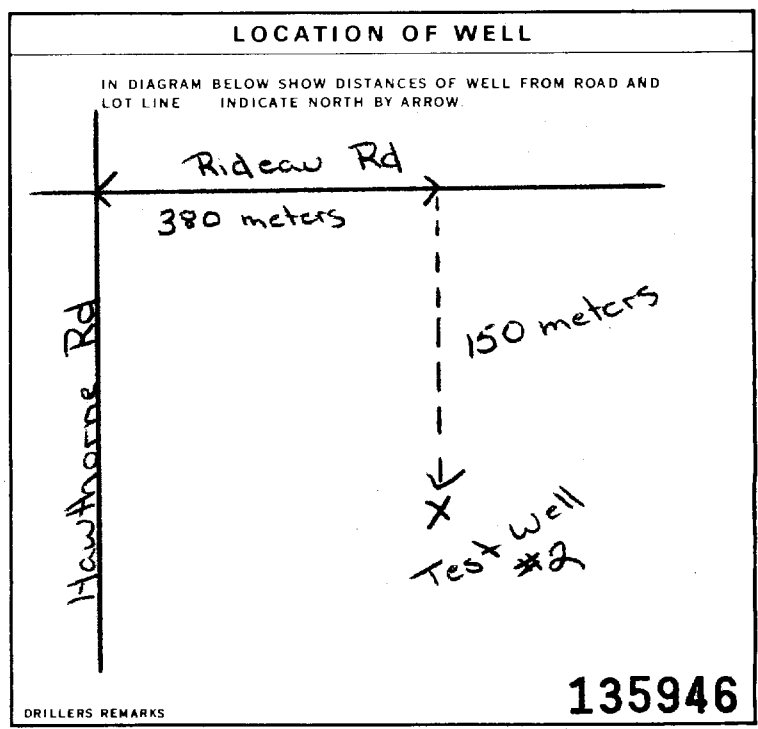
SIZE (S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC)
37.5	Cement - Grouted

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 <input checked="" type="checkbox"/> PUMP 2 <input type="checkbox"/> BAILER	20 GPM	1 15-18 HOURS
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING
7'6" FEET	14'6" FEET	15 MINUTES: 13'11" FEET 30 MINUTES: 14 FEET 45 MINUTES: 14'4" FEET 60 MINUTES: 14'6" FEET
IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
	50 GPM	1 <input type="checkbox"/> CLEAR 2 <input checked="" type="checkbox"/> CLOUDY
RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP	50 FEET	5 GPM



FINAL STATUS OF WELL

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

WATER USE

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

METHOD OF CONSTRUCTION

1 CABLE TOOL 6 BORING
2 ROTARY (CONVENTIONAL) 7 DIAMOND
3 ROTARY (REVERSE) 8 JETTING
4 ROTARY (AIR) 9 DRIVING
5 AIR PERCUSSION 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: **1558** CONTRACTOR: **1558** DATE RECEIVED: **SEP 21 1993**

DATE OF INSPECTION: _____ INSPECTOR: _____

REMARKS: _____

Appendix C

Certificates of Analysis – Water Supply

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

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

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
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 CaCO ₃	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

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

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	-	-	-

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

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	

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

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			

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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

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 CaCO ₃	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

Report Date: 18-Jan-2021

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Robert Neck

Project Description: 11220832

Client ID:	TW2-END	-	-	-
Sample Date:	19-Nov-20 15:30	-	-	-
Sample ID:	2047519-01	-	-	-
MDL/Units	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	-	-	-

Certificate of Analysis

Report Date: 18-Jan-2021

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Robert Neck

Project Description: 11220832

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

Report Date: 18-Jan-2021

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Robert Neck

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	

Certificate of Analysis

Report Date: 18-Jan-2021

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Robert Neck

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			

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

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

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, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

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

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

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	-	-	-

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: 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						

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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	

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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 - K0L 2H0
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

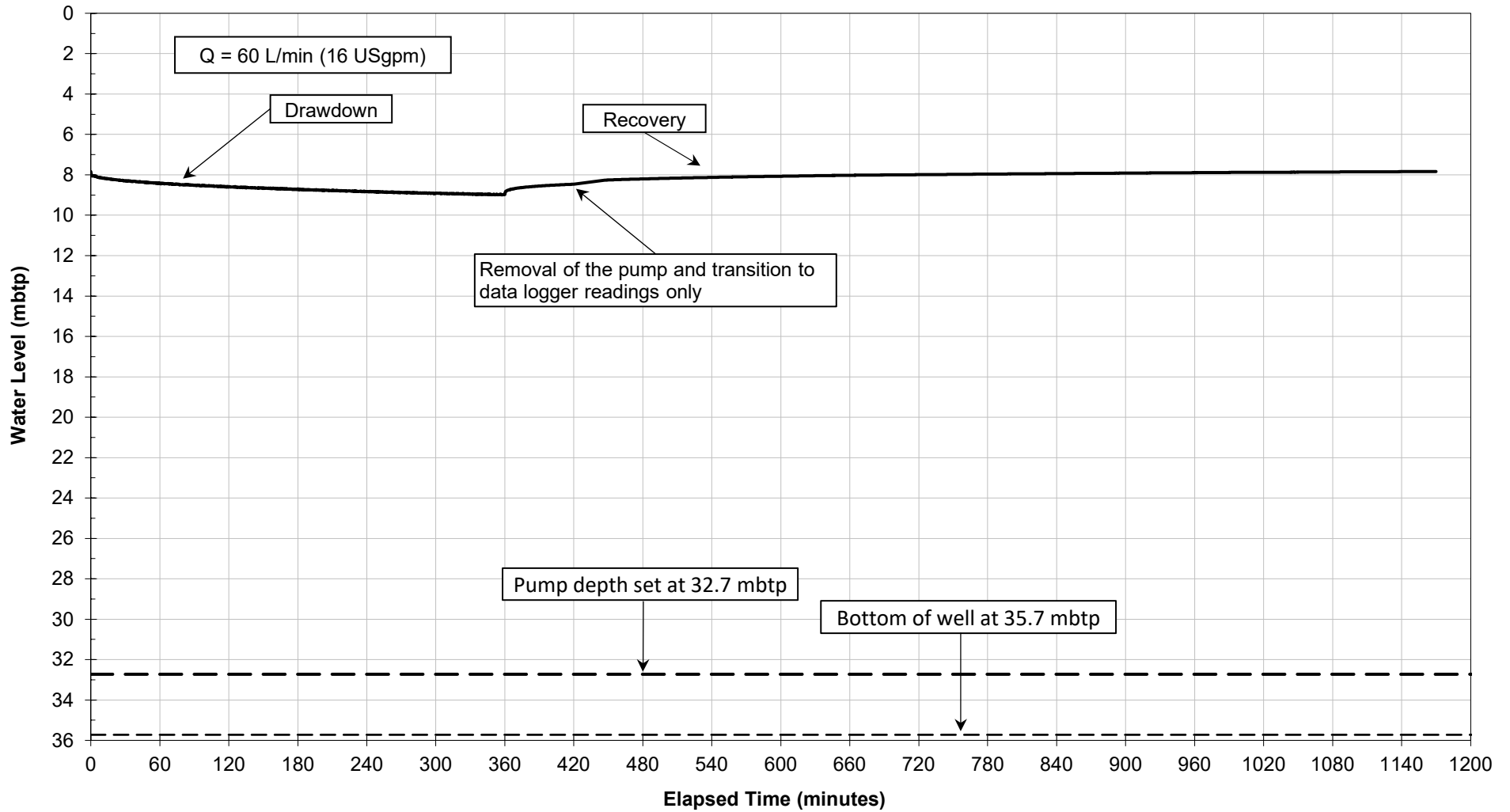
Chain of Custody Number: 011447

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

Appendix D

Aquifer Performance Testing Data

**PUMP HISTORY CURVE
TW-2: November 19-20, 2020**



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

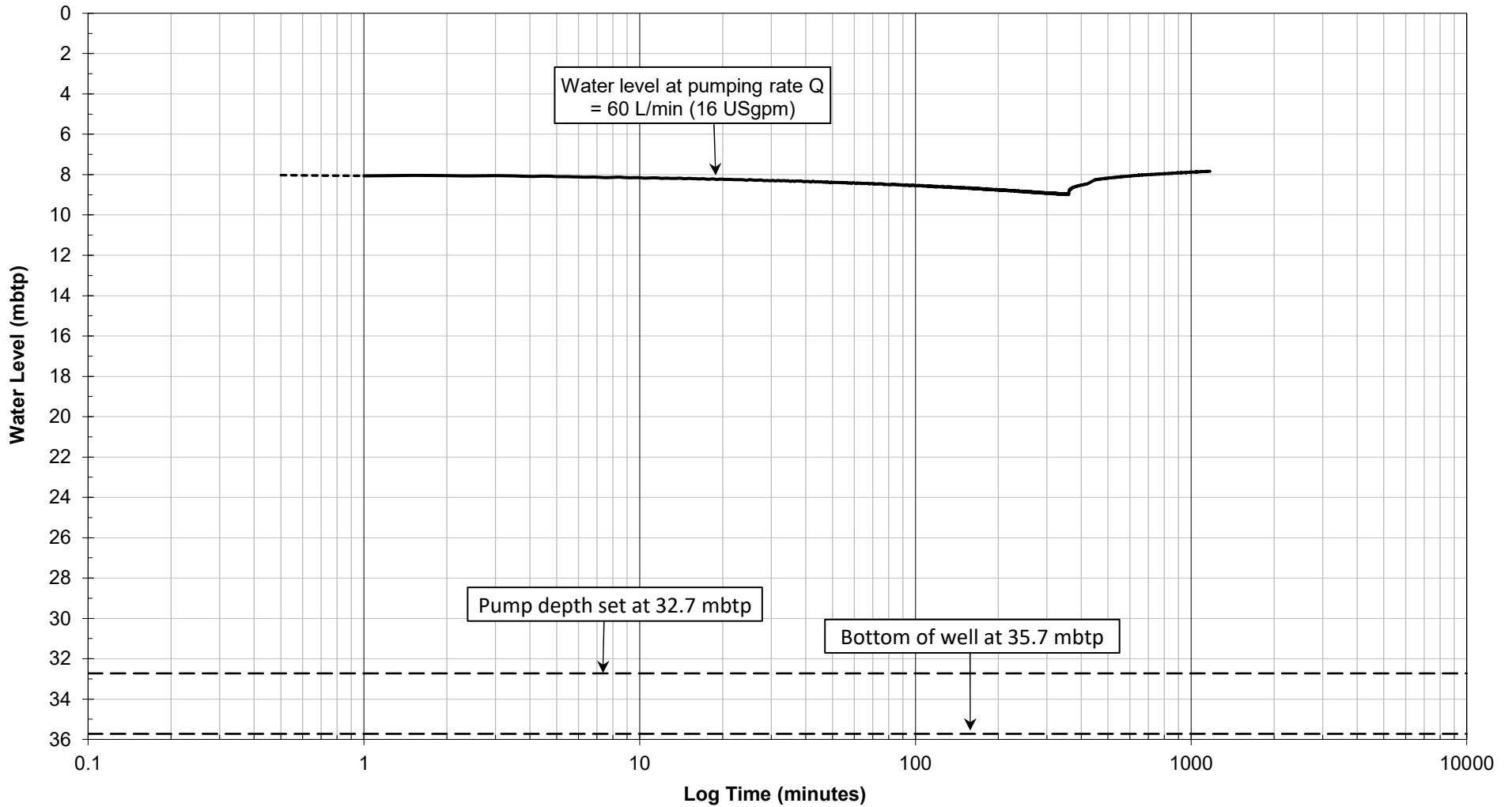
DRAWING NUMBER: D-1



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

(705) 749-3317 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs LOG TIME
TW-2: November 19-20, 2020



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

LOCATION: Rideau & Somme St, Ottawa, ON

JOB NUMBER: 11220832-01

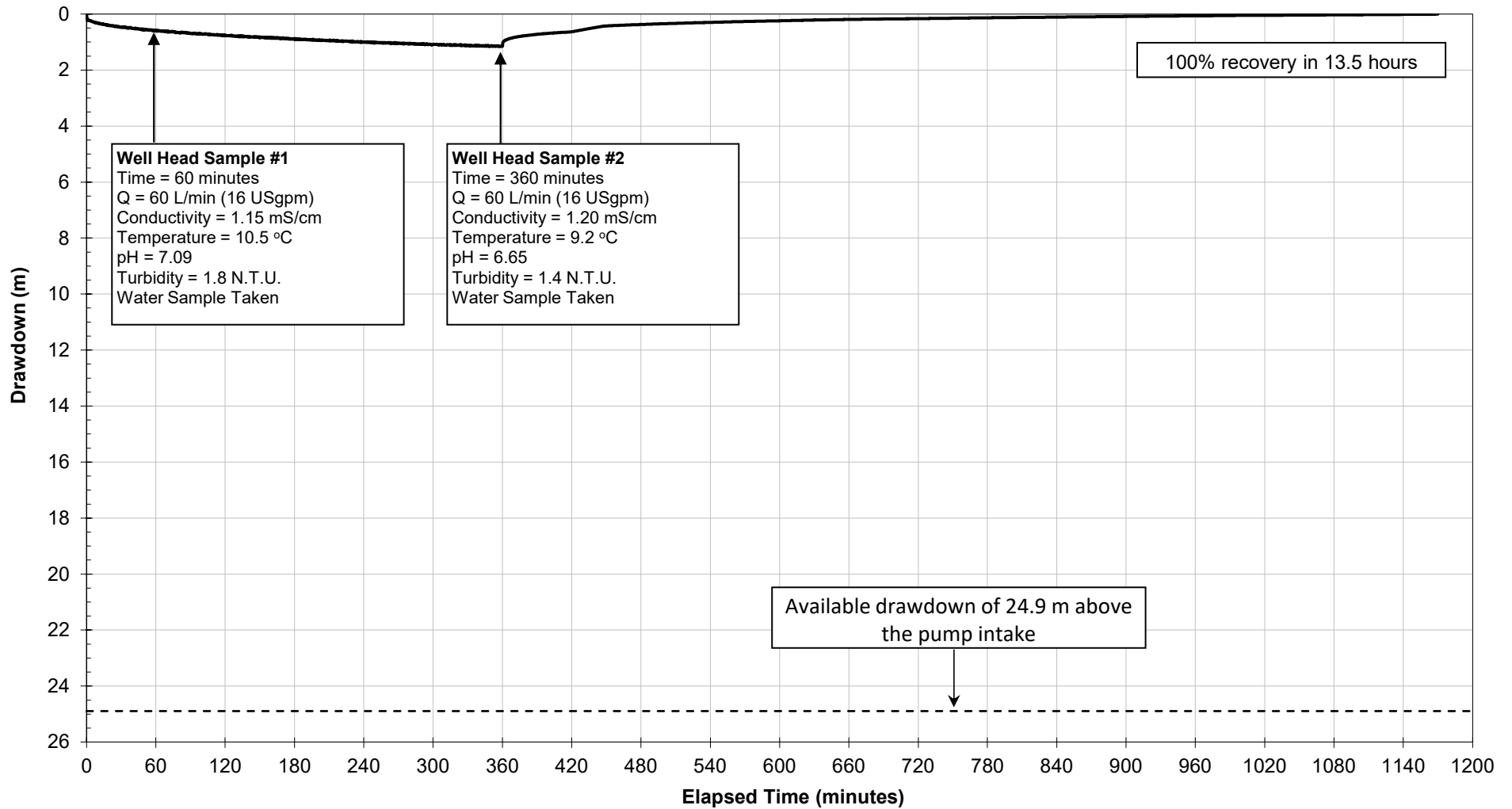
DRAWING NUMBER: D-2



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

(705) 749-3317 www.ghd.com

**CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS
TW-2: November 19-20, 2020**



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

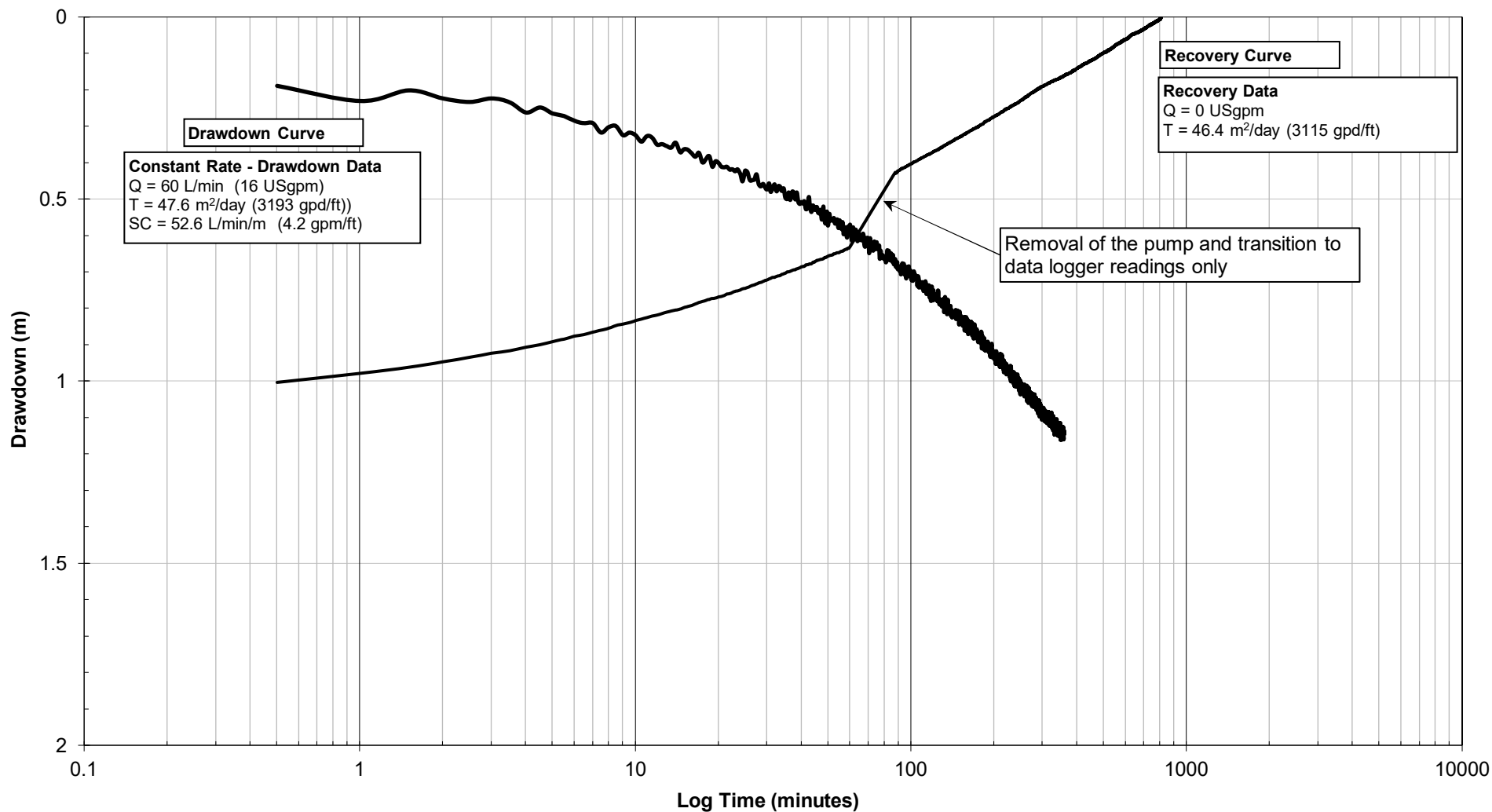
DRAWING NUMBER: D-3



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

(705) 749-3317 www.ghd.com

CONSTANT RATE: DRAWDOWN and RECOVERY VS LOG TIME
TW-2: November 19-20, 2020



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



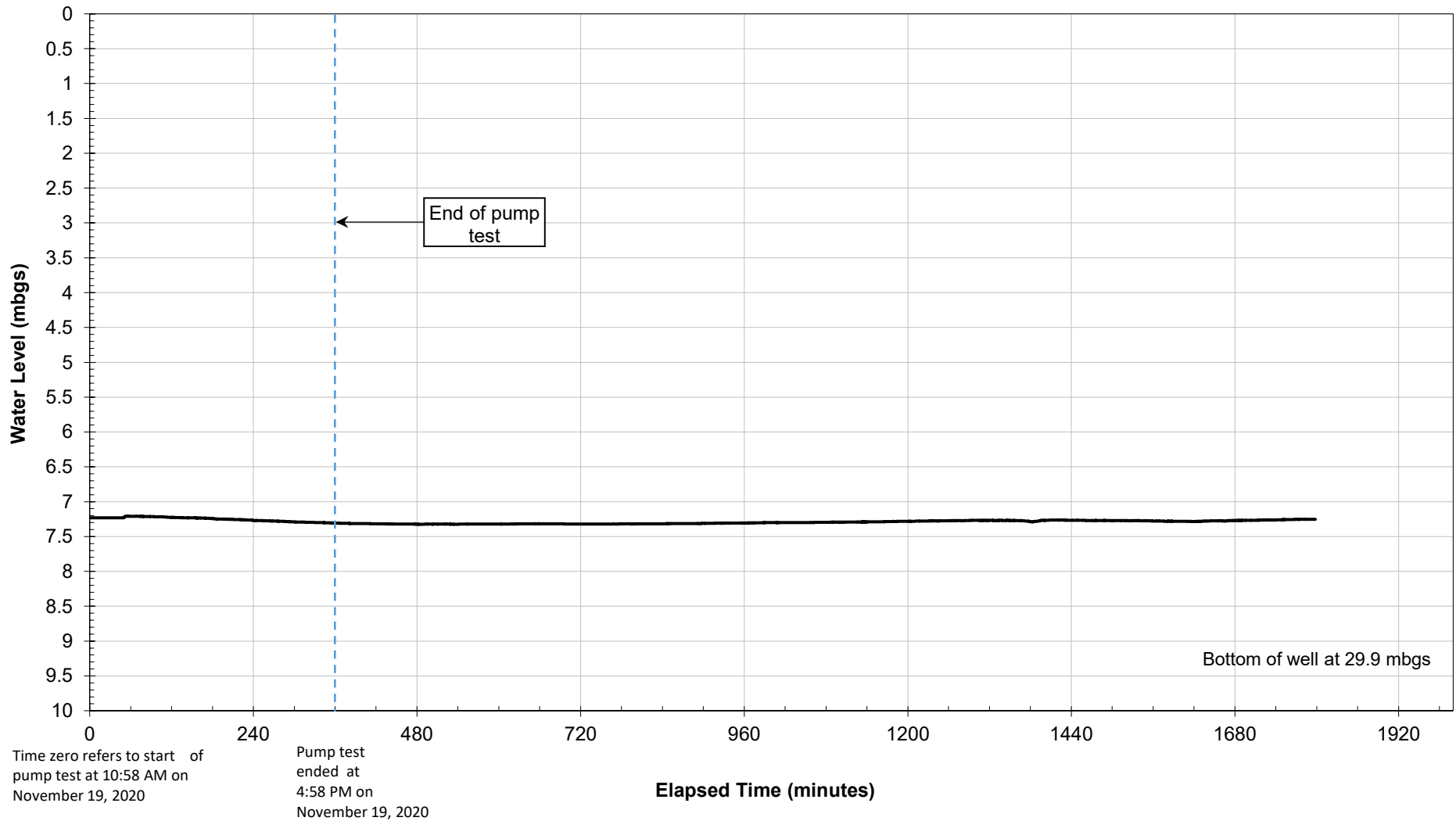
347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7

(705) 749-3317 www.ghd.com

Appendix E

Observation Well Monitoring Data

**TW-5
OBSERVATION WELL
November 19 - 20, 2020**



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

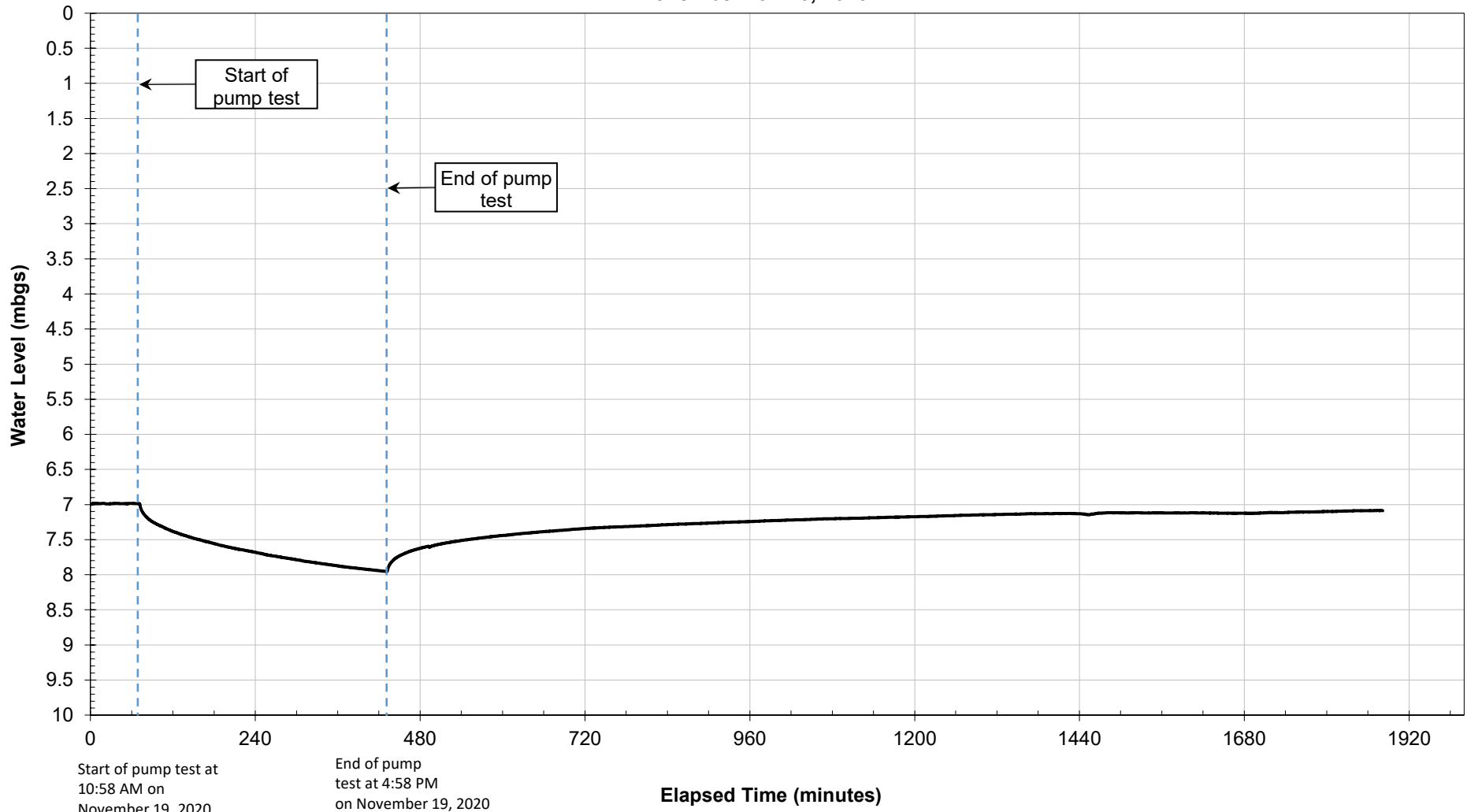
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-1



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

**A305146
OBSERVATION WELL
November 19 - 20, 2020**



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

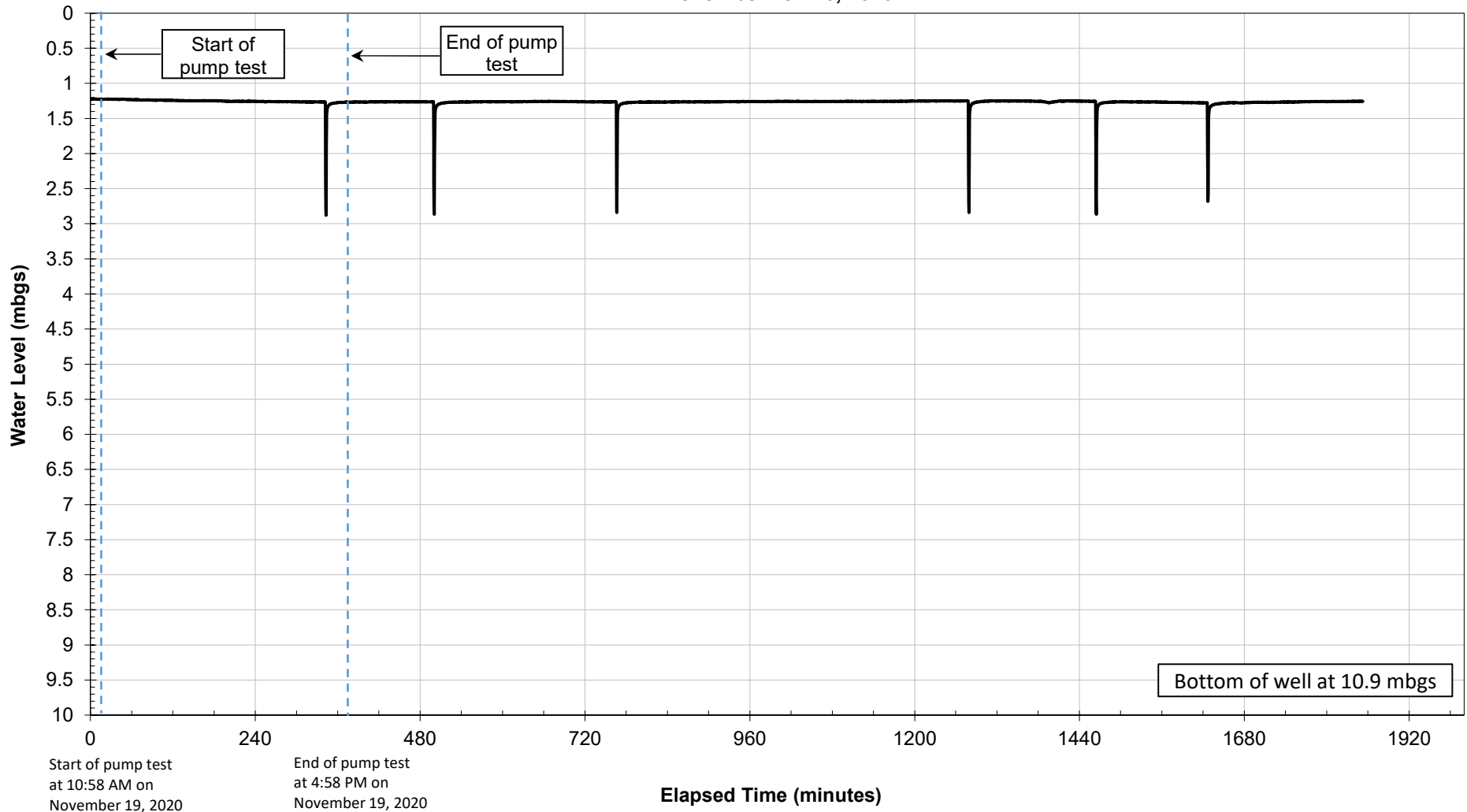
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-2



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

**4885 HAWTHORNE ROAD
DOMESTIC WELL
November 19 - 20, 2020**



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

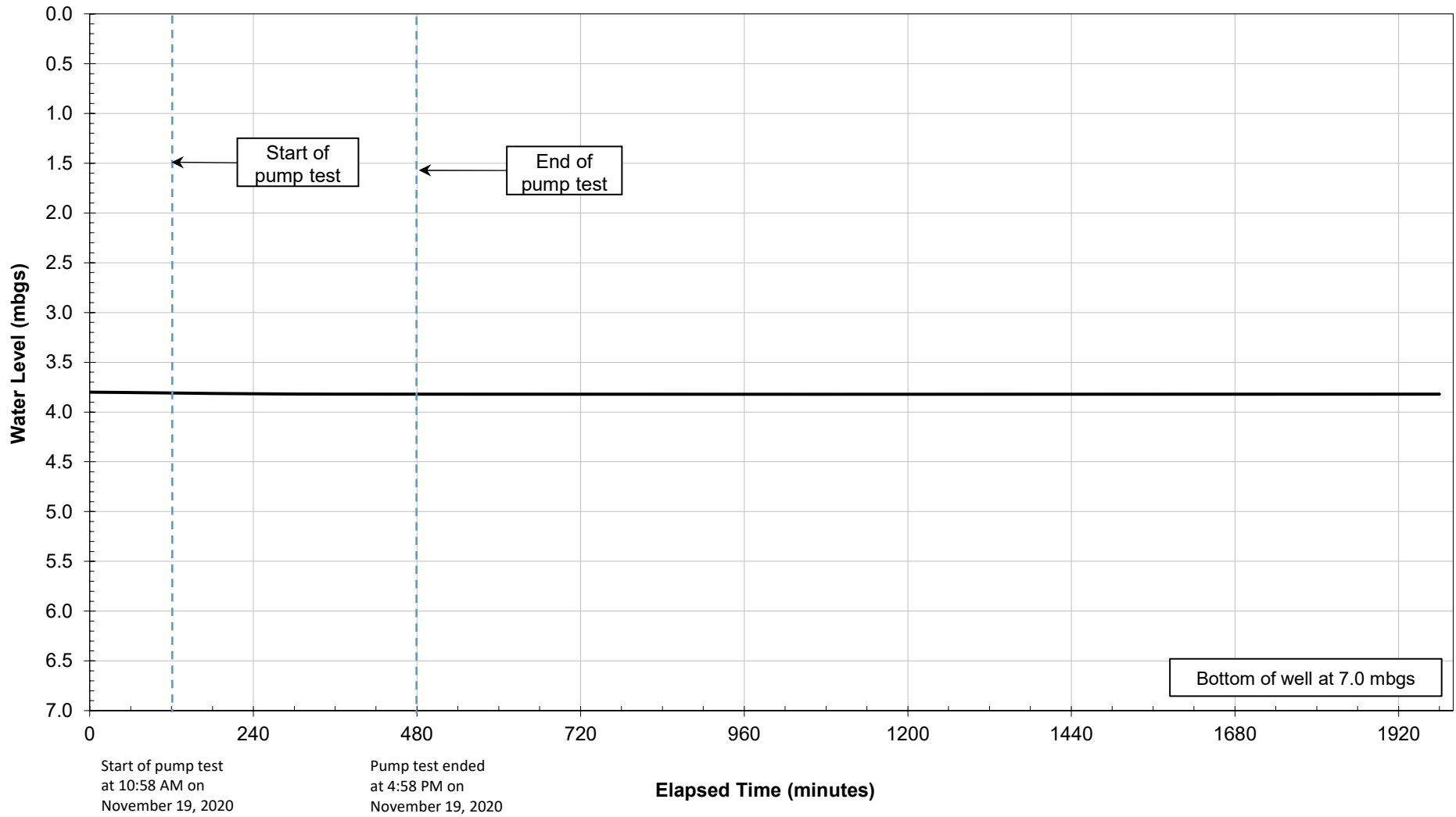
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-3



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

**MW1-20
OBSERVATION WELL
November 19 - 20, 2020**



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

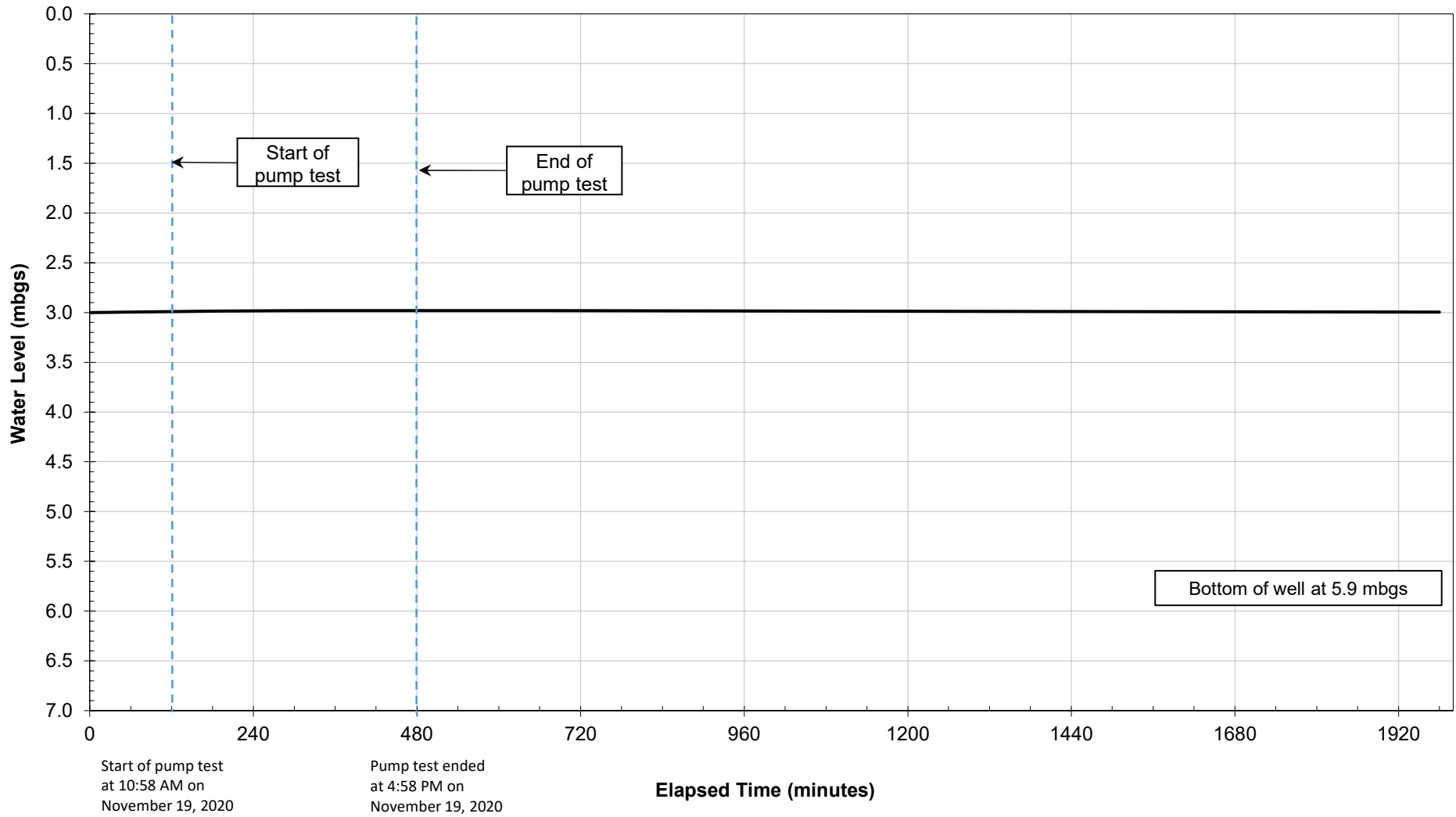
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-4



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

**MW7-08
OBSERVATION WELL
November 19 - 20, 2020**



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

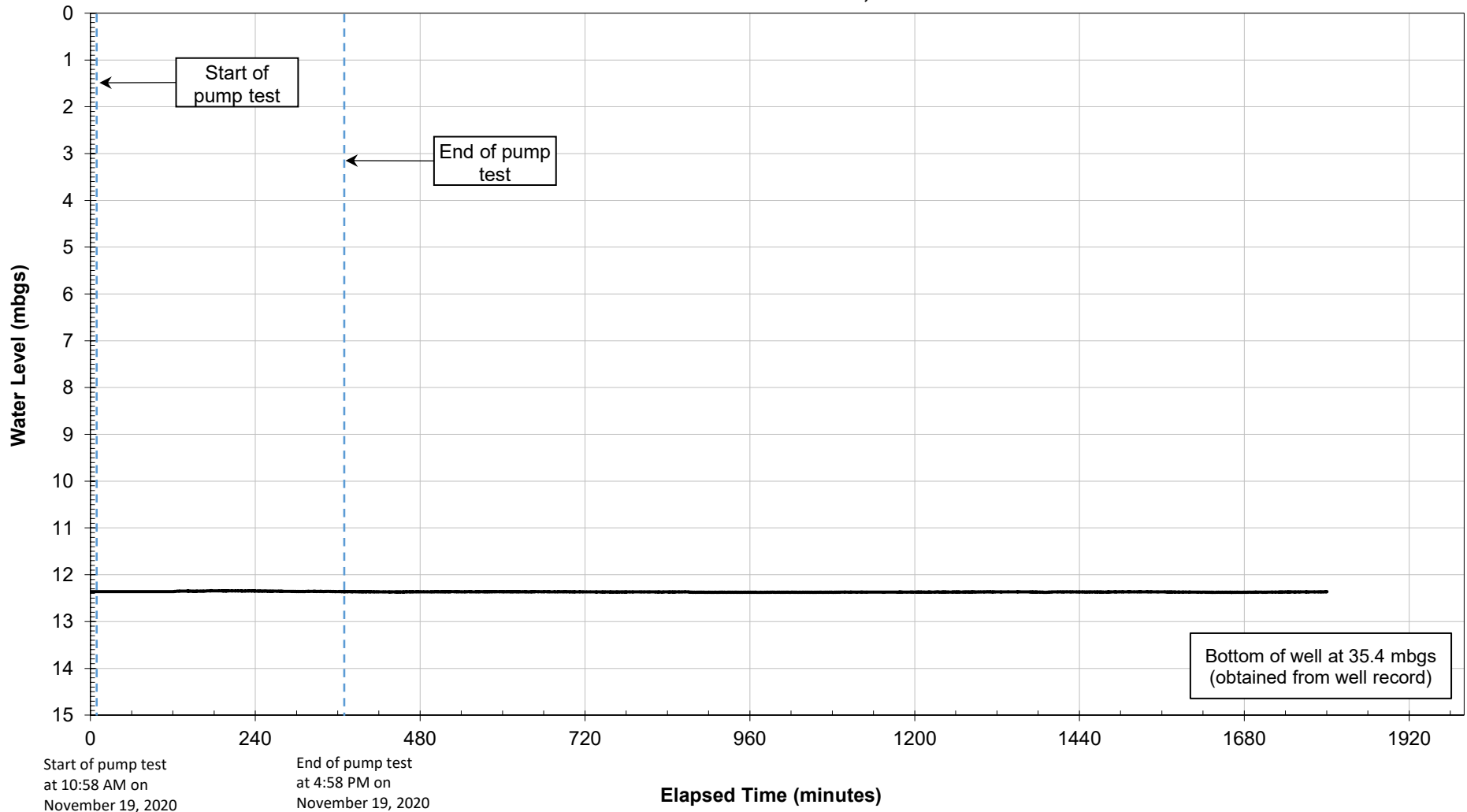
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-5



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

**TOMLINSON QUARRY - WELL 1514733
OBSERVATION WELL
November 19 - 20, 2020**



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

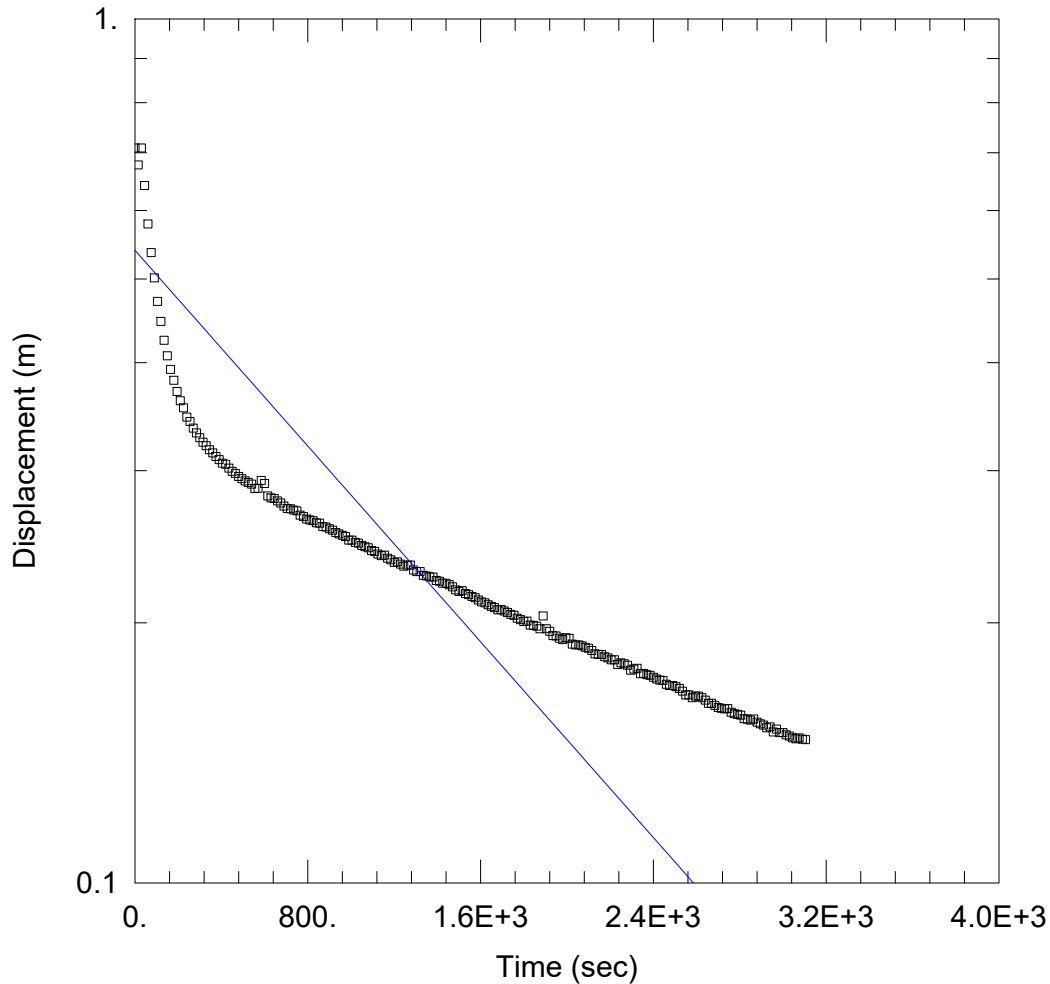
DRAWING NUMBER: E-6



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

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

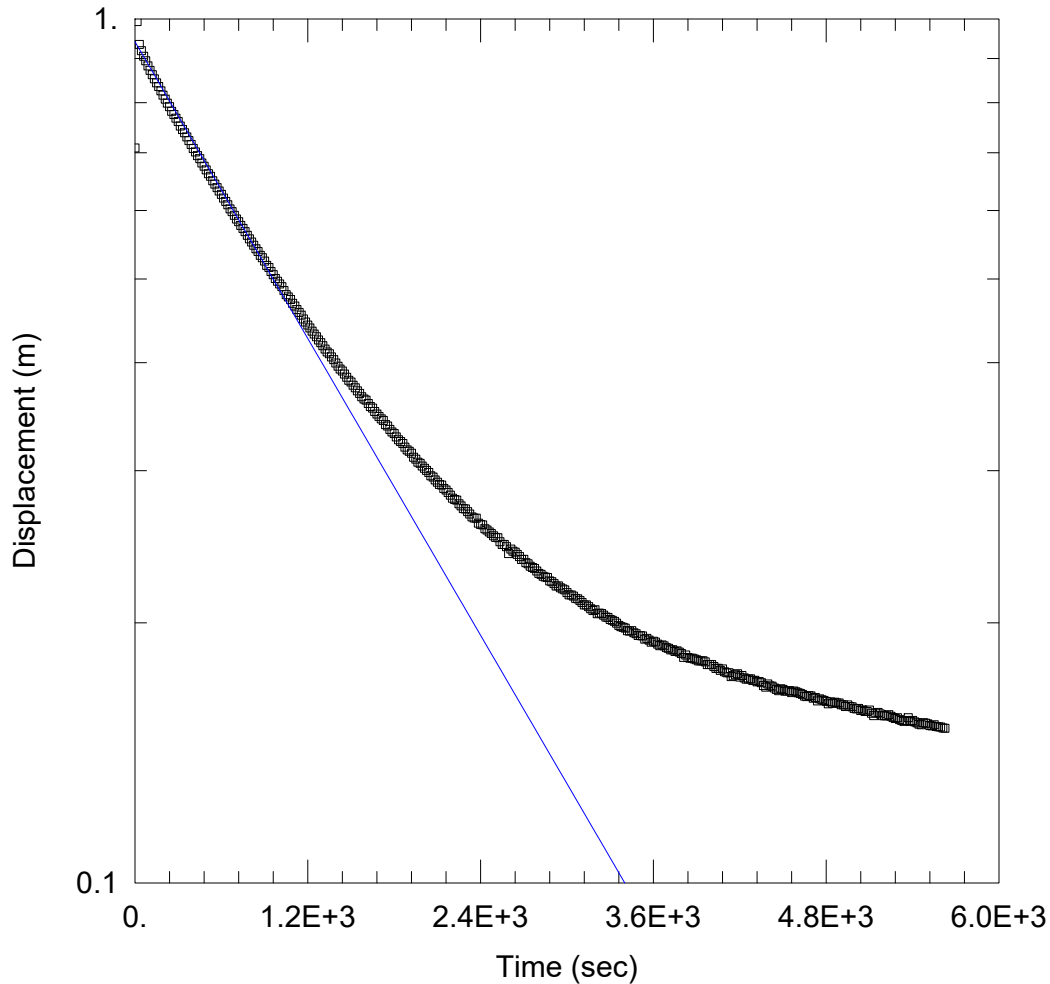
Saturated Thickness: 3.15 m Anisotropy Ratio (Kz/Kr): 1.

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: Bower-Rice
 K = 5.632E-5 cm/sec $y_0 =$ 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

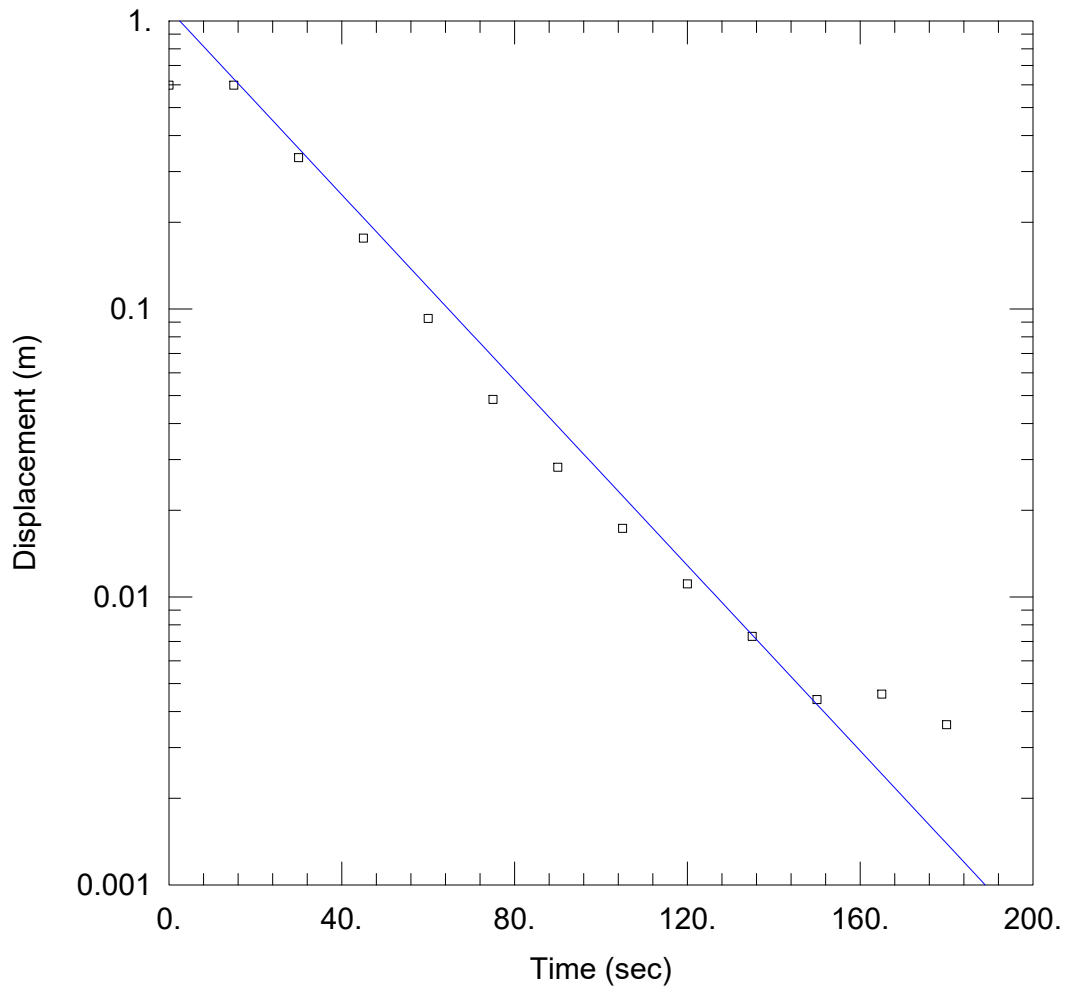
Saturated Thickness: 3.15 m Anisotropy Ratio (Kz/Kr): 1.

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: Bower-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

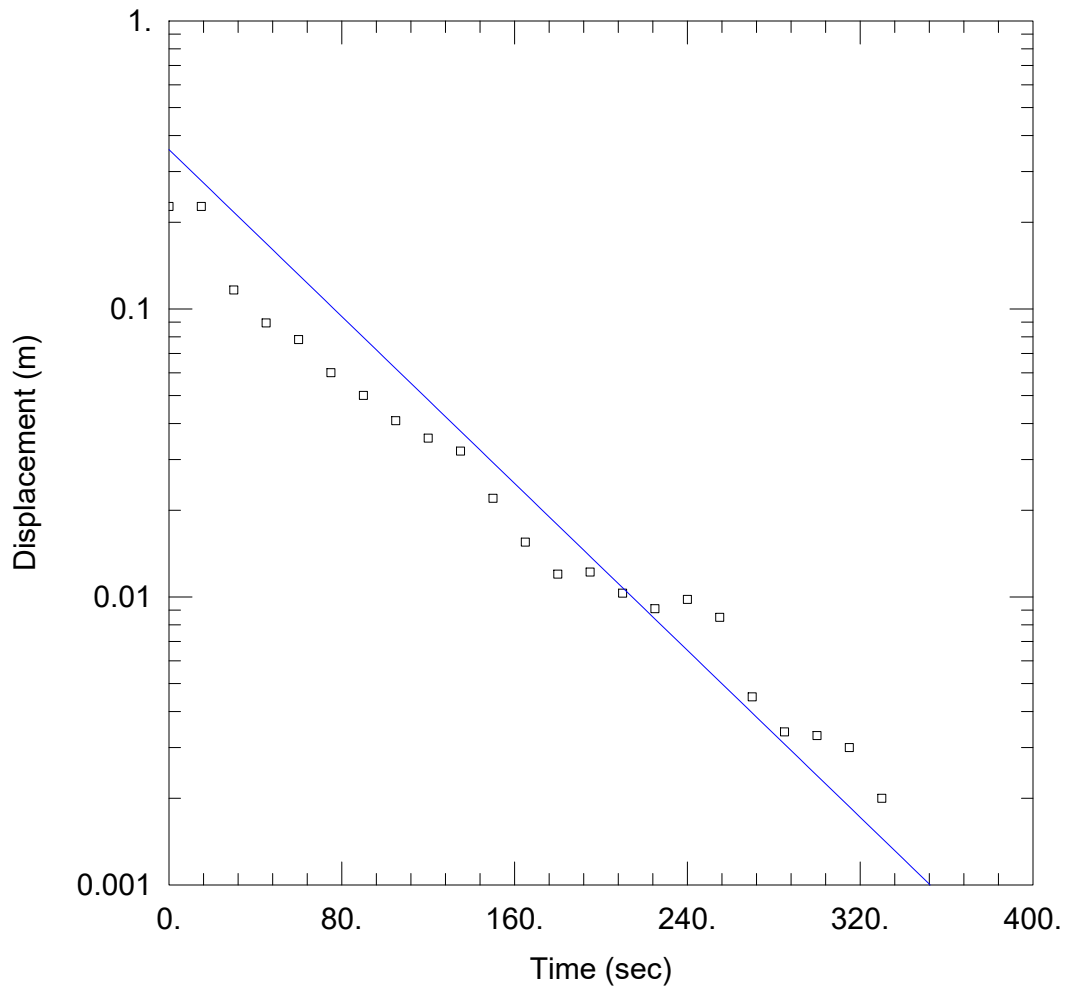
Saturated Thickness: 3.09 m Anisotropy Ratio (Kz/Kr): 1.

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 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: Bowser-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

Storm Sewer
ByLaw 2003-514
Schedule A Table 2

Parameter	Units	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

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, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

Client ID:	MW7-08	-	-	-
Sample Date:	19-Nov-20 10:00	-	-	-
Sample ID:	2047520-01	-	-	-
MDL/Units	Water	-	-	-

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%	-	-	-

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

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			

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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			

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

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

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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D

Appendix D - Septic Assessment and Percolation Rate Evaluation

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



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

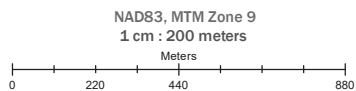
Figures



LEGEND

— Study Property Limit

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

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

ATTRIBUTION STATEMENTS

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**SEPTIC ASSESSMENT
SITE LOCATION PLAN**

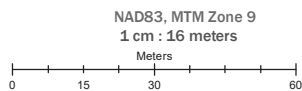
FIGURE 1



LEGEND

— Study Property Limit

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

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

ATTRIBUTION STATEMENTS

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**SEPTIC ASSESSMENT
TEST HOLE LOCATION PLAN**

FIGURE 2

Appendix A

Test Pit Logs and Gradation Results



TEST HOLE No.: TP-1
ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastrate
 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	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%)	Field Lab	COMMENTS
ft	m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90		
		0.0		TOPSOIL (178mm)					
		0.2		SM - Gravelly sand (fill), with silt, trace clay, concrete, brick, asphalt, compact, brown, moist					
1	0.5				GS-1	--			- Test pit open upon completion
2									- GS-1 37% Gravel 47% Sand 12% Silt 4% Clay
3	1.0								
4									
5	1.5								
6	1.8			With clay, loose	GS-2	--			- GS-2 41% Gravel 36% Sand 16% Silt 7% Clay
7	2.0								- Groundwater infiltration observed at approximately 2.1 mbgs
8	2.1			Wet					- Refusal at 2.4m (asphalt)
8	2.4			END OF TEST HOLE					
9									
10	3.0								
11									
12	3.5								
13	4.0								
14									
	4.5								

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



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	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%)	Field Lab	COMMENTS
ft	m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90		
		0.1		TOPSOIL (102mm) SM - Gravelly sand (fill), with silt, concrete, brick, asphalt, brown, moist					
1									- Test pit open upon completion
		0.5							
2									
		1.0			GS-1	--			
3									
		1.5							
4									
		1.8		Wet					- Groundwater infiltration observed at approximately 1.8 mbgs
5									
		2.0							
6									
		2.5							
7									
		2.7		END OF TEST HOLE					
8									
		3.0							
9									
		3.5							
10									
		4.0							
11									
		4.5							

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



TEST HOLE No.: TP-3
ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastrate
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		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%)	Field Lab	COMMENTS
ft	m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90		
		0.2		TOPSOIL (152 mm)					
1	0.5			SM - Gravelly sand (fill), with silt, concrete, asphalt, brown, moist					- Test pit open upon completion
2	1.0								
3	1.5								
4	1.8			Grey, cobbles	GS-1	--			
5	2.0			Wet					- Groundwater infiltration observed at approximately 1.8 mbgs
6	2.5								
7	3.0								
8	3.0			END OF TEST HOLE	GS-2	--			- 50 mm diameter monitoring well installed to 2.7 mbgs
9	3.5								
10	4.0								
11	4.5								

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



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

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



TEST HOLE No.: TP-5
ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastrate
 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

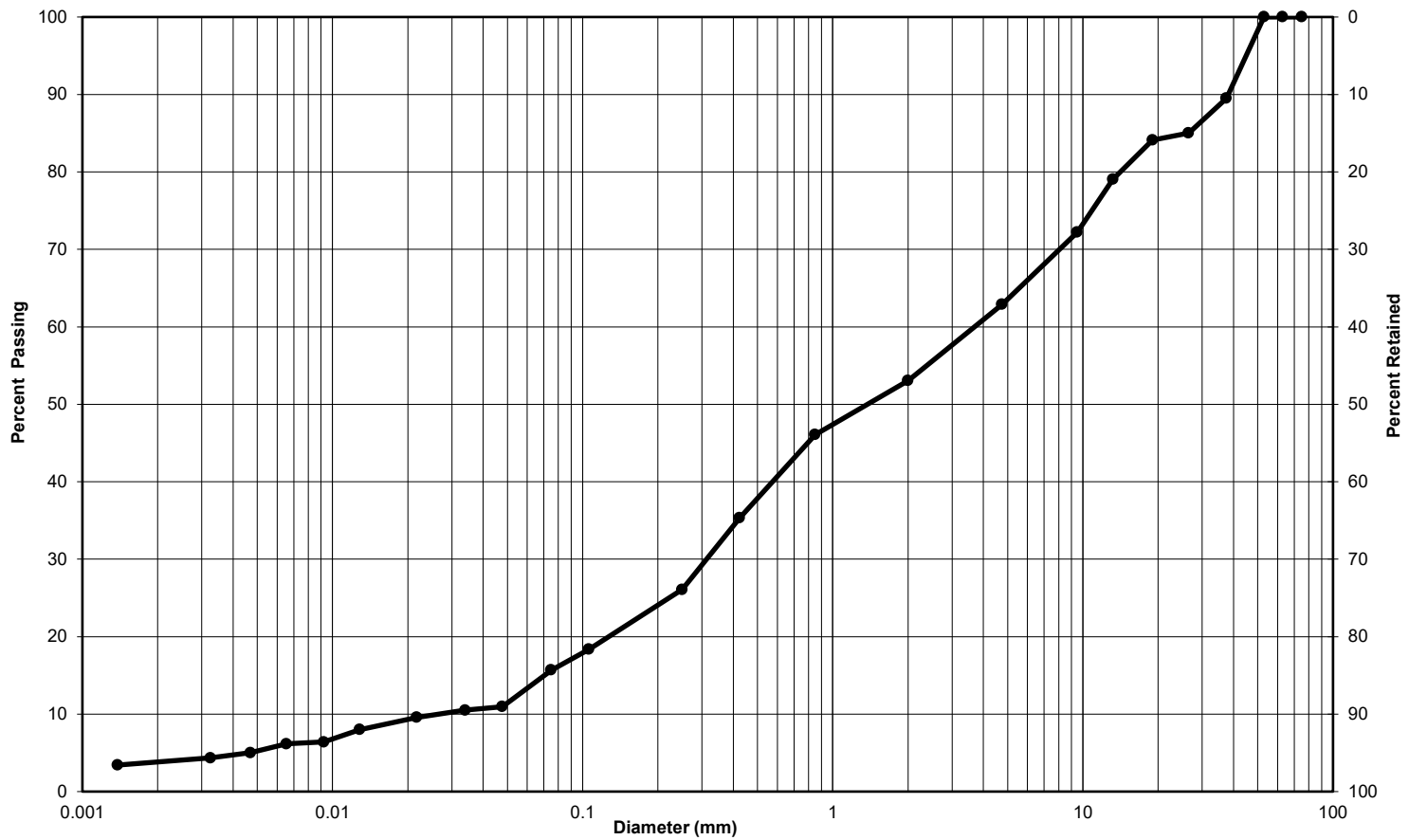
Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%)	Field Lab	COMMENTS
ft	m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90		
		0.1		TOPSOIL (102mm) SM - Silty sand (fill), with gravel, with clay, with asphalt, concrete, brown, moist					
1	0.5								- Test pit open upon completion
2									
3	1.0				GS-1	--			
4	1.2			Grey					
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	3.0		END OF TEST HOLE	GS-2	--			- GS2 18% Gravel 47% Sand 23% Silt 12% Clay
11	3.5								
12									
13	4.0								
14									
	4.5								

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



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		

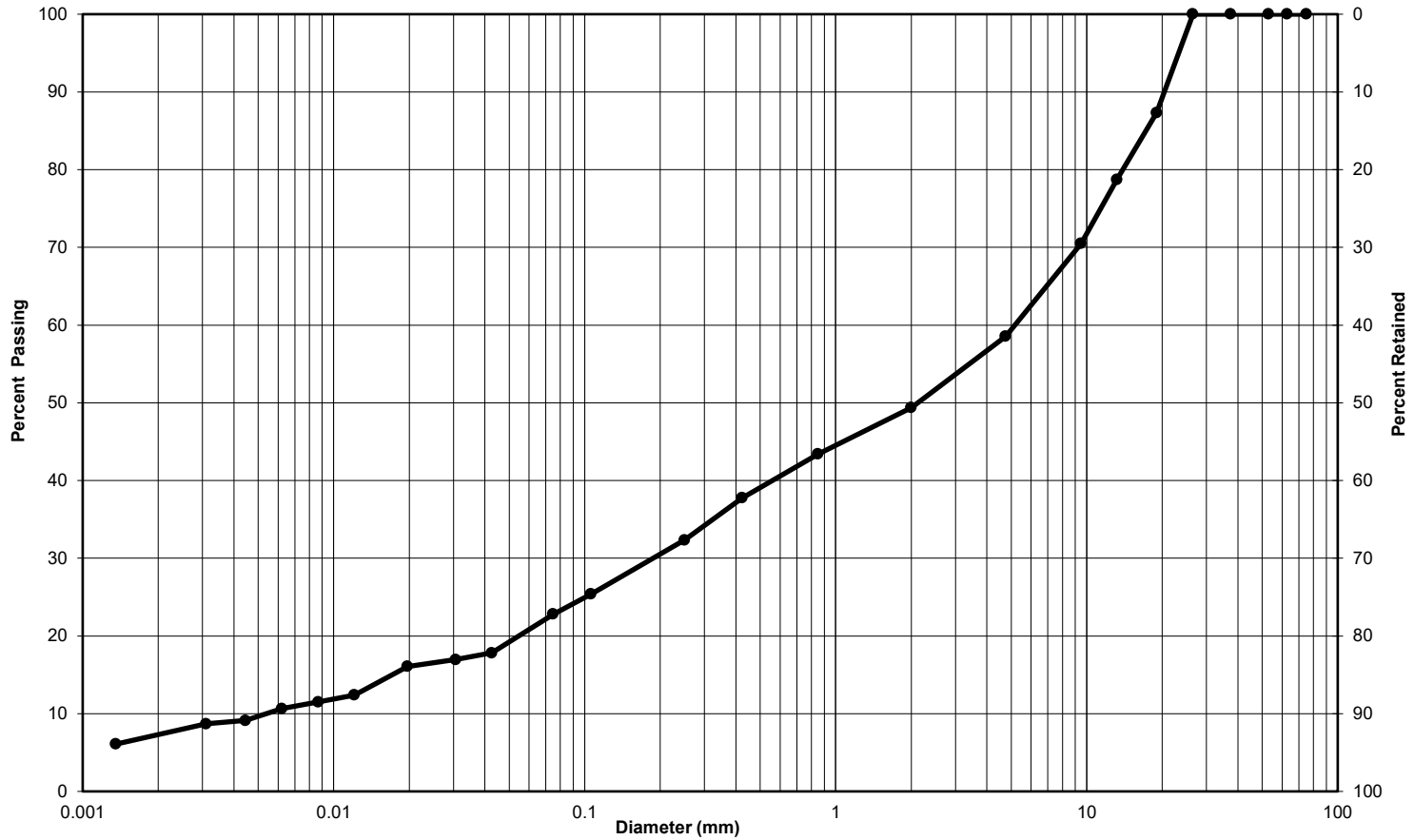
Remarks: Moisture Content = 7.1% as per, ASTM D2216.

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		

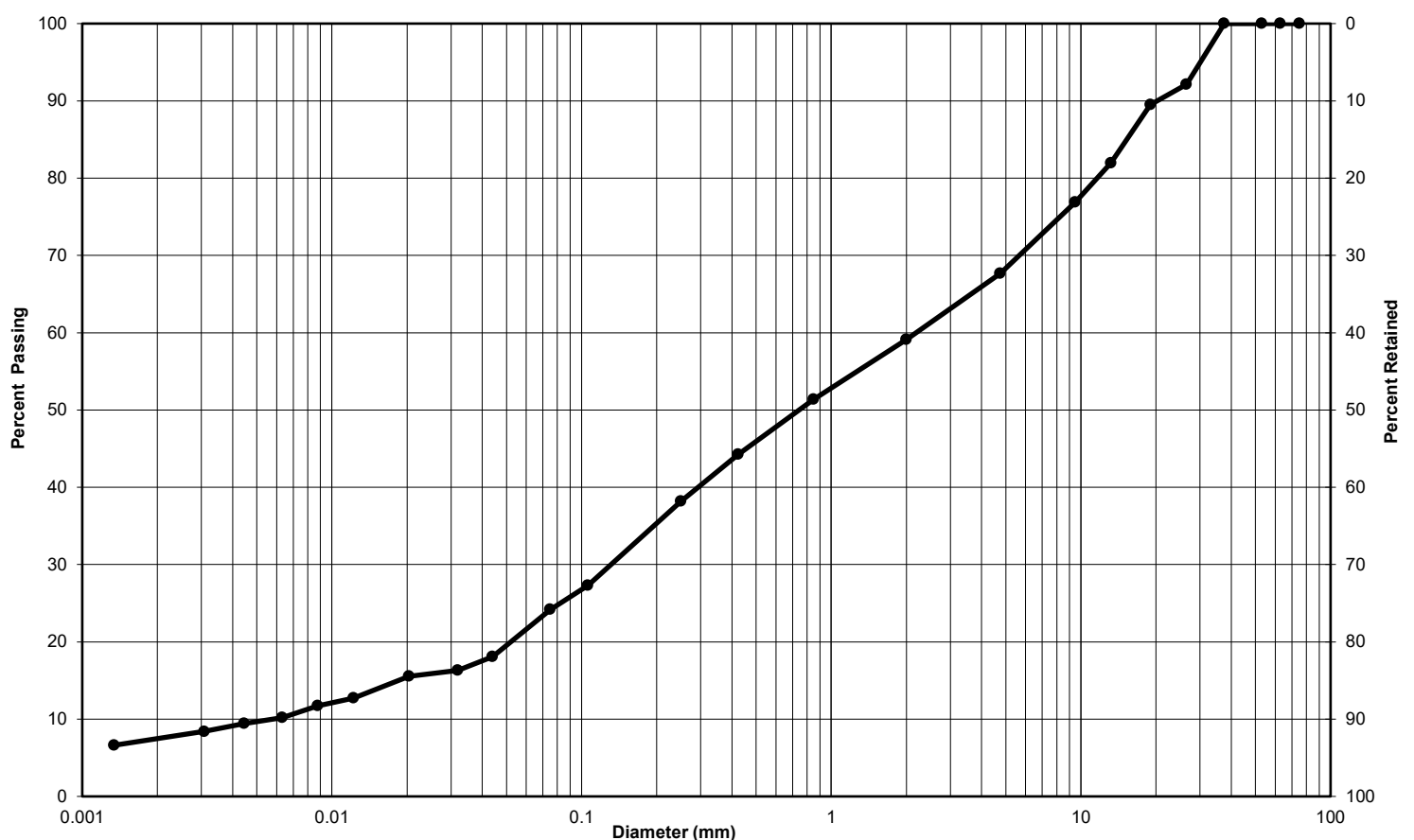
Remarks: Moisture Content = 8.7% as per, ASTM D2216.

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		

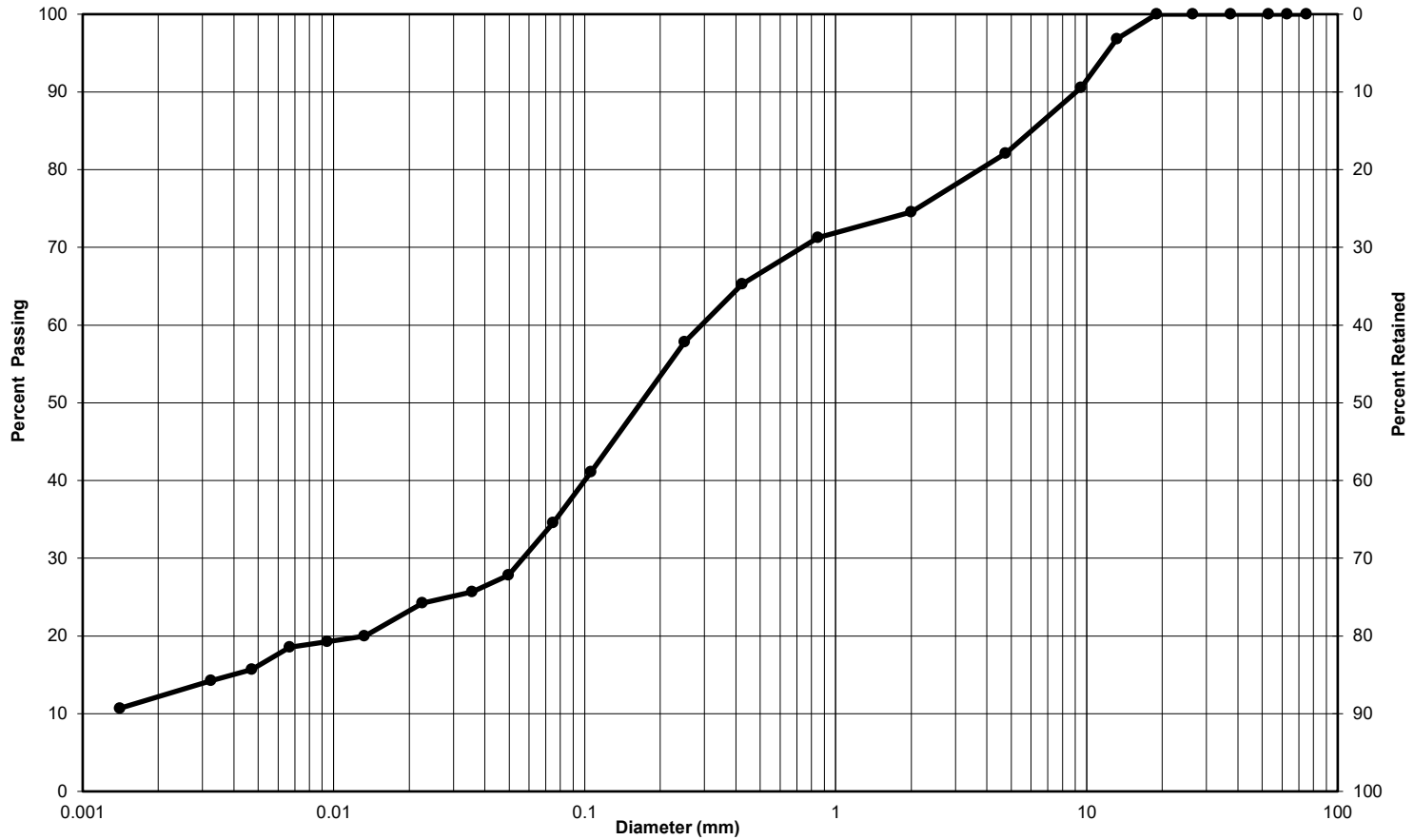
Remarks: Moisture Content = 10.6% as per, ASTM D2216.

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



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E

Appendix E - Geotechnical Report

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



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

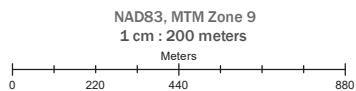
Figures



LEGEND

— Study Property Limit

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Distribution Airbus DS © 2020 HERE



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

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

ATTRIBUTION STATEMENTS

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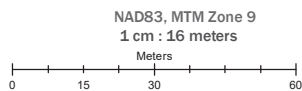
**SEPTIC ASSESSMENT
SITE LOCATION PLAN**

FIGURE 1



LEGEND
 — Study Property Limit

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 Distribution Airbus DS © 2020 HERE



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

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

ATTRIBUTION STATEMENTS

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**SEPTIC ASSESSMENT
 TEST HOLE LOCATION PLAN**

FIGURE 2

K:\GIS_PROJECTS\IGHDICA-

Appendix A

Test Pit Logs and Gradation Results



TEST HOLE No.: TP-1
ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastrate

LEGEND

PROJECT: Septic Assessment

- GS - GRAB SAMPLE
- WATER LEVEL

LOGGED BY: J. Scott DATE: 31 March 2021

EXCAVATION COMPANY: Goldie Mohr Ltd. METHOD: Backhoe

NOTES: 18T E: 456548 N: 5017167

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Soil Test Parameters										COMMENTS
	ft	m					Shear test (Cu)	Sensitivity (S)	Water content (%)	Atterberg limits (%)	Field	Lab					
		0.0		GROUND SURFACE		%	10	20	30	40	50	60	70	80	90		
		0.2		TOPSOIL (178mm)													
1		0.5		SM - Gravelly sand (fill), with silt, trace clay, concrete, brick, asphalt, compact, brown, moist													- Test pit open upon completion
2		1.0			GS-1	--											- GS-1 37% Gravel 47% Sand 12% Silt 4% Clay
3		1.5															
4		2.0															
5		2.5															
6		3.0		With clay, loose													
7		3.5		Wet	GS-2	--											- GS-2 41% Gravel 36% Sand 16% Silt 7% Clay - Groundwater infiltration observed at approximately 2.1 mbgs
8		4.0		END OF TEST HOLE													- Refusal at 2.4m (asphalt)
9		4.5															

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



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	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%)	Field Lab	COMMENTS
ft	m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90		
		0.1		TOPSOIL (102mm) SM - Gravelly sand (fill), with silt, concrete, brick, asphalt, brown, moist					
1									- Test pit open upon completion
		0.5							
2									
		1.0			GS-1	--			
3									
		1.5							
4									
		1.8		Wet					- Groundwater infiltration observed at approximately 1.8 mbgs
5									
		2.0							
6									
		2.5							
7									
		2.7		END OF TEST HOLE					
8									
		3.0							
9									
		3.5							
10									
		4.0							
11									
		4.5							

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



TEST HOLE No.: TP-3
 ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastrate
 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	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Soil Test Parameters										COMMENTS	
	ft	m					Shear test (Cu)	Sensitivity (S)	Water content (%)	Atterberg limits (%)	Field							
		0.0		GROUND SURFACE		%	10	20	30	40	50	60	70	80	90	△ Field □ Lab		
		0.2		TOPSOIL (152 mm)														
		0.2		SM - Gravelly sand (fill), with silt, concrete, asphalt, brown, moist														
1		0.5																
2		1.0																
3		1.2		Grey, cobbles														
4		1.2			GS-1	--												
5		1.5																
6		1.8		Wet														
7		2.0																
8		2.5																
9		3.0			GS-2	--												
10		3.0		END OF TEST HOLE														
11		3.5																
12		4.0																
13		4.5																
14		4.5																

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

- 0.2 m

- Test pit open upon completion

- Groundwater infiltration observed at approximately 1.8 mbgs

- 50 mm diameter monitoring well installed to 2.7 mbgs



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

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



TEST HOLE No.: TP-5
ELEVATION: Existing grade

TEST HOLE REPORT

Page: 1 of 1

CLIENT: Consolidated Fastrate
 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

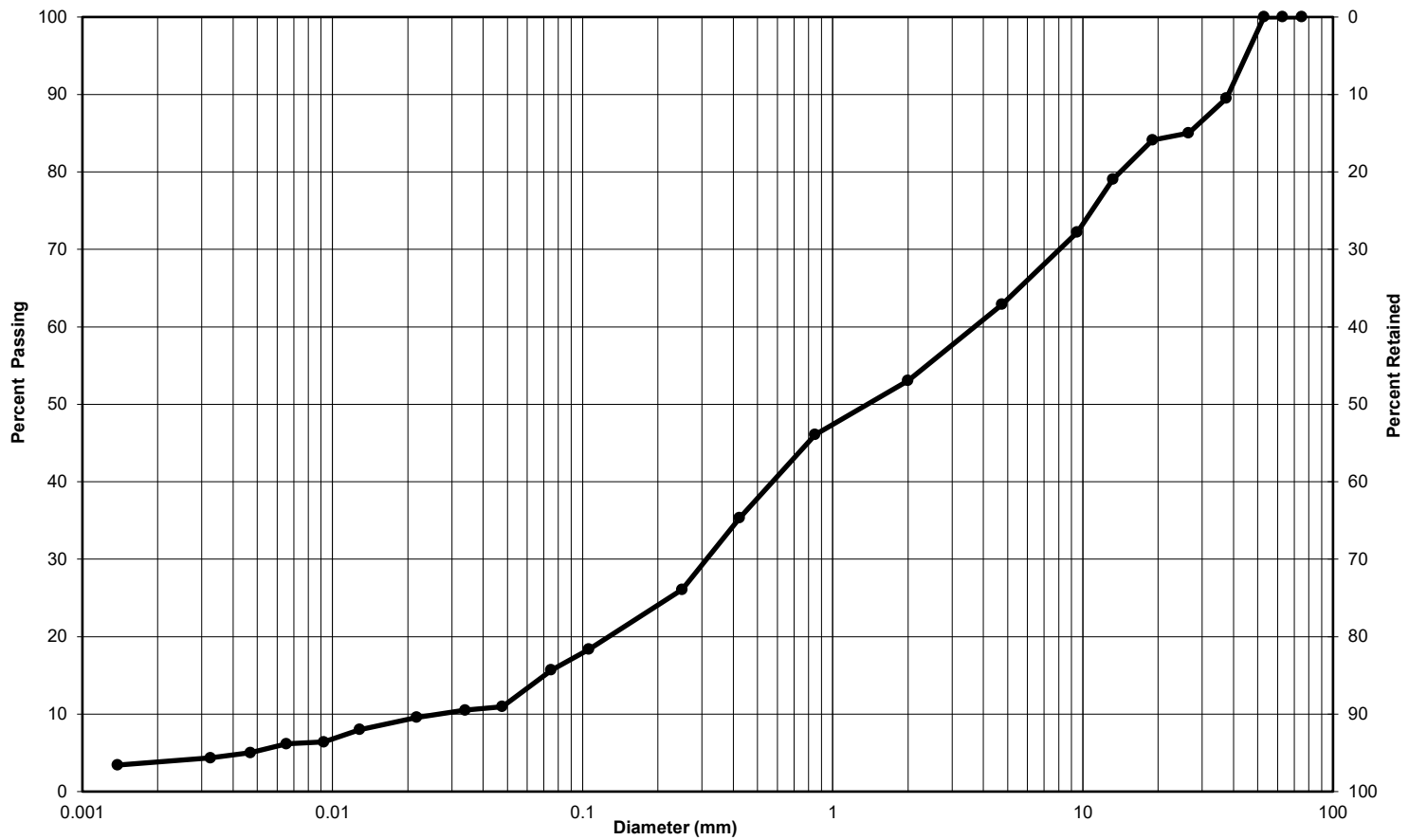
Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%)	Field Lab	COMMENTS
ft	m	0.0		GROUND SURFACE		%	10 20 30 40 50 60 70 80 90		
		0.1		TOPSOIL (102mm) SM - Silty sand (fill), with gravel, with clay, with asphalt, concrete, brown, moist					
1	0.5								- Test pit open upon completion
2									
3	1.0				GS-1	--			
4	1.2			Grey					
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	3.0		END OF TEST HOLE	GS-2	--			- GS2 18% Gravel 47% Sand 23% Silt 12% Clay
11	3.5								
12									
13	4.0								
14									
	4.5								

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



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	

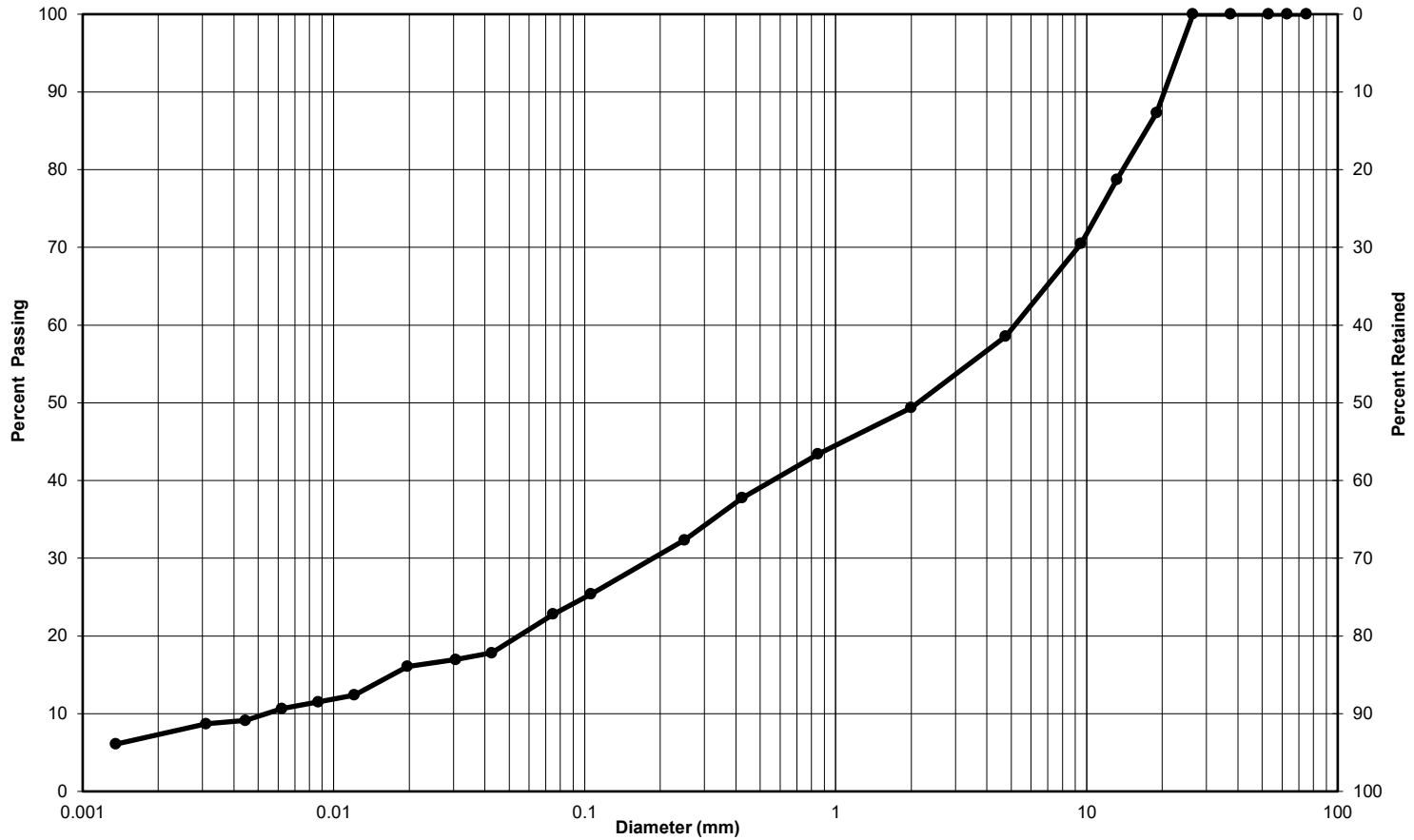
Remarks: Moisture Content = 7.1% as per, ASTM D2216.

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		

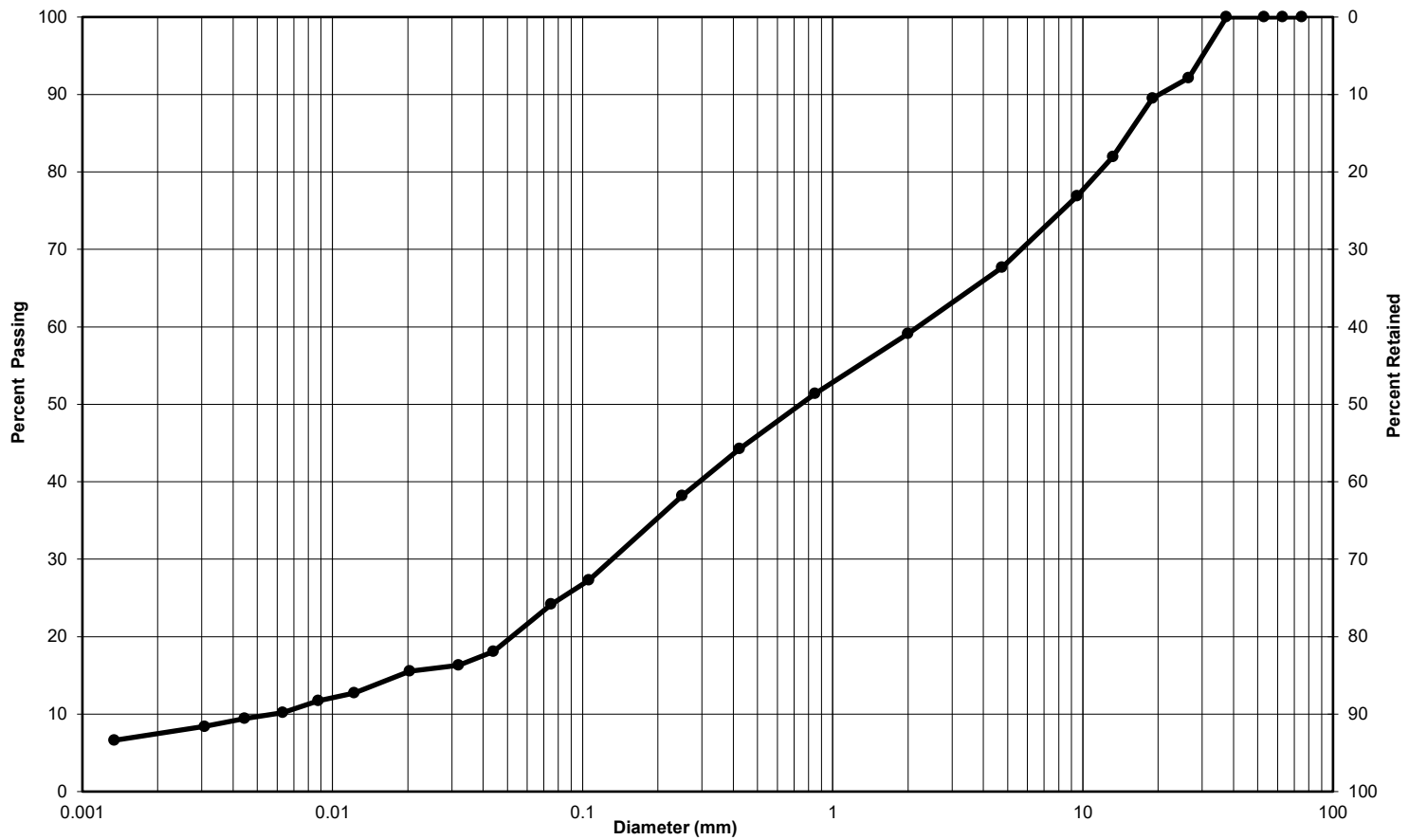
Remarks: Moisture Content = 8.7% as per, ASTM D2216.

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		

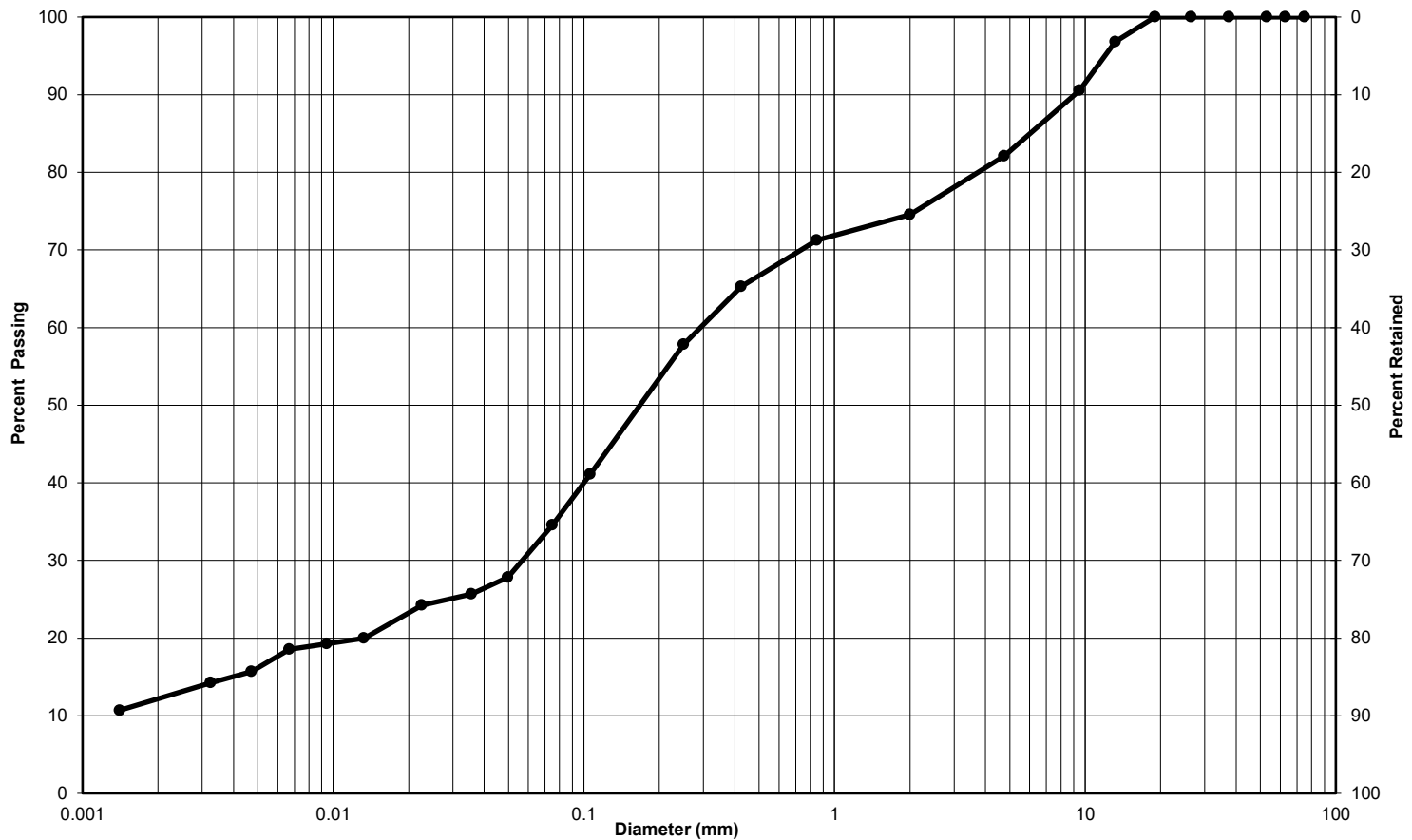
Remarks: Moisture Content = 10.6% as per, ASTM D2216.

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



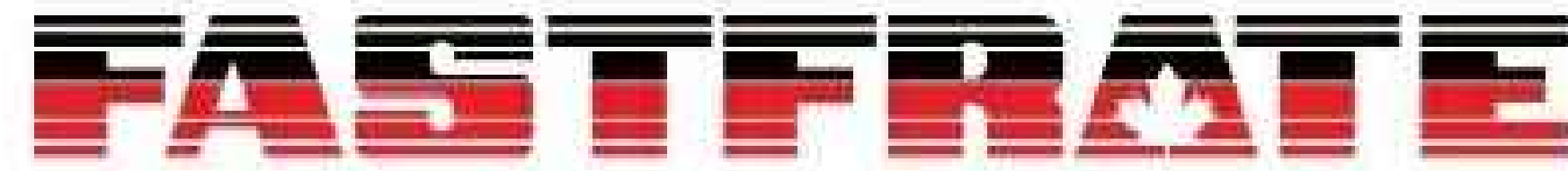
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F

Appendix F - Drawings





FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY SOMME STREET, OTTAWA, ONTARIO

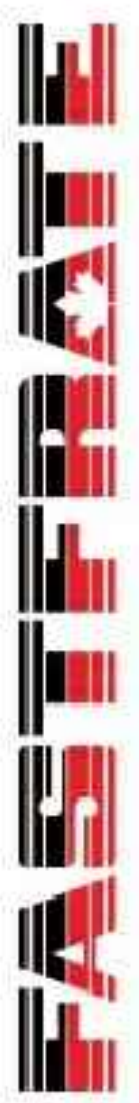
LIST OF DRAWINGS

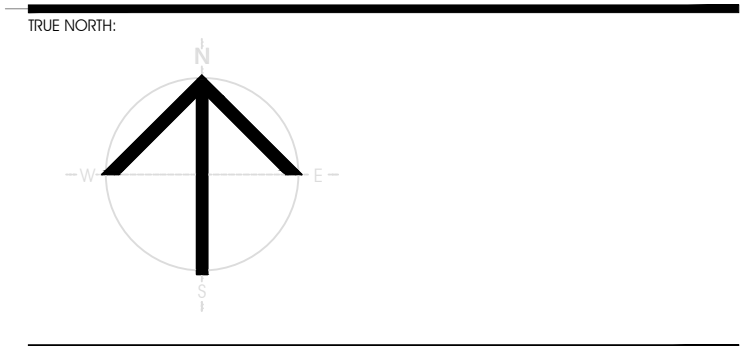
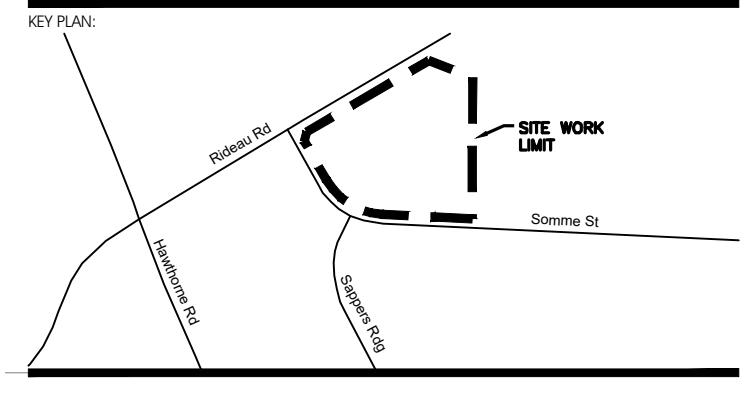
PLAN No:	DESCRIPTION
C001	COVER PAGE
C002	LEGAL PLAN
C003	TOPOGRAPHICAL SURVEY PLAN
C004	SEDIMENT AND EROSION CONTROL PLAN
C005	NOTES PLAN
C006A	GRADING PLAN
C006B	SECTIONS
C007	SITE SERVICING PLAN
C008	SEPTIC SYSTEM CONFIGURATION AND SECTIONS
C009	DETAILS PLAN
C010	DETAILS PLAN
C011	DETAILS PLAN
C012	DETAILS PLAN
C013	DETAILS PLAN
C014	DETAILS PLAN
C015	DETAILS PLAN
C016	DETAILS PLAN
C017	DETAILS PLAN
C018	DETAILS PLAN
C019	DETAILS PLAN



115-200 Catherine Street, Ottawa, ON K1P 6B8 CANADA
1.877.368.2422

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





PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NO.	REVISION	DATE (MM/CCYY)
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

PROFESSIONAL STAMP: [Blank]



CIVITAS ARCHITECTURE INC. 14 CHAMBERLAN AVENUE, SUITE 101 OTTAWA, ON CANADA K1S 1V9 1-613-742-7482 WWW.CIVITAS-K1C.CA



PROJECT TITLE: FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

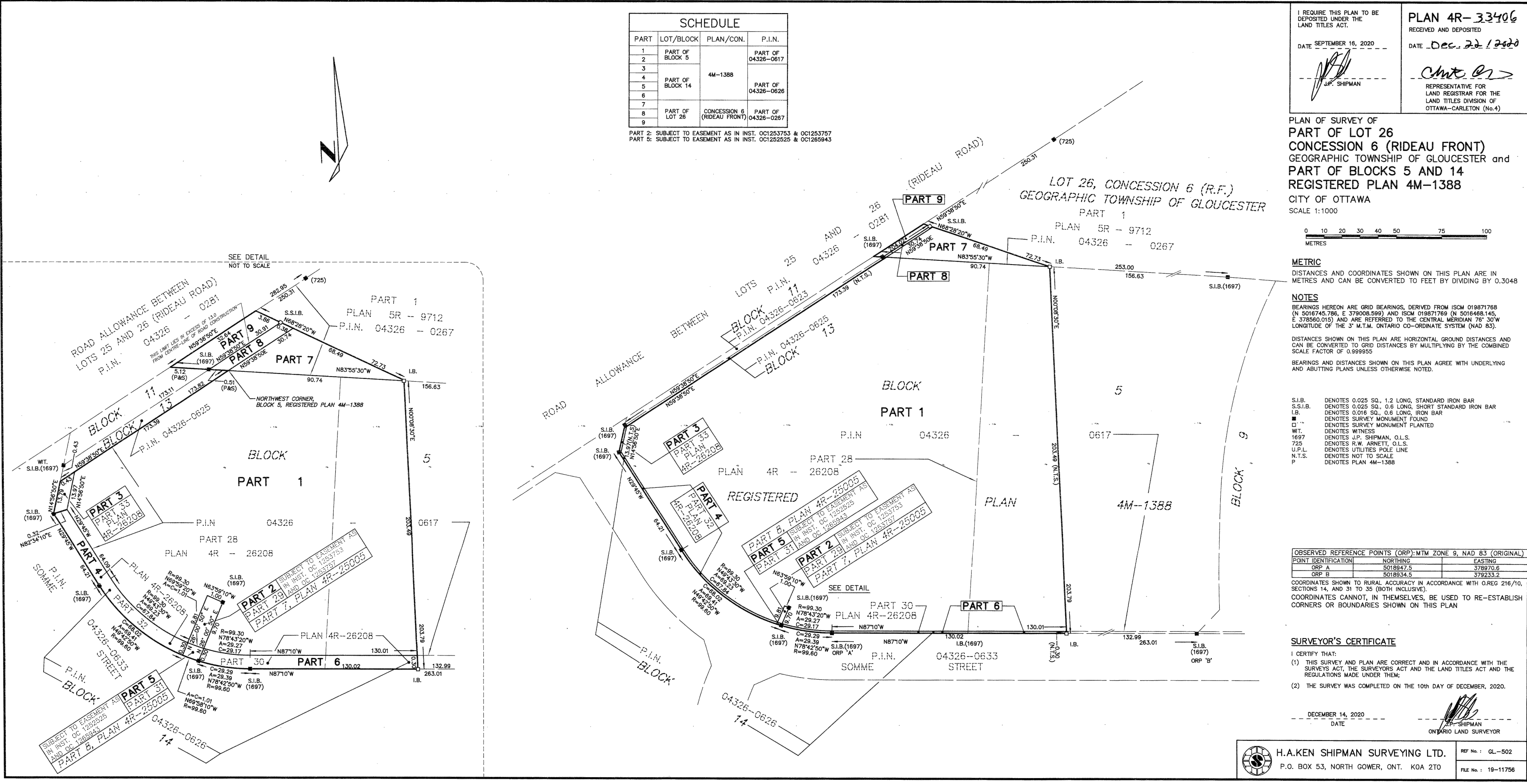
SOMME ST. OTTAWA, ON

LEGAL PLAN

DRAWN BY: D.CANN DRAWING NUMBER: C002
 DATE: J.SALVE
 APPROVED BY: J.SALVE
 ISSUE DATE: AUGUST 13, 2021 REVISION NUMBER:
 CLIENT PROJECT #: PROJECT #:

A001083

DO NOT SCALE THE DRAWING. USE DIMENSIONS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL DIMENSIONS AND CHECKING THE ACCURACY OF ANY INFORMATION BEFORE COMMENCING WORK. THE DRAWING IS TO BE READ IN CONJUNCTION WITH ALL STRUCTURAL, MECHANICAL, ELECTRICAL, CIVIL AND OTHER CONSULTANT DRAWINGS. THIS DRAWING SHALL BE USED FOR CONSTRUCTION PURPOSES UNLESS STATED BY THE ARCHITECT. COPYRIGHT RESERVED. ALL PARTS OF THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF THE ARCHITECT AND SHALL NOT BE REPRODUCED WITHOUT THE EXPRESSED PERMISSION FROM THE ARCHITECT.



\\CIMA-PUBLIC\CIVITAS\CIMA-CI\0101_PROJECTS\A001000-001_499\A01083_FASTFRATE WAREHOUSE DEVELOPMENT\A001000_CIVIL\DWG

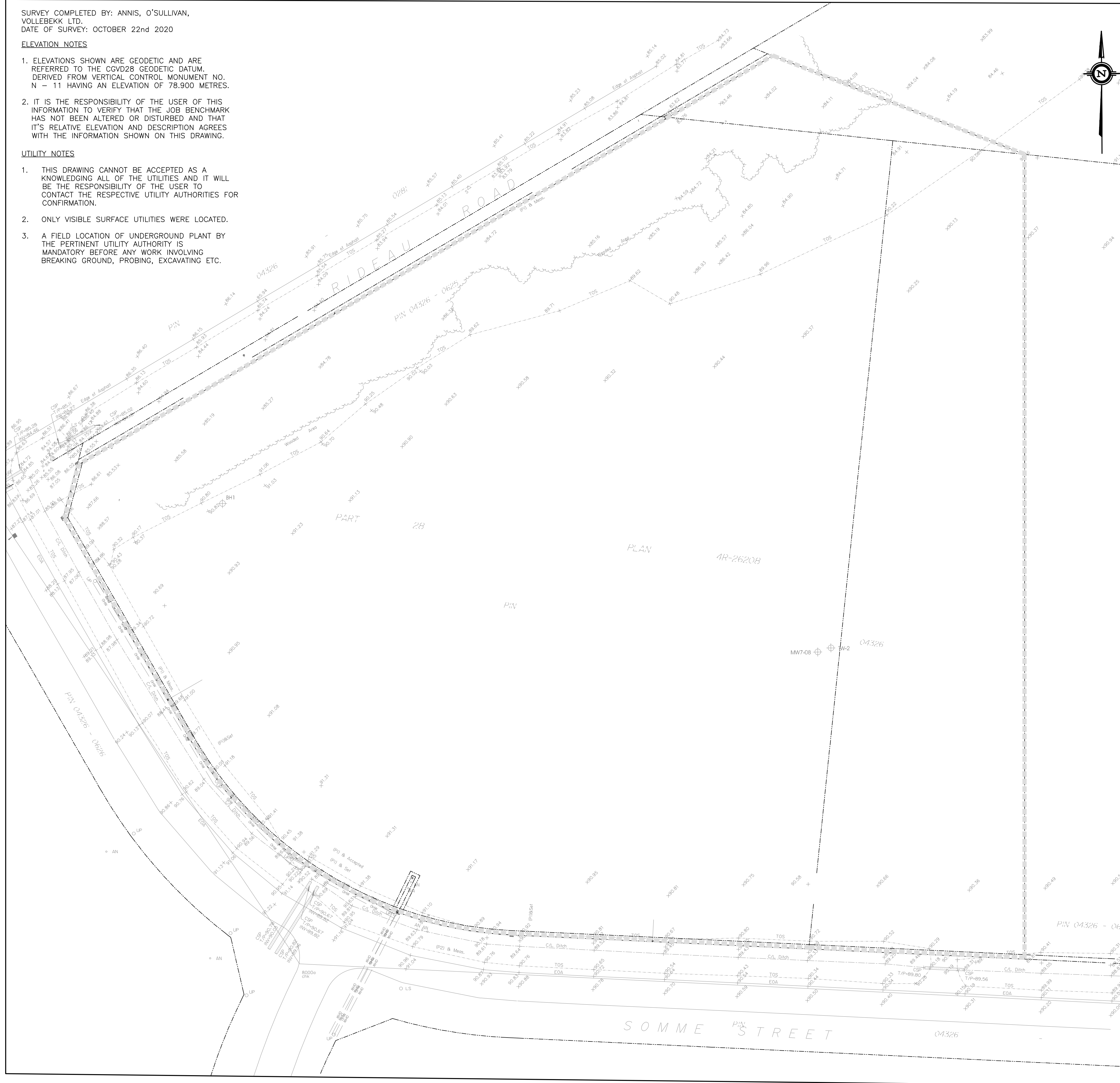
SURVEY COMPLETED BY: ANNIS, O'SULLIVAN,
VOLLEBEKK LTD.
DATE OF SURVEY: OCTOBER 22nd 2020

ELEVATION NOTES

- 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.
- IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.

UTILITY NOTES

- 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.
- ONLY VISIBLE SURFACE UTILITIES WERE LOCATED.
- A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY BEFORE ANY WORK INVOLVING BREAKING GROUND, PROBING, EXCAVATING ETC.

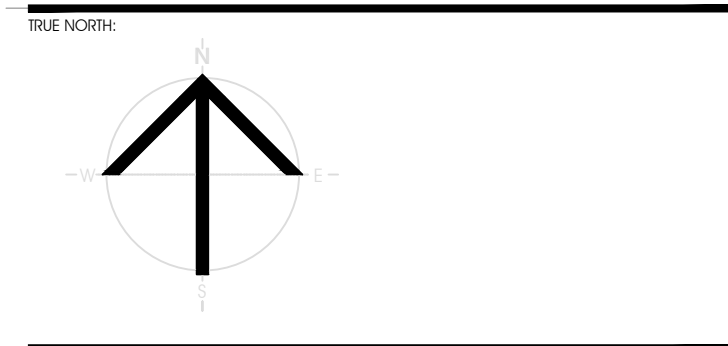
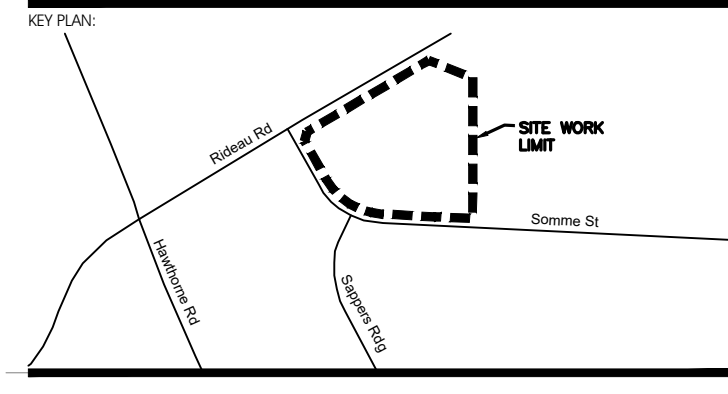


EXISTING

- SURVEY MONUMENT PLANTED
- SURVEY MONUMENT FOUND
- STANDARD IRON BAR
- SHORT STANDARD IRON BAR
- IRON BAR
- CUT CROSS
- CONCRETE PIN
- ROUND IRON BAR
- SHORT STANDARD IRON BAR
- IRON BAR
- (WIT) WITNESS
- Meas. MEASURED
- (AOG) ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
- (PI) REGISTERED PLAN 4M-1388
- (P2) PLAN 4R-26208
- △ SIGN
- LS LIGHT STANDARD
- LP UTILITY POLE
- AN ANCHOR
- NATURAL GAS LINE
- CSP CORRUGATED STEEL PIPE
- +E5.00 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

LEGEND

PROPOSED



PRELIMINARY
NOT FOR CONSTRUCTION

REVISION	DATE

PROFESSIONAL STAMP: _____

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAN AVENUE, SUITE 101 OTTAWA, ON CANADA K1S 1V9 1-613-742-7482 WWW.CIVITAS-INC.CA



PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: 1:500

SOMME ST. OTTAWA, ON

TOPOGRAPHICAL SURVEY PLAN

DRAWN BY: D.CANN DRAWING NUMBER: **C003**

DATE: _____

REVIEWED BY: J.SAUVÉ

APPROVED BY: _____

ISSUE DATE: AUGUST 13, 2021 REVISION NUMBER: _____

CLIENT PROJECT #: _____ PROJECT #: **A001083**

NOTE OF CAUTION

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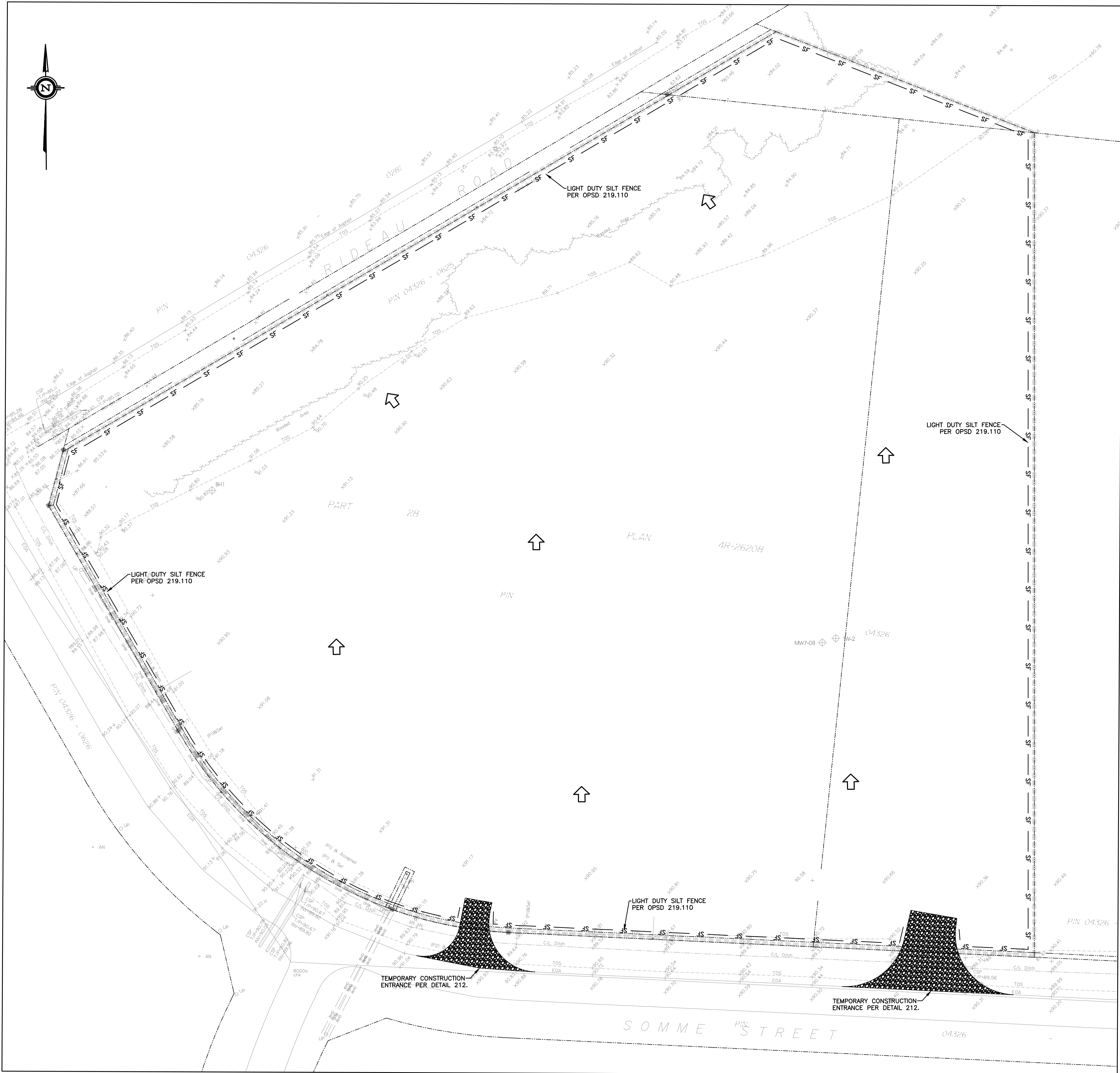
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THE CONTRACTOR WILL HAVE THE RESPONSIBILITY AND THE OBLIGATION TO VALIDATE, BY EXPLORATORY EXCAVATION, THE SIZE OF THE PUBLIC UTILITIES UNDERGROUND SERVICES AND TO WARN THE ENGINEER OF ANY CONFLICT WITH THE PROJECTED WORK.



\\CIMA-PUBLIC\CIVITAS\CIMA-C\DOT\PROJECTS\A001000-A001499\A001083_FASTFRATE WAREHOUSE DEVELOPMENT\A001440_CVILVREB



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	
○ LP	UTILITY POLE	
+ AN	ANCHOR	
○ LS	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	
---	OVERHEAD WIRES	
---	WORK LIMIT	
⊕ BH-1	BOREHOLE	
	ELEVATION	+ 99,000
	DRAINAGE DIRECTION	→
	OVERLAND FLOW	→
	SILT FENCE	SF
	TEMPORARY CONSTRUCTION ENTRANCE	[Pattern]

- SEDIMENT AND EROSION CONTROL - GENERAL NOTES**
- 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.
 - Wherever standards, laws and/or regulations are mentioned they refer to their current versions, modifications included.
 - Specifically, sediment and erosion control measures to be constructed as per OPSS/MUNI 805.
 - The Contractor must implement best management practices and provide adequate sediment and erosion control measures during construction.
 - 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.
 - 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.
 - The Contractor must set up the measures shown on the plan, inspect them frequently and clean and repair or replace the deteriorated structures.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - This plan is a "Living Document" which may be revised in the event that the control measures are not sufficient.



NOTE OF CAUTION

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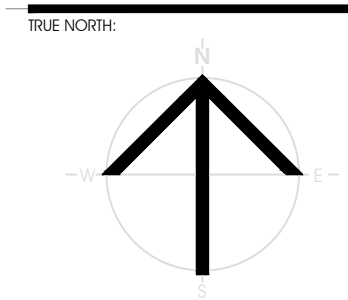
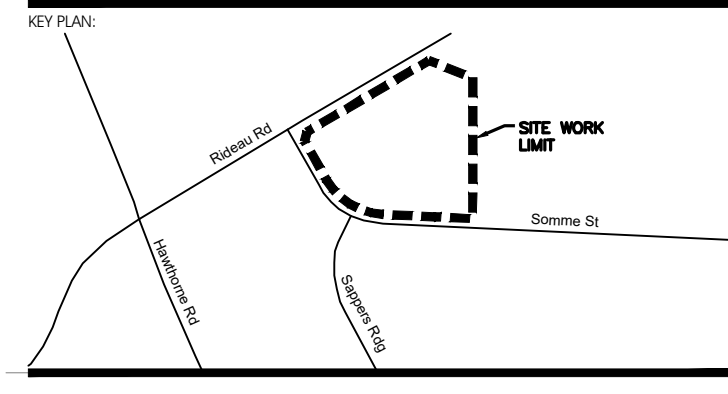
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PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:	ISSUED FOR SITE PLAN APPROVAL	DATE: (MM/CCYY)
1		AUGUST 13, 2021
2		
3		
4		
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PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: 1:500

SOMME ST. OTTAWA, ON

SEDIMENT AND EROSION CONTROL PLAN

DRAWN BY: D.CANN DRAWING NUMBER: **C004**

DATE: J.SAUVÉ

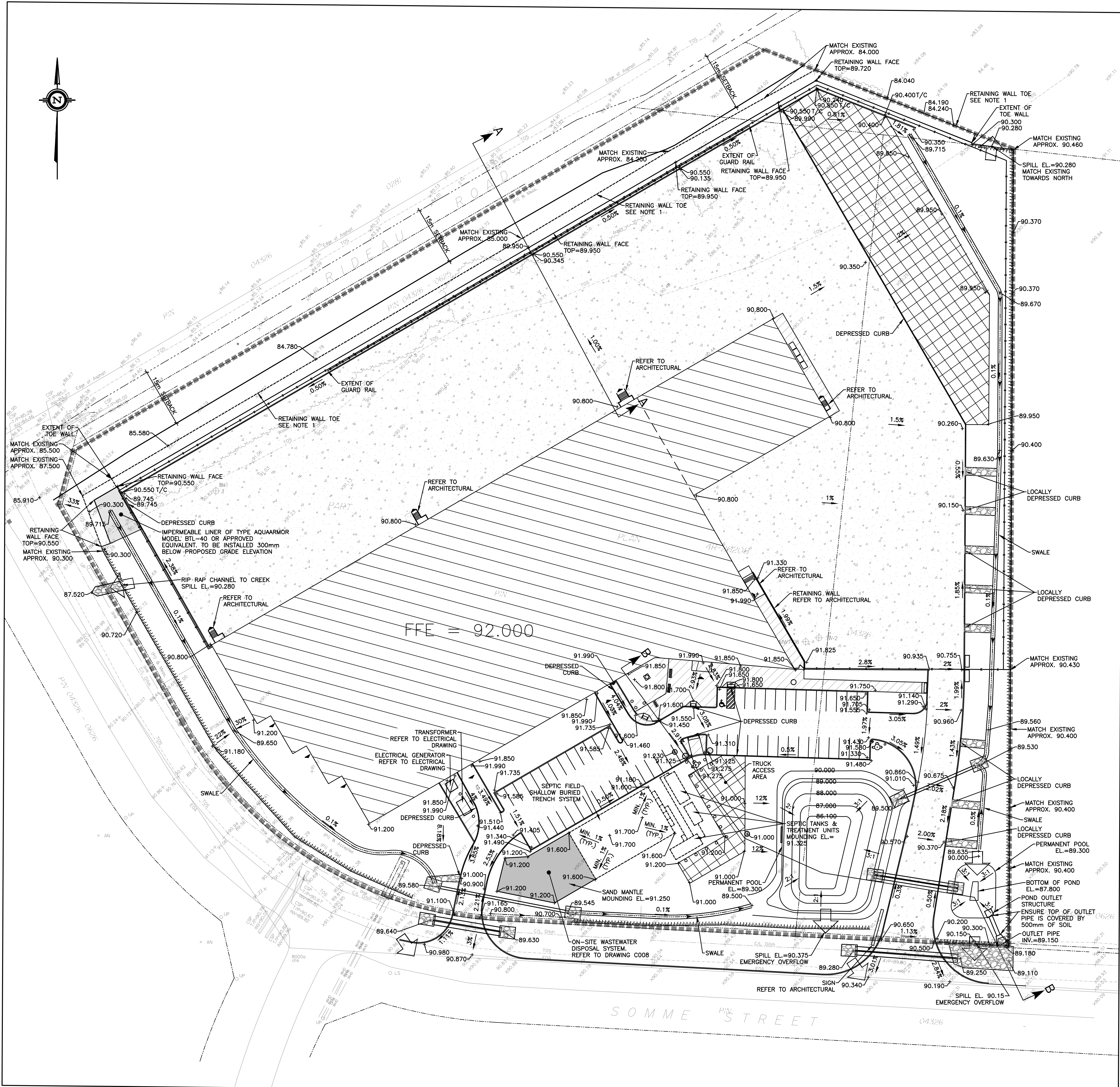
REVIEWED BY: J.SAUVÉ

APPROVED BY: J.SAUVÉ

ISSUE DATE: AUGUST 13, 2021 REVISION NUMBER:

CLIENT PROJECT #: **A001083**

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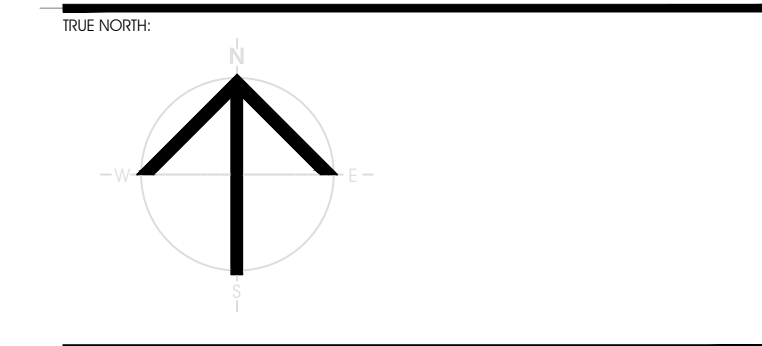
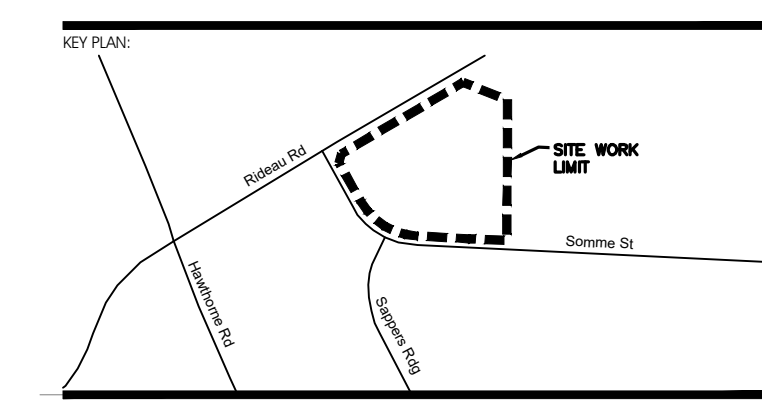


EXISTING

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
- RIB*— ROUND IRON BAR
- SSIB*— SHORT STANDARD IRON BAR
- IB*— IRON BAR
- (WIT)— WITNESS
- (M)— MEASURED
- (AOC)— ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
- (PI)— REGISTERED PLAN 4M-1388
- (P2)— PLAN 4R-2820B
- △— SIGN
- LS— LIGHT STANDARD
- UP— UTILITY POLE
- AN— ANCHOR
- NG— NATURAL GAS LINE
- CSP— CORRUGATED STEEL PIPE
- E— LOCATION OF ELEVATIONS
- C/L— CENTRELINE
- P/L— PROPERTY LINE
- TOS— TOP OF SLOPE
- BOS— BOTTOM OF SLOPE
- T/P— TOP OF PIPE
- T/G— TOP OF GRATE
- EGA— EDGE OF ASPHALT
- JB— JERSEY BARRIER
- OW— OVERHEAD WIRES
- WL— WORK LIMIT
- BH-1— BOREHOLE
- A— WATERMAIN
- S— SANITARY SEWER
- F— STORM SEWER
- D— DRAIN
- G— GAS LINE (APPROX. LOC.)
- T— UNDERGROUND TELEPHONE (APPROX. LOC.)
- CA— UNDERGROUND CABLE (APPROX. LOC.)
- X— FENCE
- E— UNDERGROUND ELECTRICITY (APPROX. LOC.)
- WL— OVERHEAD WIRES
- L— LOT LINE
- R— RIGHT-OF-WAY LIMITS
- E— EASEMENT
- W— WORK LIMITS AREA
- T/S— TOP OF SLOPE
- D/C— DITCH CENTER
- B/S— BOTTOM OF SLOPE
- WA— WOOD AREA
- GC— GRADE CROSSING
- F— FLAGPOLE
- CB— CATCHBASIN
- M/CB— MANHOLE/CATCHBASIN
- M— MANHOLE
- FH— FIRE HYDRANT
- V— VALVE
- R— REDUCER
- TC— TEE
- W— WATER CHAMBER
- P— PRIVATE UTILITIES (WATERMAIN)
- EWF— EXTERIOR WATER FAUCET
- S— SLUICEWAY
- NGSV— NATURAL GAS VALVE
- S— SIGN
- TLP— TRAFFIC LIGHT
- ELP— ELECTRICITY POLE
- TELP— TELEPHONE POLE
- ELS— ELECT.—STREET LIGHT POLE
- ELP— ELECT.—TEL.—TRANSFORMER POLE
- PSLP— PRIVATE STREET LIGHT
- EM— ELECTRICITY MANHOLE
- TMS— TELEPHONE MANHOLE
- SS— SURVEY STATION
- E— ELEVATION
- D— DRAINAGE DIRECTION
- S— SAMPLING LOCATION
- OF— OVERLAND FLOW
- RC— ROLLED CONCRETE (REFER TO DETAIL 203)
- HDP— HEAVY DUTY PAVEMENT (REFER TO DETAIL 202)
- CS— CONCRETE SIDEWALK (REFER TO DETAIL 101, 102 & 103)
- GP— GRANULAR PAD (REFER TO DETAIL 202)
- RR— RIP RAP (REFER TO DETAIL)



PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NO.	DATE	DESCRIPTION
1	AUGUST 13, 2021	ISSUED FOR SITE PLAN APPROVAL

PROFESSIONAL STAMP:

LICENSED PROFESSIONAL ENGINEER
J. A. SAUVE
10020/100
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
C. LAVOIE-LEBEL
100067842
PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTS & LANDSCAPE ARCHITECTS

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 OTTAWA, ONT CANADA K1S 1V9 1-613-742-7482 WWW.CIVITAS-INC.CA

PROJECT TITLE: FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: 1:500

SOMME ST. OTTAWA, ON

GRADING PLAN

DRAWN BY: D.CANN DRAWING NUMBER: C006A

DATE: REVIEWED BY: J.SAUVE

APPROVED BY: PROJECT DATE: AUGUST 13, 2021 REVISION NUMBER:

CLIENT PROJECT #: A001083

RIP-RAP			
TYPE	CALIBER (mm)	d50 (mm)	THICKNESS (mm)
2	200-100	150	300
3	300-200	250	500

NOTES

- TOE OF RETAINING WALL SHOWN AT WIDEST LOCATION. LOCATION VARIES WITH HEIGHT OF WALL.
- RIP RAP SIZE IN MUNICIPAL ROW TO BE TYPE 3; RIP RAP SIZE ON SITE TO BE TYPE 2.

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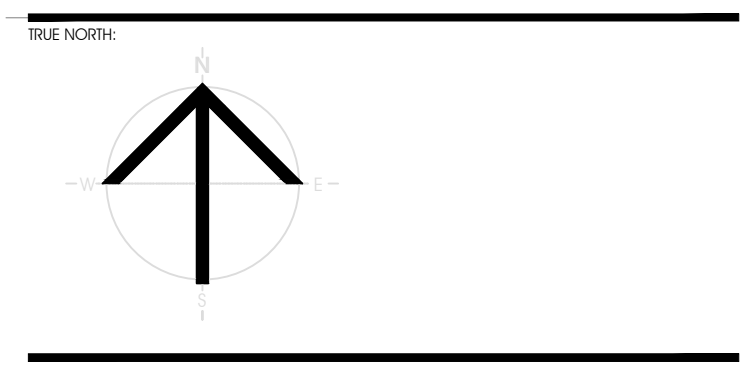
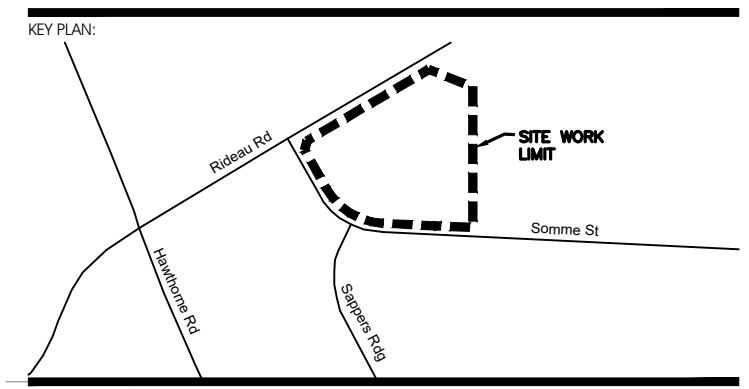
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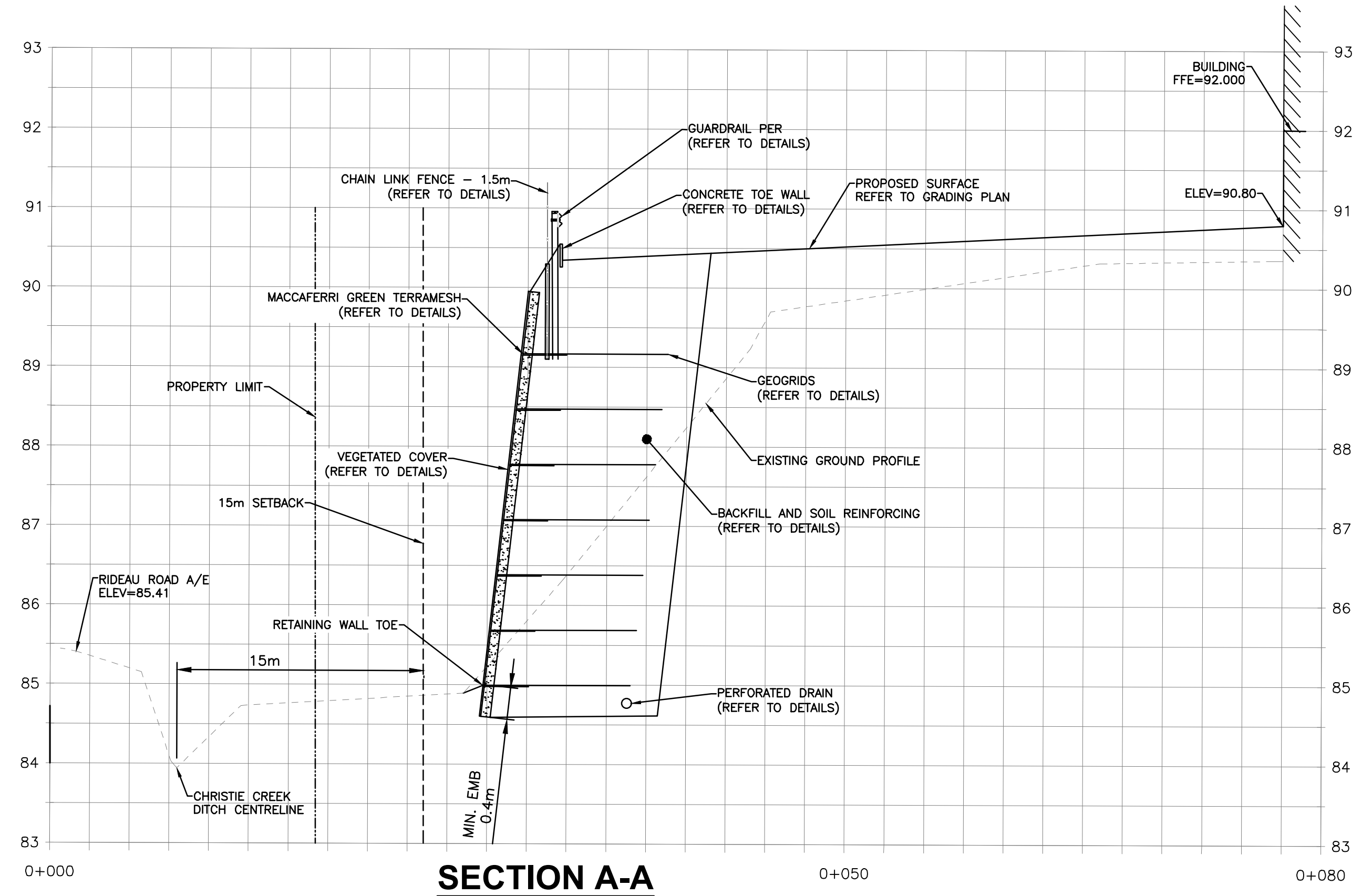
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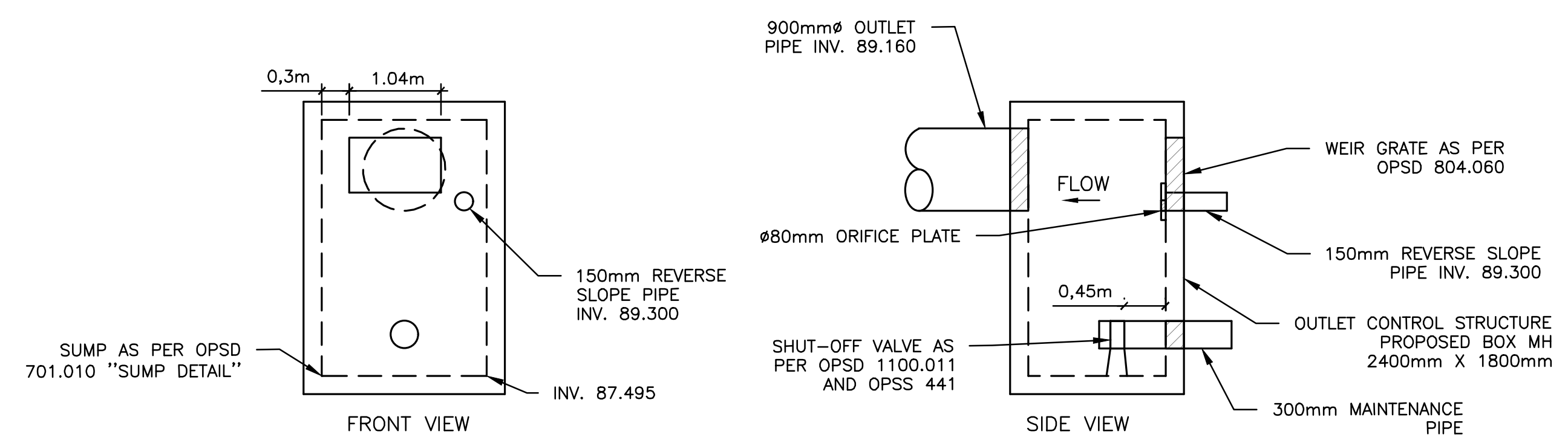
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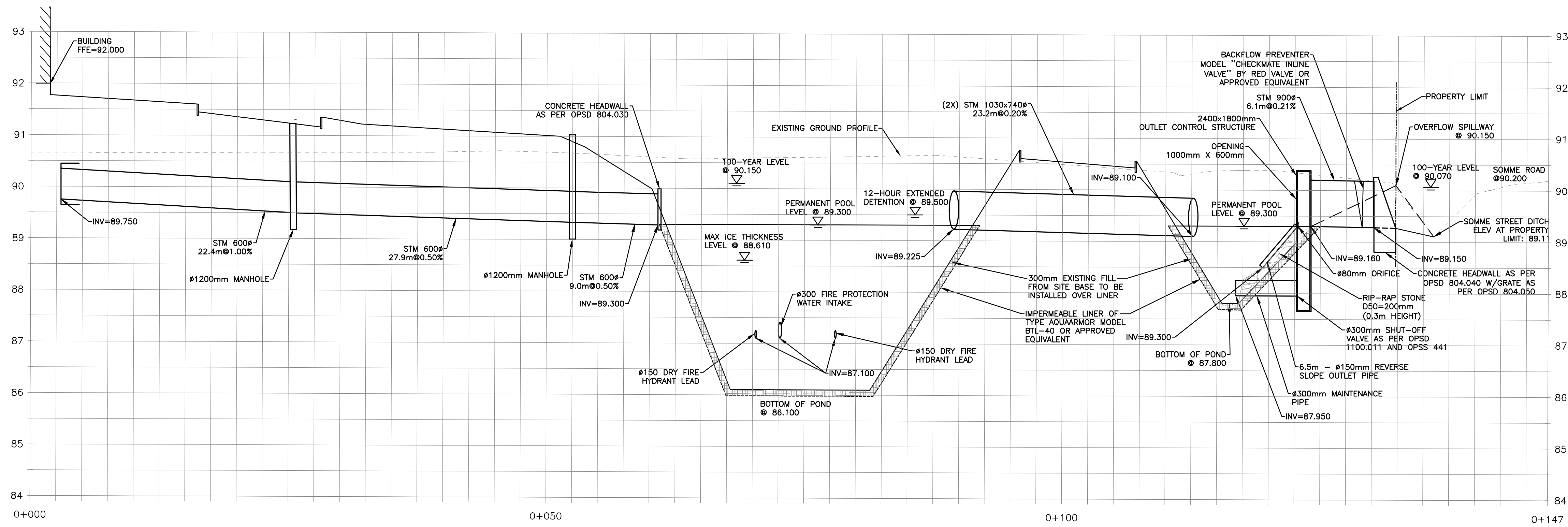
PRELIMINARY		NOT FOR CONSTRUCTION	
RECORD OF REVISIONS:			
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ISSUED FOR SITE PLAN APPROVAL		ANGUST 13, 2021	
NUMBER: REVISION:		DATE: (MM/DD/YY)	



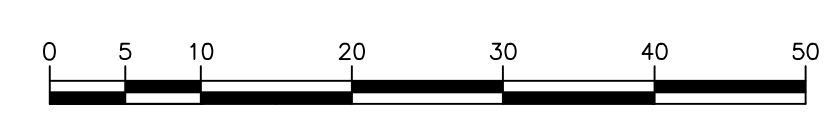
SECTION A-A
H=1:250 V:1:50



OULET CONTROL STRUCTURE DETAILS
SCALE: NTS



SECTION B-B
H=1:250 V:1:50



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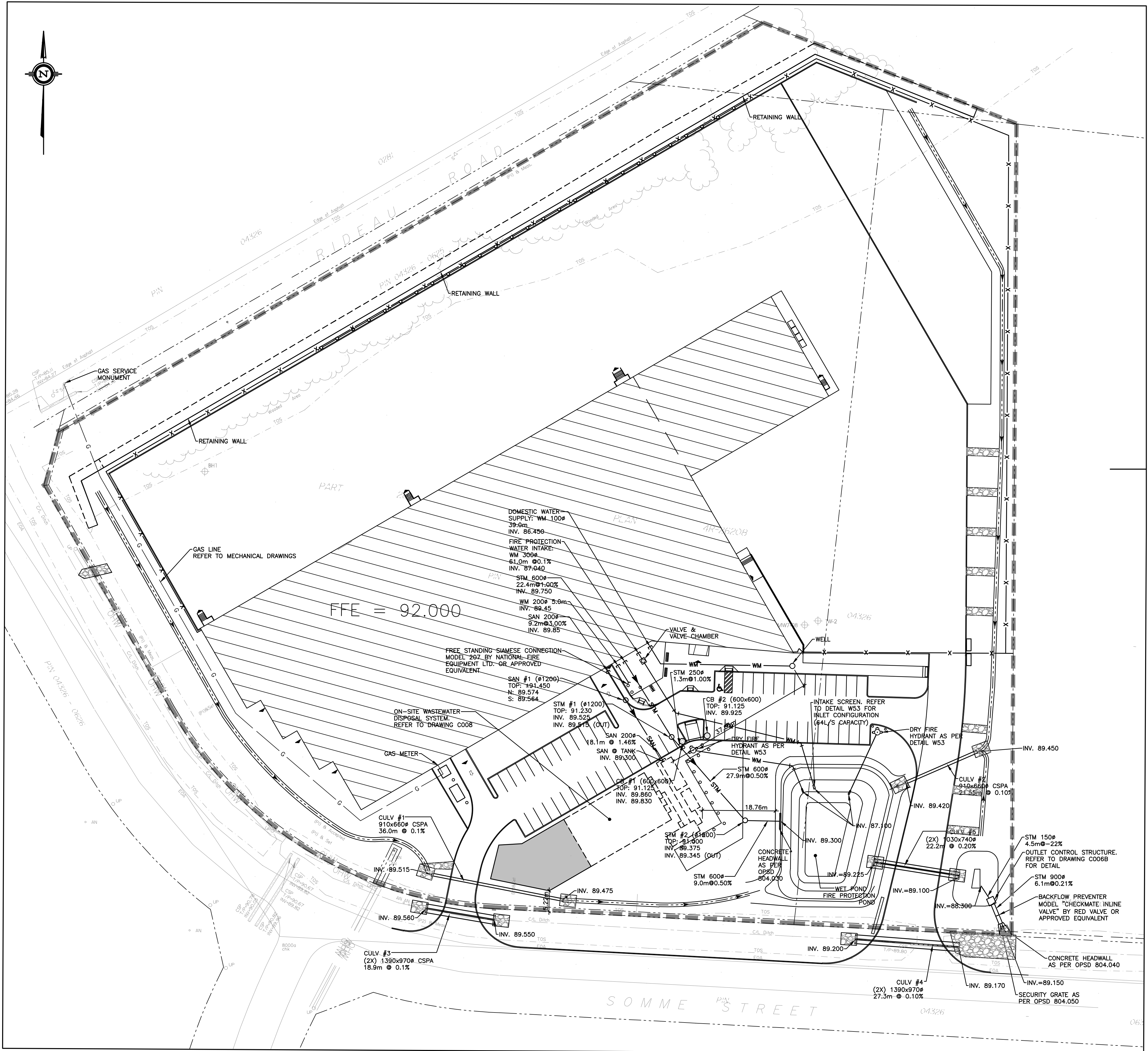


PROJECT FILE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: 1:500
SOMME ST, OTTAWA, ON

SECTIONS

DRAWN BY: D.CANN DRAWING NUMBER: C006B
DATE: J.SAUVÉ
APPROVED BY: J.SAUVÉ
PRINT DATE: AUGUST 13, 2021 REVISION NUMBER:
CLIENT PROJECT #: A001083 PROJECT #:

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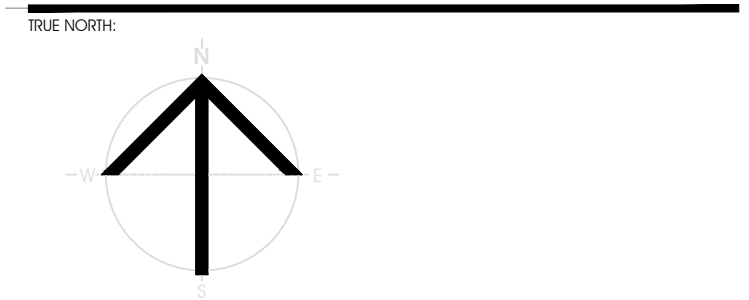
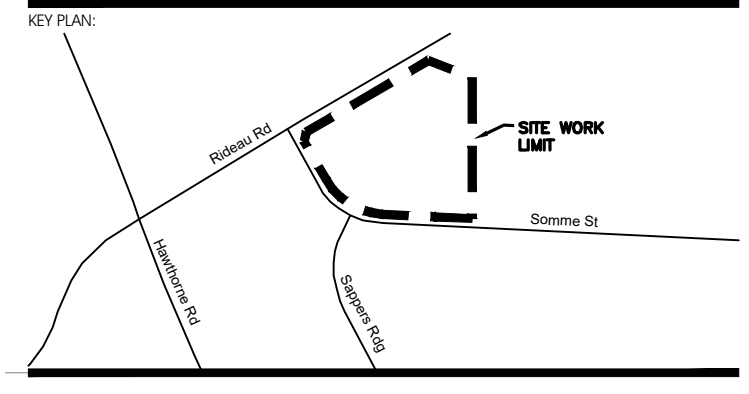


EXISTING

- SIB SURVEY MONUMENT PLANTED
- SSIB SURVEY MONUMENT FOUND
- IB STANDARD IRON BAR
- CC SHORT STANDARD IRON BAR
- CP IRON BAR
- IB# CUT CROSS
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- IB# ROUND IRON BAR
- SSIB# SHORT STANDARD IRON BAR
- IB# IRON BAR
- (WIT) WITNESS
- MEAS. MEASURED
- (AOS) ANKNS. O'SULLIVAN, VOLLEBECK LTD.
- (PI) REGISTERED PLAN 4M-1388
- (P2) PLAN 4R-28208
- △ SIGN
- LS LIGHT STANDARD
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- JB JERSEY BARRIER
- 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.)
- E UNDERGROUND ELECTRICITY (APPROX. LOC.)
- W 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
- ELECTRICITY POLE
- TELEPHONE POLE
- ELECT.-TEL-STREET LIGHT POLE
- ELECT.-TEL-TRANSFORMER POLE
- PRIVATE STREET LIGHT
- ELECTRIC MANHOLE
- TELEPHONE MANHOLE
- SURVEY STATION
- ELEVATION
- DRAINAGE DIRECTION
- OVERLAND FLOW

PROPOSED

- PROPERTY LINE
- 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
- S SANITARY SEWER
- P STORM SEWER
- D DRAIN
- G GAS LINE (APPROX. LOC.)
- T UNDERGROUND TELEPHONE (APPROX. LOC.)
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- ELEVATION
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- OVERLAND FLOW



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RECORD OF REVISIONS

NO.	REVISION	DATE

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

PROFESSIONAL STAMP

CIVITAS GROUP
ARCHITECTS & LANDSCAPE ARCHITECTS

CIVITAS ARCHITECTURE INC.
14 CHARLEBAIN AVENUE, SUITE 101
OTTAWA, ON
CANADA K1S 1V9
1-813-742-7482
WWW.CIVITAS-INC.CA

CIMA+

PROJECT FILE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: 1:500
SOMME ST. OTTAWA, ON
DRAWING FILE:

SITE SERVICING PLAN

DRAWN BY: D.CANN DRAWING NUMBER:
DATE: _____
REVIEWED BY: J.SAIVE **C007**
APPROVED BY: _____
FIRST DATE: _____
ISSUED DATE: AUGUST 13, 2021 REVISION NUMBER:
CLIENT PROJECT #: _____ PROJECT #:

A001083

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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.

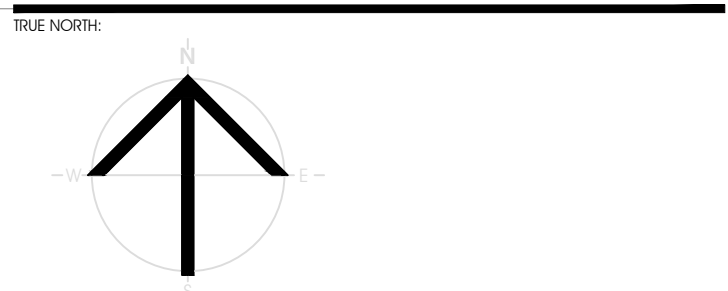
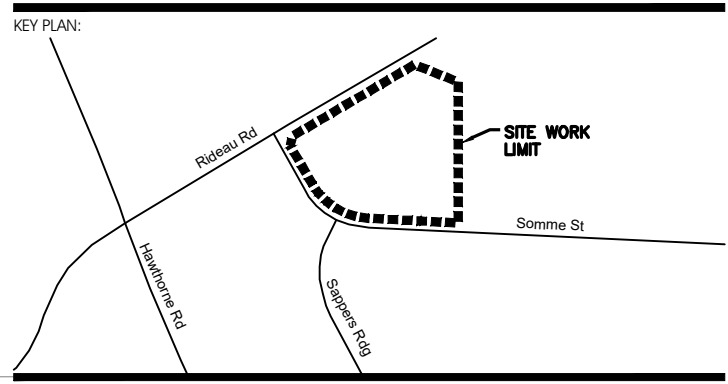
THE UNDERGROUND FEATURES AND INFORMATION THAT APPEAR ON THE DRAWINGS WERE OBTAINED FROM THE PUBLIC UTILITY COMPANIES AND/OR FROM THE CITY EACH RESPECTIVELY.

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.



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RECORD OF REVISIONS			
NO.	DESCRIPTION	DATE	BY

ISSUED FOR SITE PLAN APPROVAL: AUGUST 13, 2021



CIVITAS ARCHITECTURE INC. 14 CHAMBERLAN AVENUE, SUITE 101 OTTAWA, ONTARIO CANADA K1S 1Y9 1-813-742-7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO

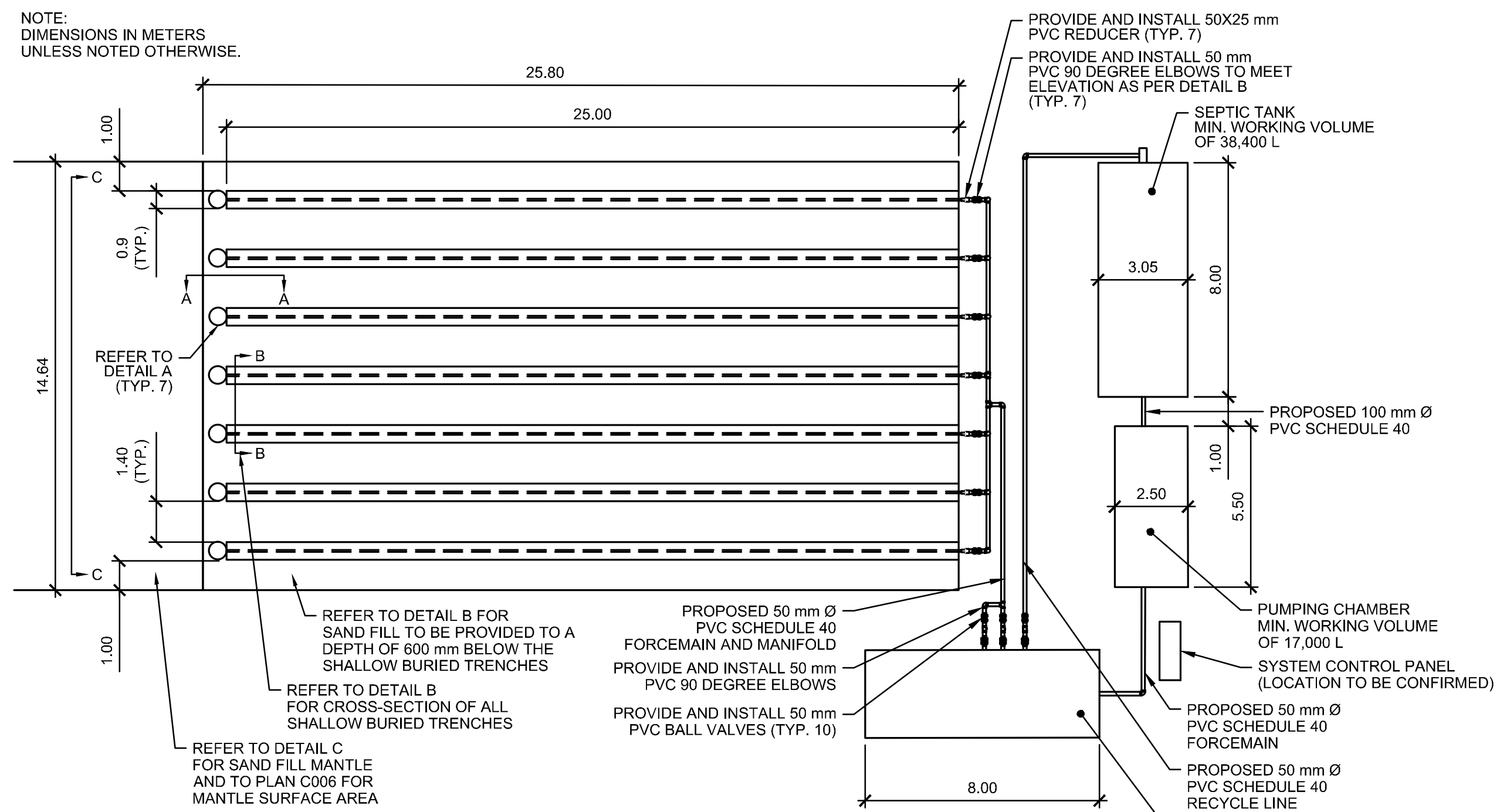


PROJECT TITLE: FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOWME ST, OTTAWA, ON

SEPTIC SYSTEM CONFIGURATION AND SECTIONS

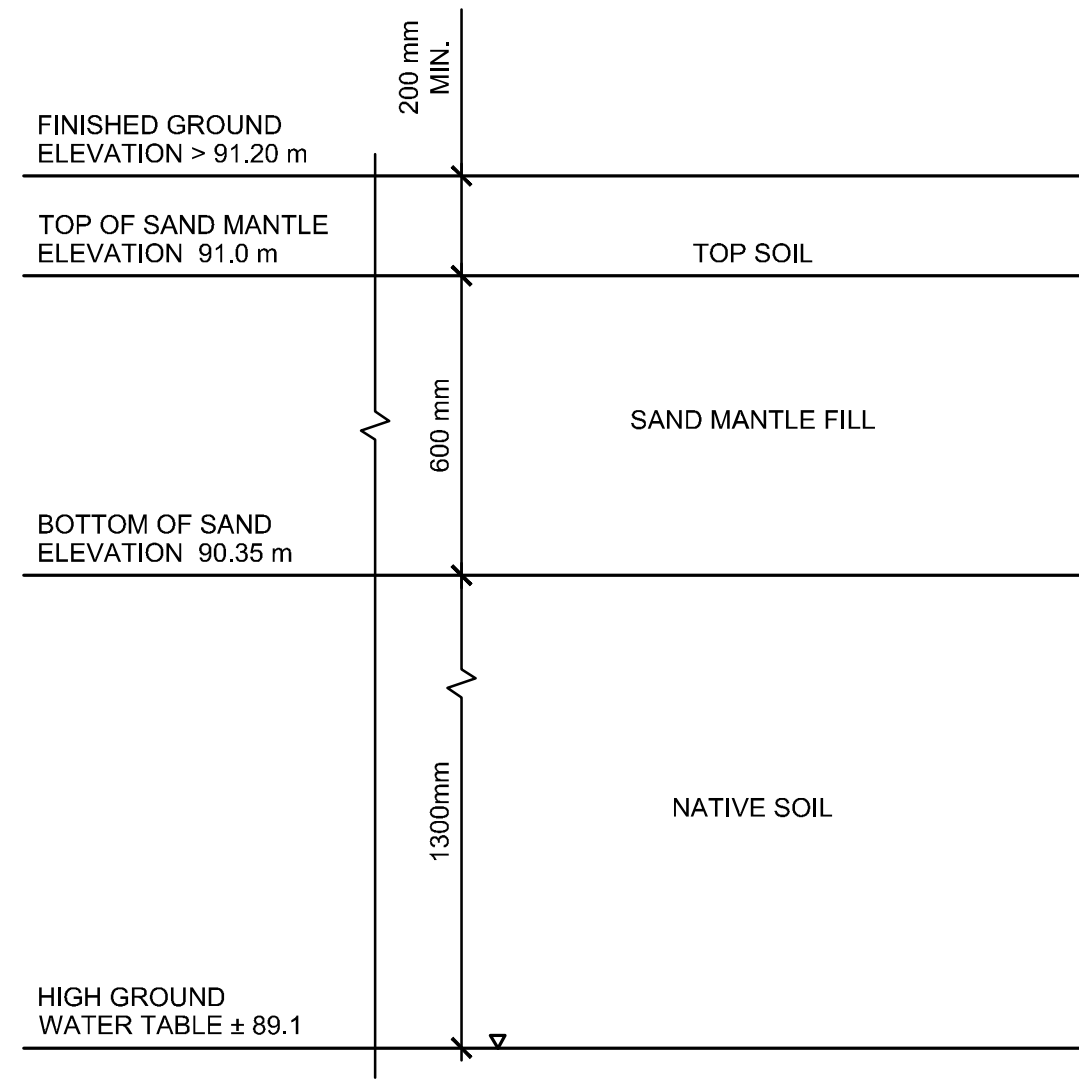
DRAWN BY: D.CANN DRAWING NUMBER: C008
DATE: K.SCHMIDT
REVIEWED BY: K.SCHMIDT
APPROVED BY: K.SCHMIDT
PRINT DATE: AUGUST 13, 2021 REVISION NUMBER:
ISSUED DATE: AUGUST 13, 2021
CLIENT PROJECT #: A001083 PROJECT #:

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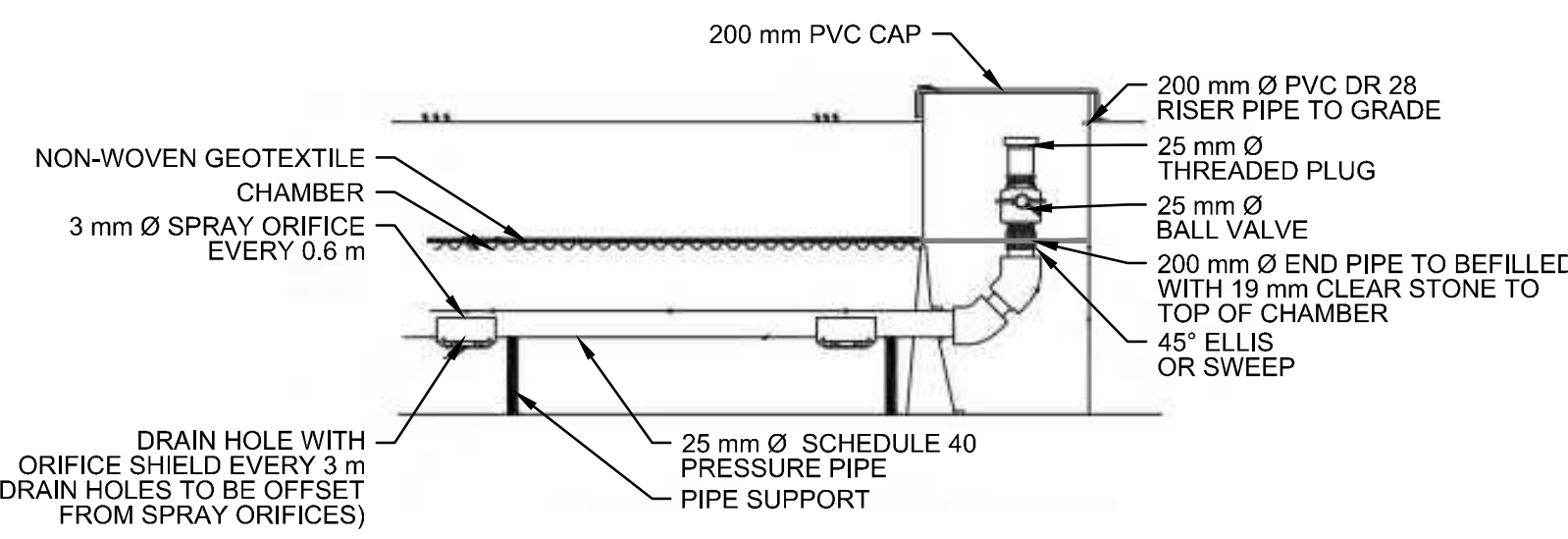
PLAN VIEW - SEPTIC SYSTEM

SCALE: N.T.S.



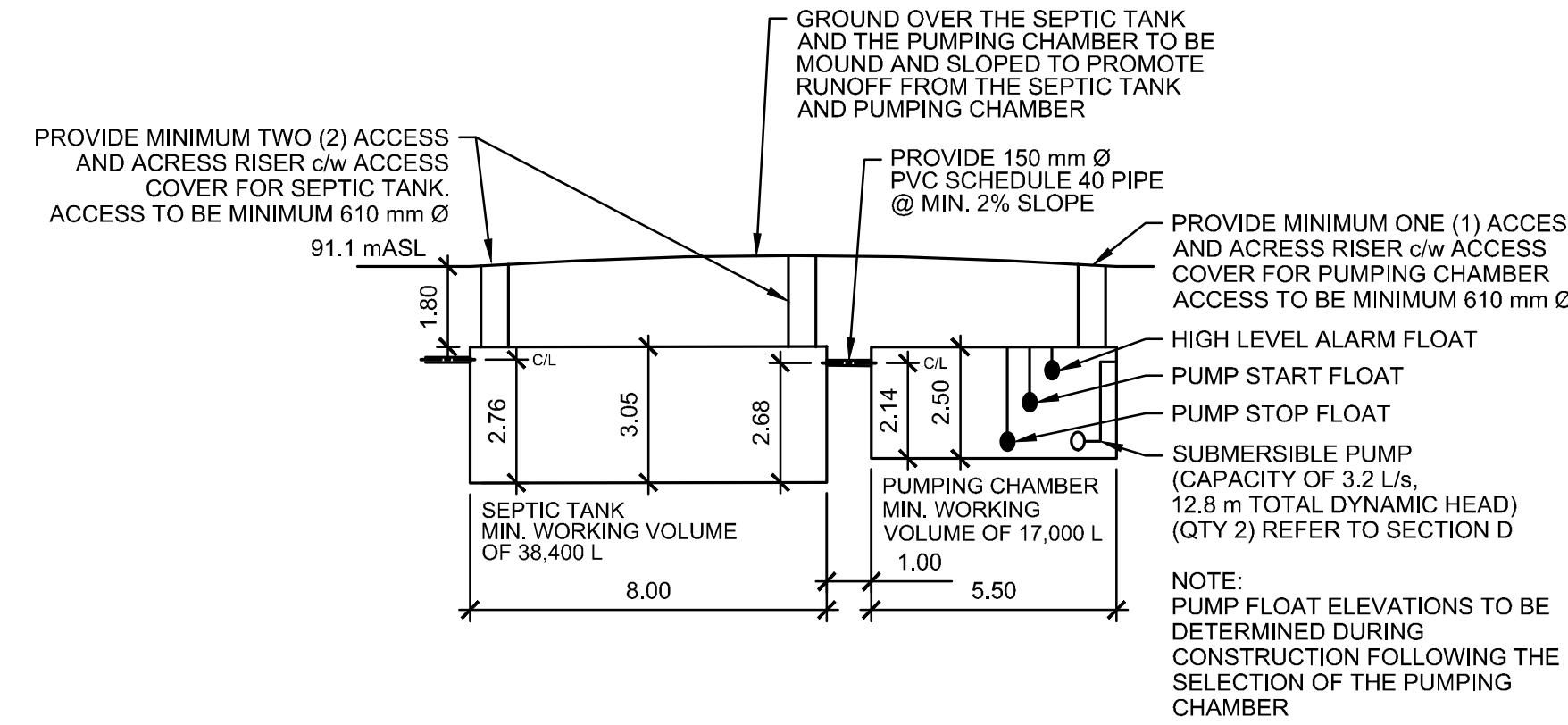
C SAND MANTLE DETAIL

SCALE: N.T.S.



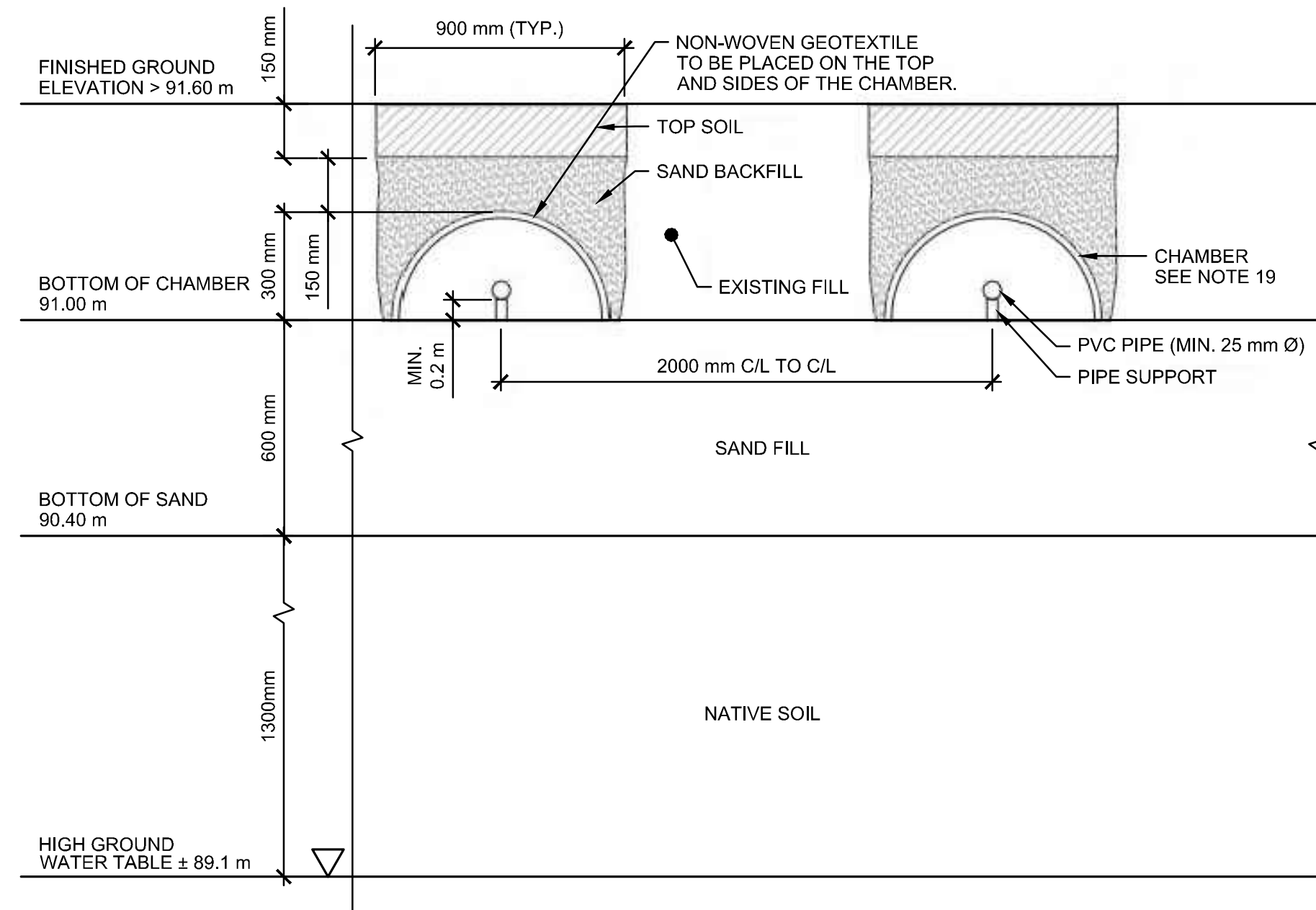
A SHALLOW BURIED TRENCH ENDPORT

SCALE: N.T.S.



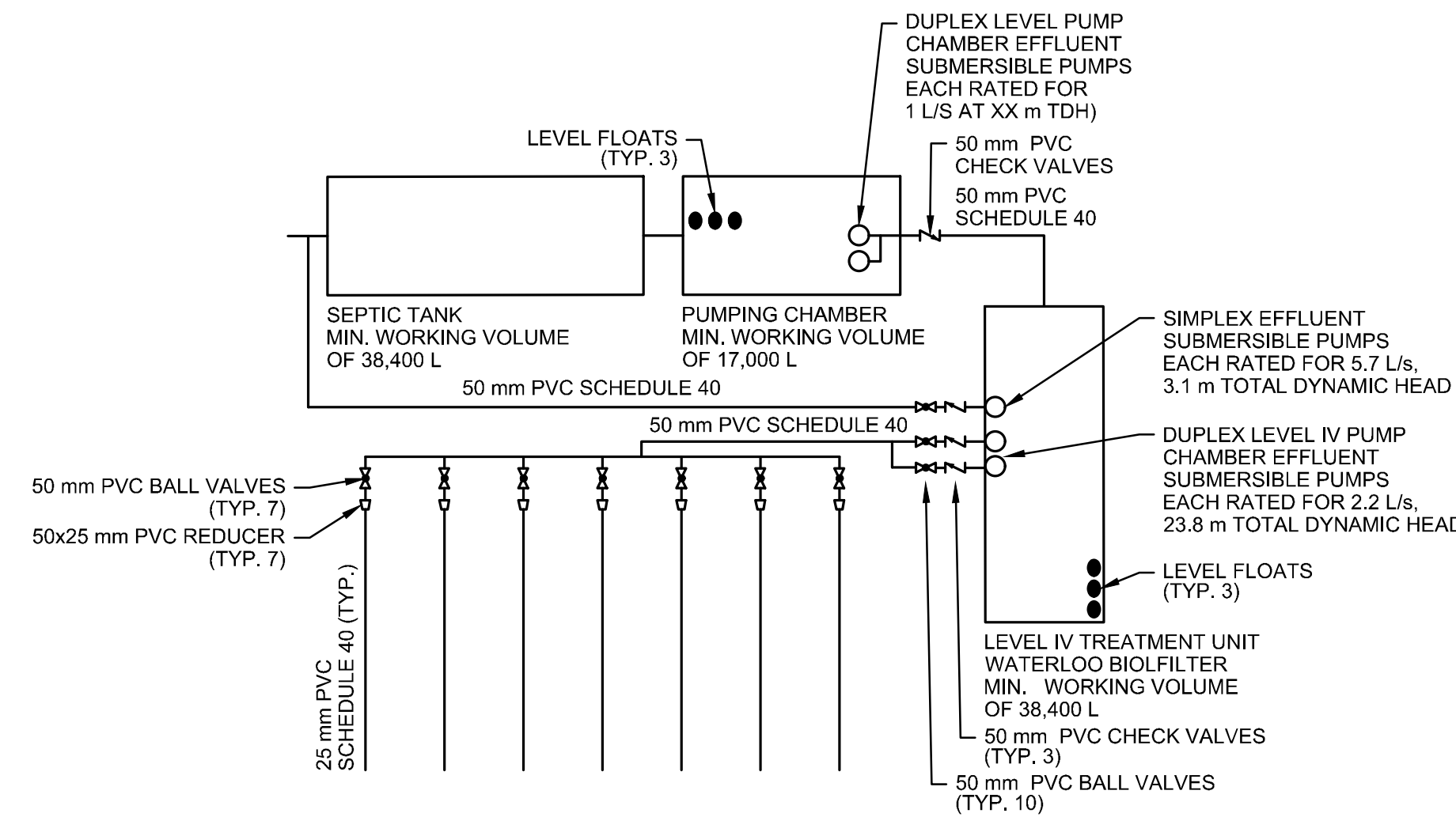
D SECTION VIEW OF SEPTIC TANK, PUMPING CHAMBER PUMPS AND DISCHARGE PIPE

SCALE: N.T.S.



B SHALLOW BURIED TRENCH DETAIL

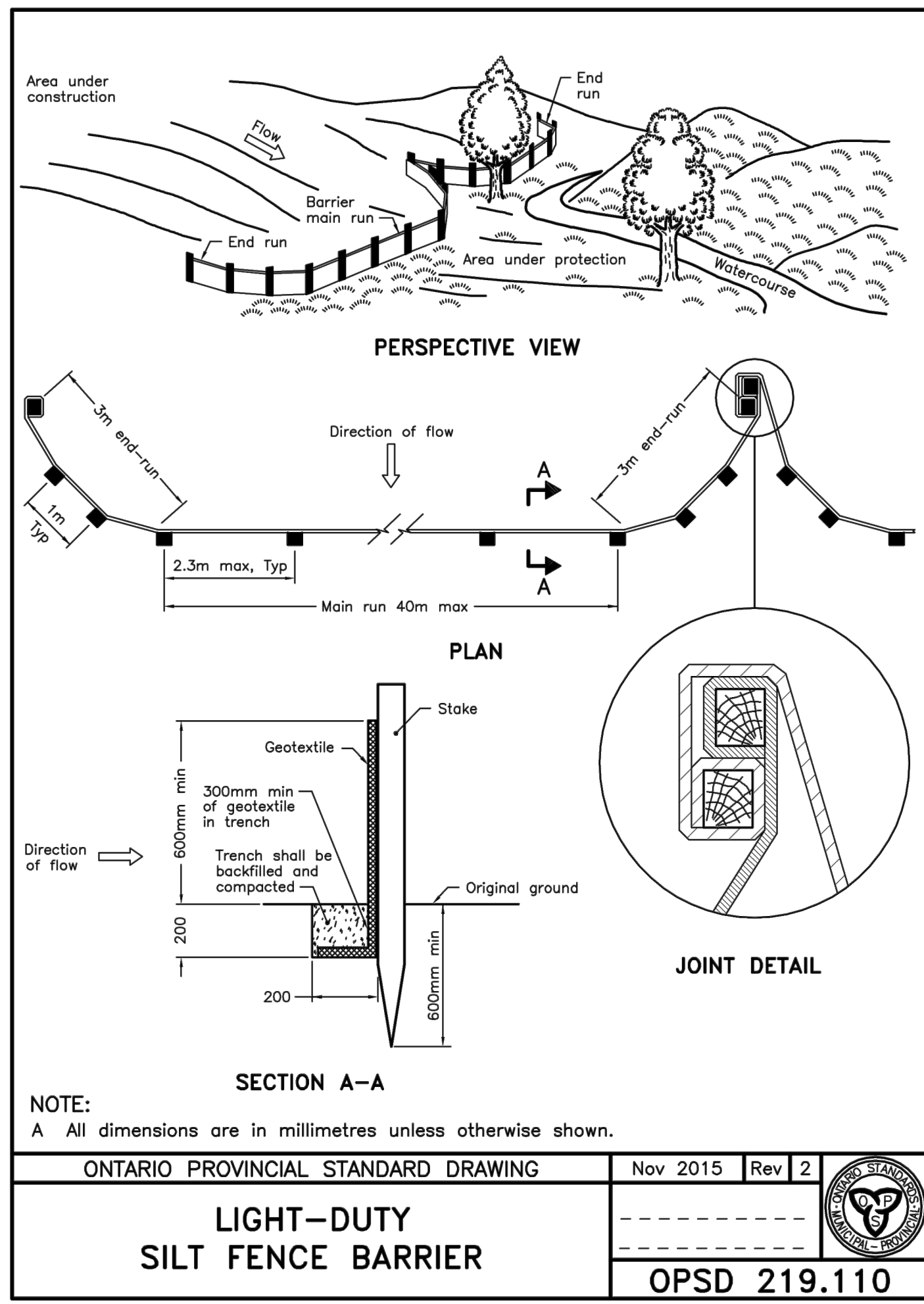
SCALE: N.T.S.



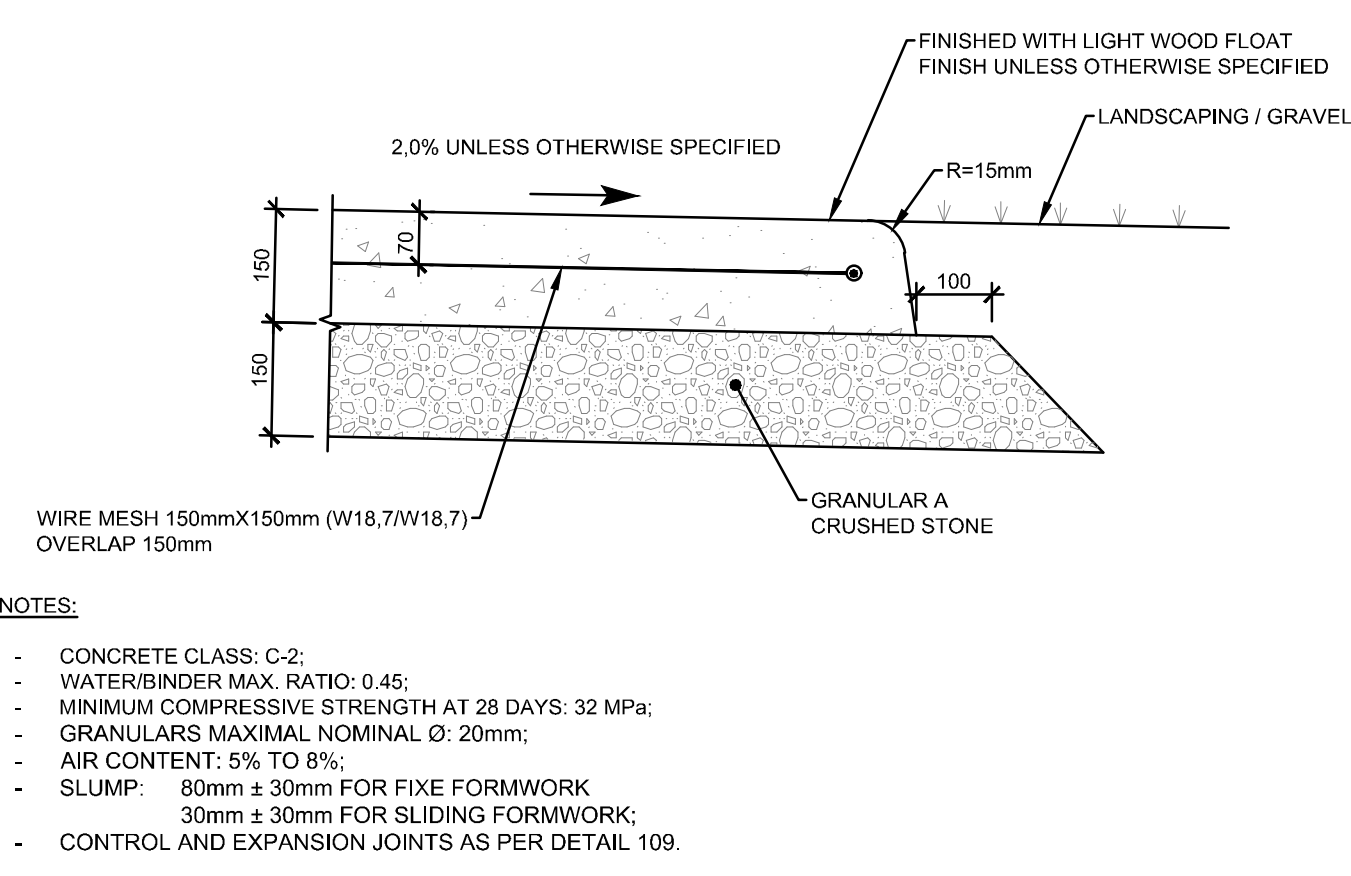
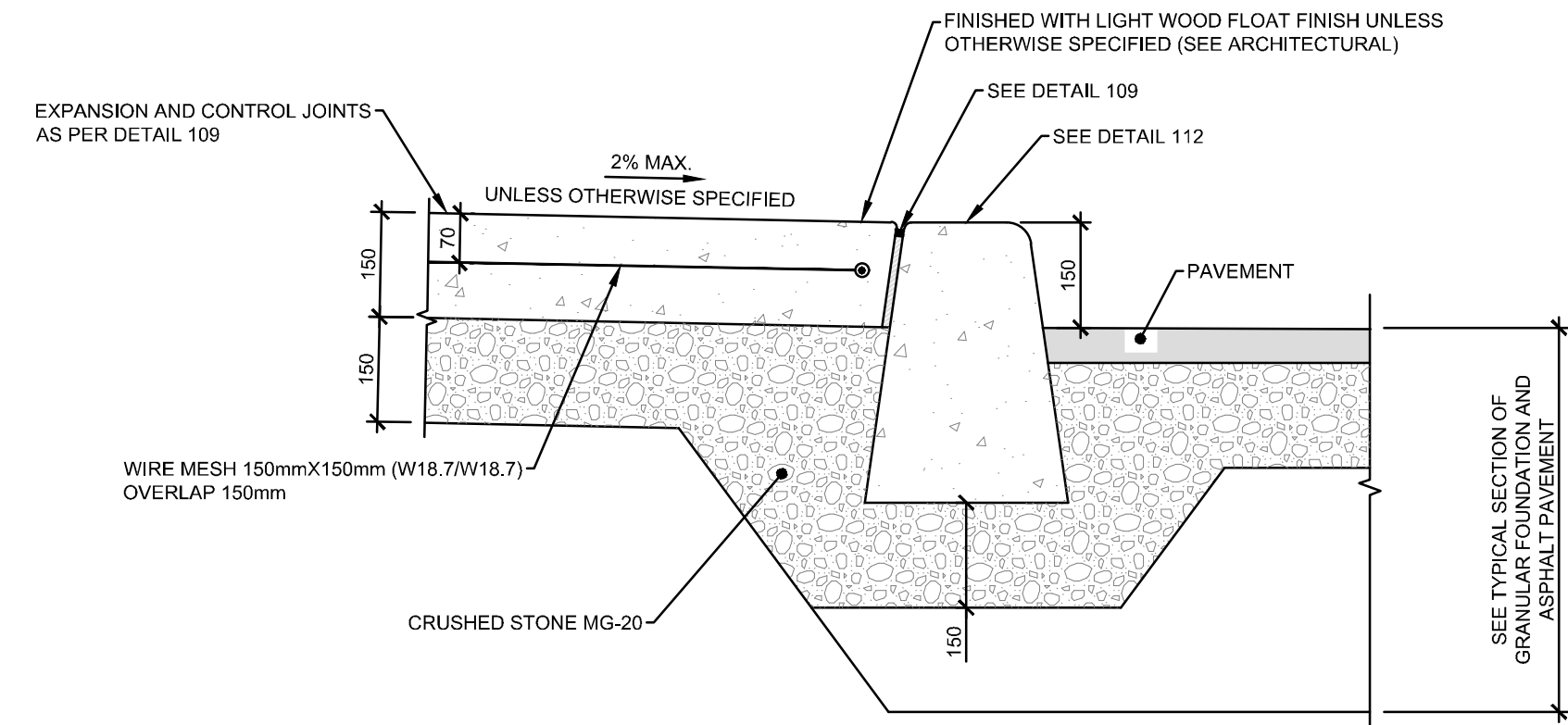
PROCESS FLOW SCHEMATIC

SCALE: N.T.S.

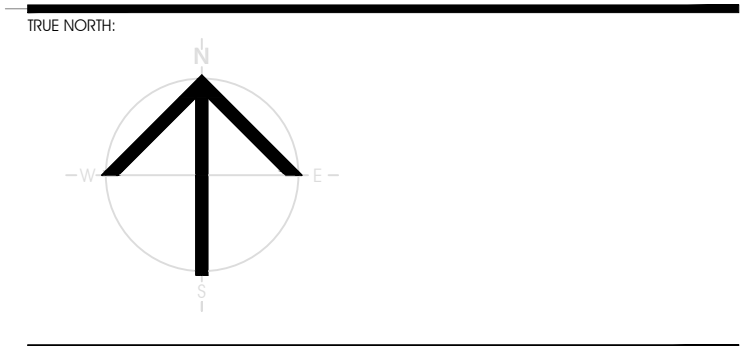
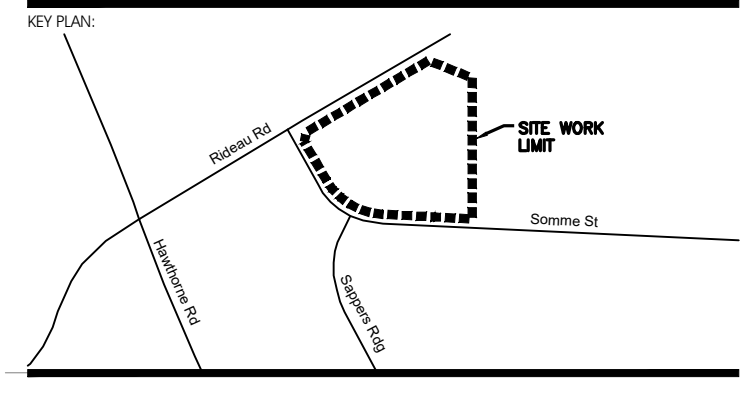
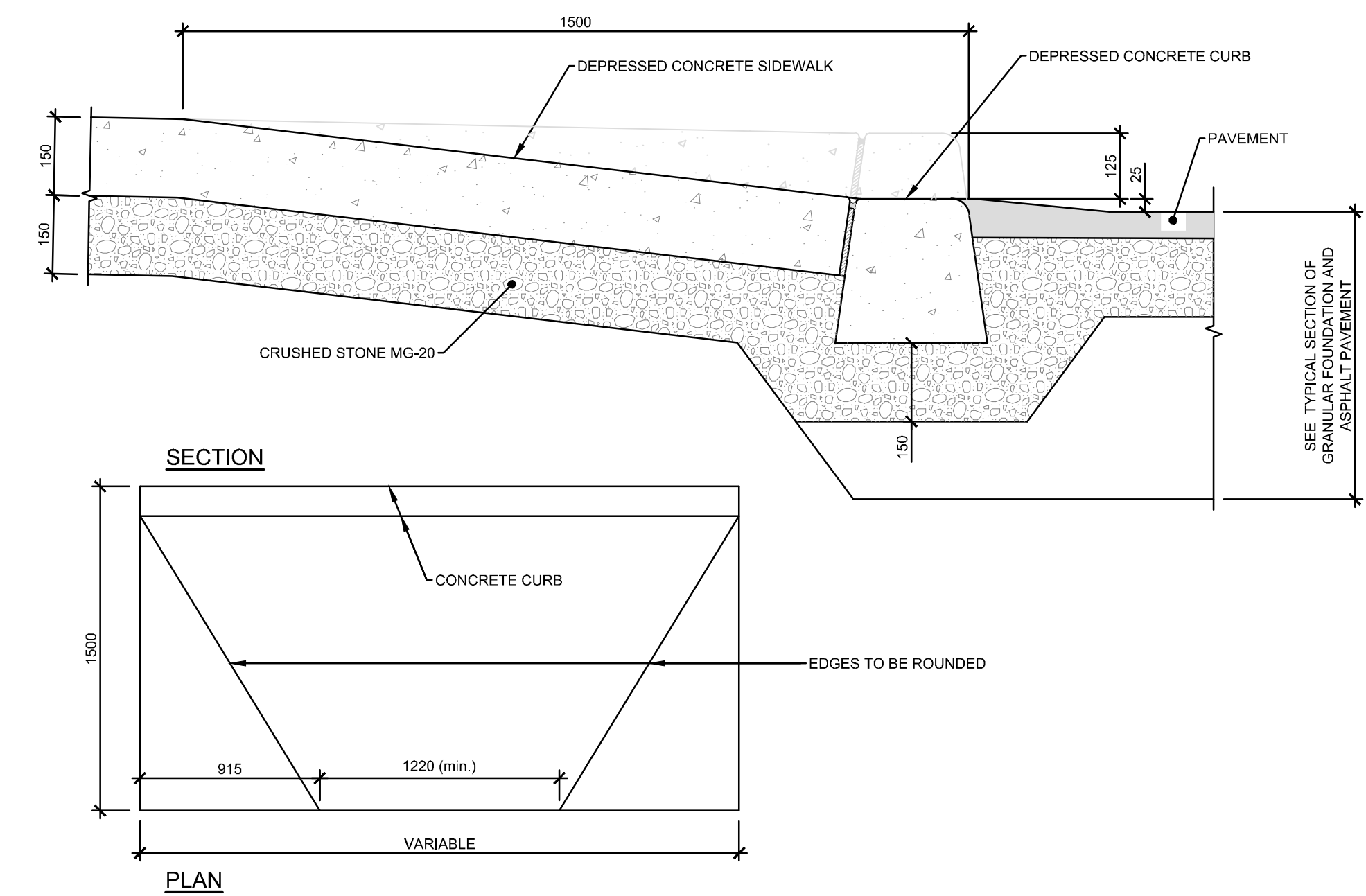
- #### CLASS 4 SEPTIC SYSTEM NOTES
- THE SEPTIC SYSTEM AND ALL APPURTENANCES SHALL ADHERE TO ONTARIO BUILDING CODE (OBC) PART 8.
 - THE DAILY DESIGN FLOW IS 12,800 L/DAY. THE SEPTIC TANK AND LEVEL IV TREATMENT UNIT TANK SHALL HAVE A MINIMUM WORKING VOLUME OF 38,400 L (THREE TIMES THE DAILY DESIGN FLOW).
 - 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.
 - PROPOSED CHANGES TO SEPTIC SYSTEM DESIGN BY CONTRACTOR TO BE APPROVED BY THE ENGINEER.
 - SANITARY FLOWS FROM THE WAREHOUSE BY GRAVITY TO THE SEPTIC TANK. THE EFFLUENT FROM THE SEPTIC TANK TO THE PUMPING CHAMBER IS GRAVITY DRIVEN.
 - THE SEPTIC, PUMPING CHAMBER, AND LEVEL IV TREATMENT UNIT TO BE WRAPPED IN MEL-ROL (OR APPROVED EQUAL) ON THE TOP, BOTTOM AND SIDES.
 - THE LEVEL IV TREATMENT UNIT TO BE PROVIDED BY WATERLOO BIOFILTER.
 - THE LEVEL IV TREATMENT SYSTEM TO BE DESIGNED FOR THE FOLLOWING EFFLUENT OBJECTIVES: CBOD5 = 10 MG/L AND TSS = 10 MG/L.
 - THE SIMPLEX PUMP IN THE LEVEL IV TREATMENT UNIT RECIRCULATES A PORTION OF THE EFFLUENT TO THE INLET OF THE SEPTIC TANK.
 - 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.
 - ALL PUMPS TO BE OPERATED BY WATERLOO SMART PANEL(S). THE WATERLOO SMART PANEL SHALL PROVIDE REMOTE MONITORING, CONTROL, AND DATA LOGGING OVER A STABLE WIRELESS CELLULAR NETWORK.
 - PROVIDE ACCESS FROM GRADE TO SEPTIC TANK EFFLUENT FILTER AS PER THE OBC.
 - PROVIDE SEPTIC TANK EFFLUENT FILTER PER OBC REQUIREMENTS DESIGNED FOR A MINIMUM CAPACITY OF 25,000 L/DAY.
 - ALL TANKS TO BE DESIGNED FOR A MINIMUM OF 2m OF BURIAL OVERTOP OF THE TANK.
 - PRIOR TO PLACEMENT OF THE IMPORTED SAND FILL ANY SURFICIAL ORGANICS ARE TO BE REMOVED FROM THE SBT BED AND MANTLE AREA.
 - THE EXISTING FILL MATERIAL IS TO BE COMPACTED TO ENSURE UNEVEN SETTLEMENT DOES NOT OCCUR.
 - 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.
 - 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 PLUGS, PIPES, REDUCERS, PVC CAPS, GEOTEXTILE, ORIFICE SHIELDS TO BE REVIEWED AND ACCEPTED BY THE ENGINEER.
 - APPROVED CHAMBERS FOR SBT INCLUDE: CULTREC RECHARGER 150XLHD OR APPROVED EQUAL. CONTRACTOR TO SUBMIT WORKING DRAWINGS FOR REVIEW AND APPROVAL BY THE ENGINEER.
 - 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 B86-10 AND CSA A23.4-19. CONTRACTOR TO SUBMIT WORKING DRAWINGS FOR REVIEW AND APPROVAL BY THE ENGINEER.



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2	
LIGHT-DUTY SILT FENCE BARRIER	OPSD 219.110		



- 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.



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RECORD OF REVISIONS:

NO.	REVISION	DATE

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



CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAIN AVENUE, SUITE 101 OTTAWA, ONTARIO CANADA K1S 1V9 1-813-742-7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO:

CIMA+

PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

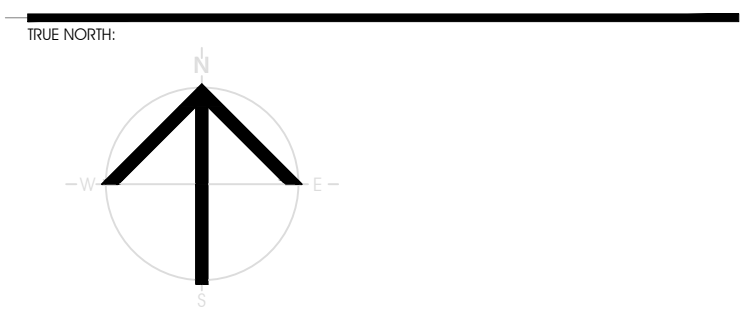
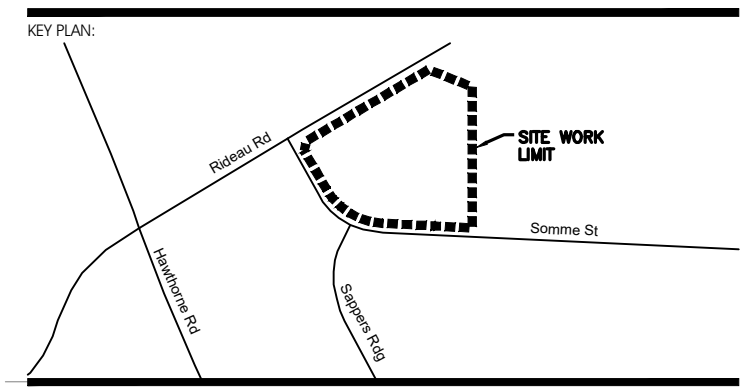
SOMME ST. OTTAWA, ON

DRAWING TITLE:

DETAILS

DRAWN BY: D.CANN **DRAWING NUMBER:** C009
DATE: **REVIEWED BY:** J.SALVE
APPROVED BY:
PRINT DATE: **REVISION NUMBER:**
ISSUED DATE: AUGUST 13, 2021
CLIENT PROJECT #: **PROJECT #:** A001083

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NO.	DESCRIPTION	DATE
1	ISSUED FOR SITE PLAN APPROVAL	AUGUST 13, 2021

NUMBER: REVISION: DATE: (MM/DD/YYYY)
DATE: (MM/DD/YYYY)



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PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

SOMME ST.
OTTAWA, ON

DETAILS

DRAWN BY: D.CANN DRAWING NUMBER: **C010**

DATE: _____

REVIEWED BY: J.SAUVÉ

APPROVED BY: _____

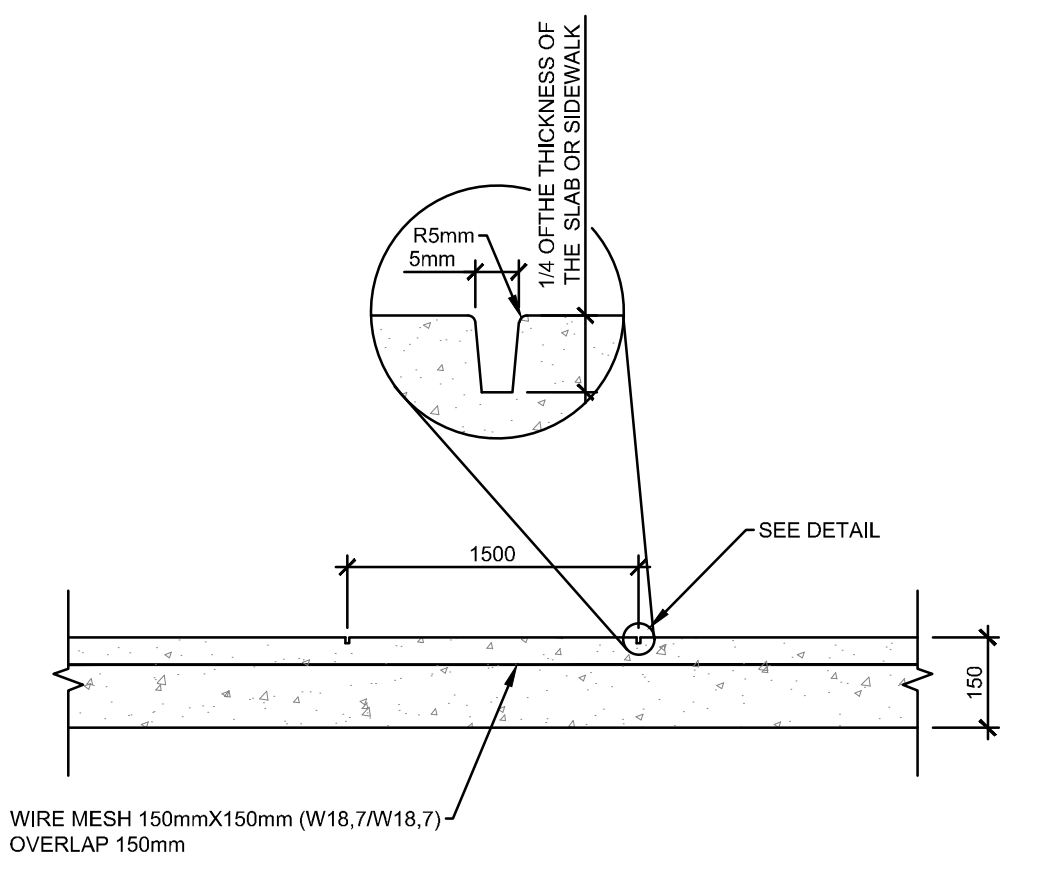
PRINT DATE: _____ REVISION NUMBER: _____

ISSUED DATE: AUGUST 13, 2021

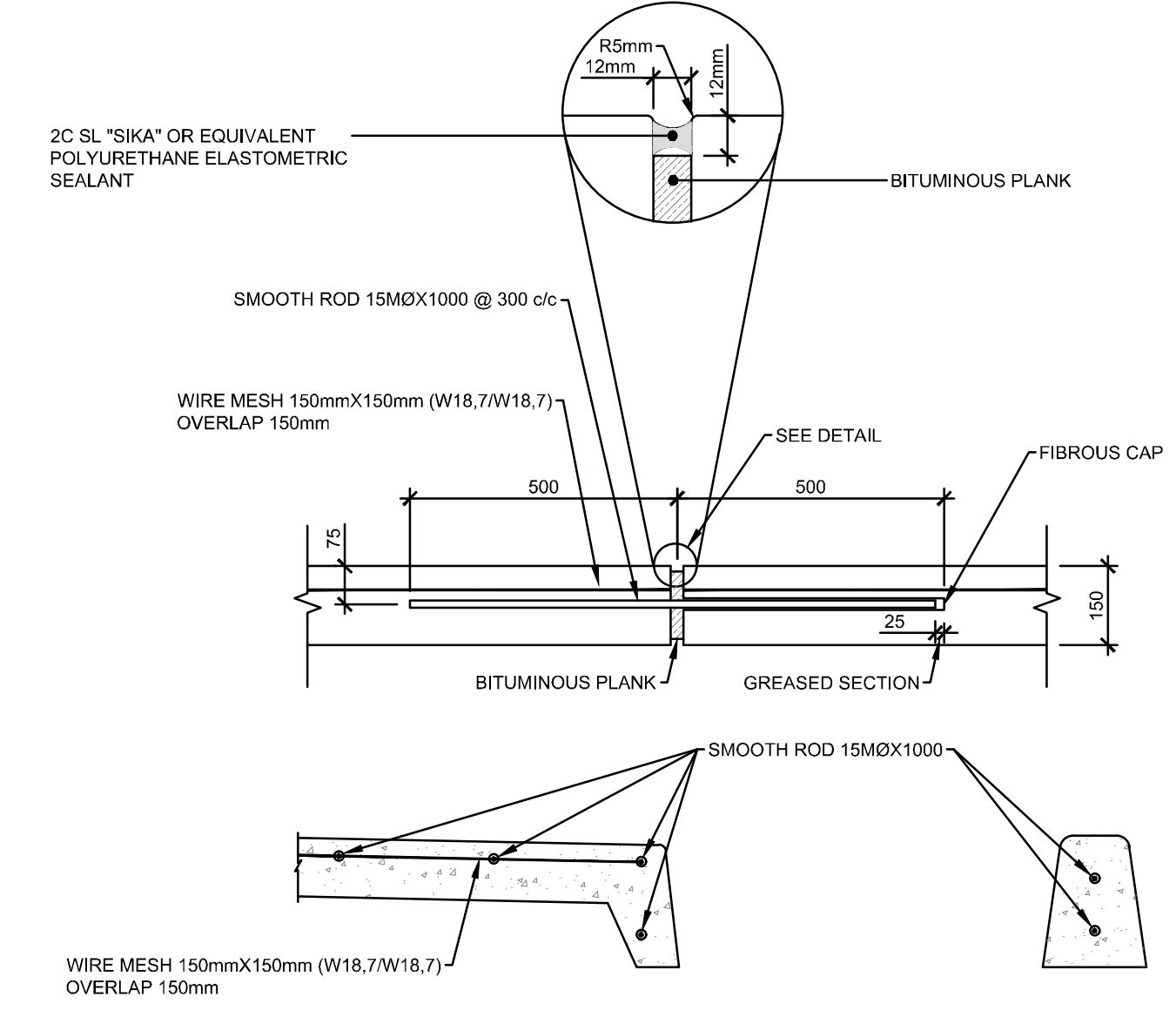
CLIENT PROJECT #: _____ PROJECT #:

A001083

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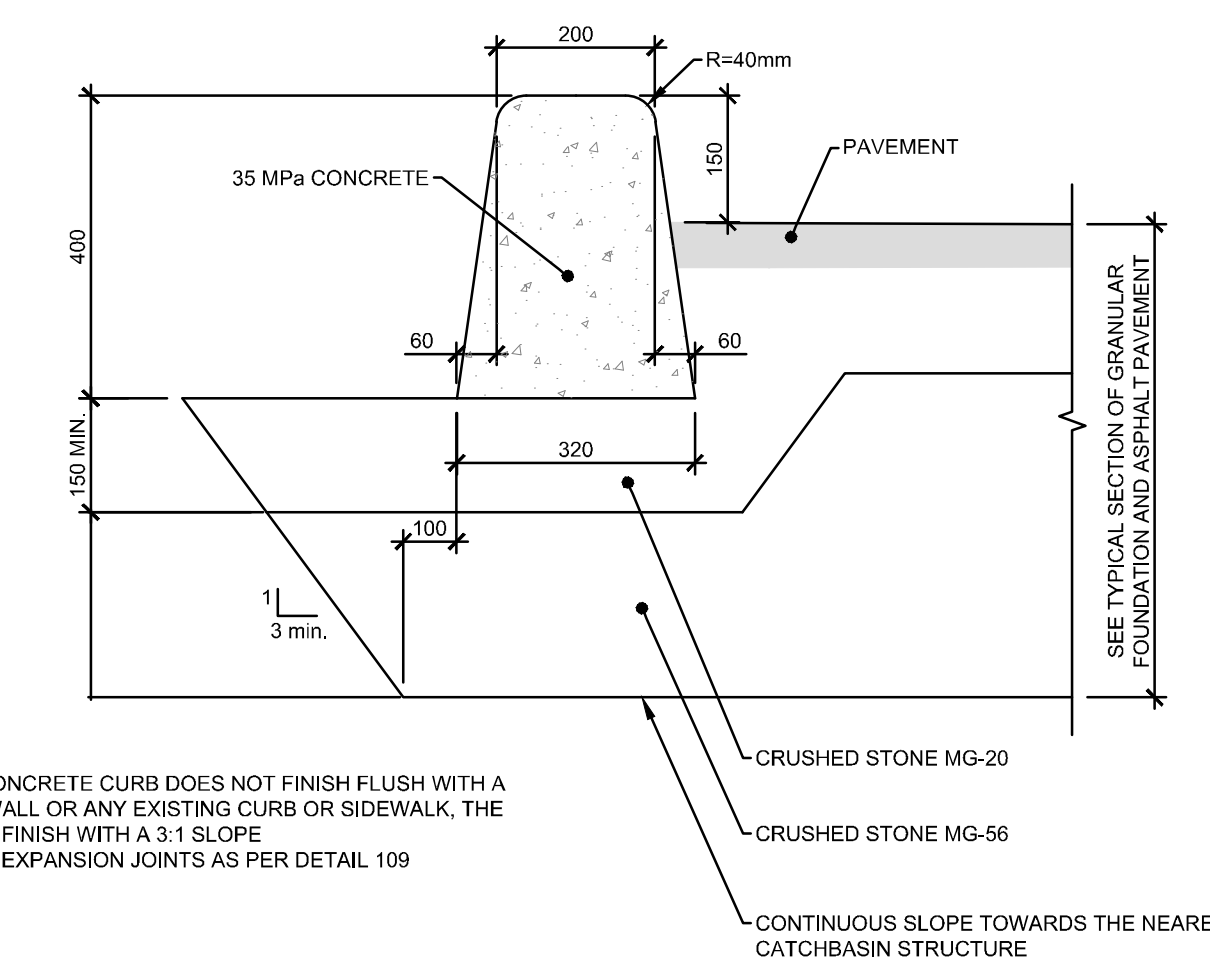


CONTROL JOINT



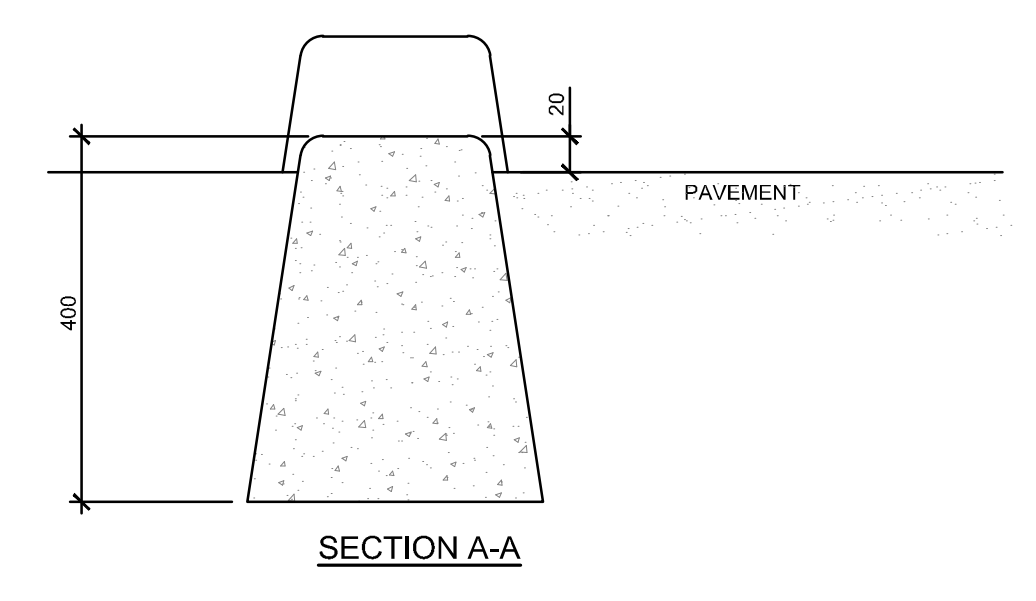
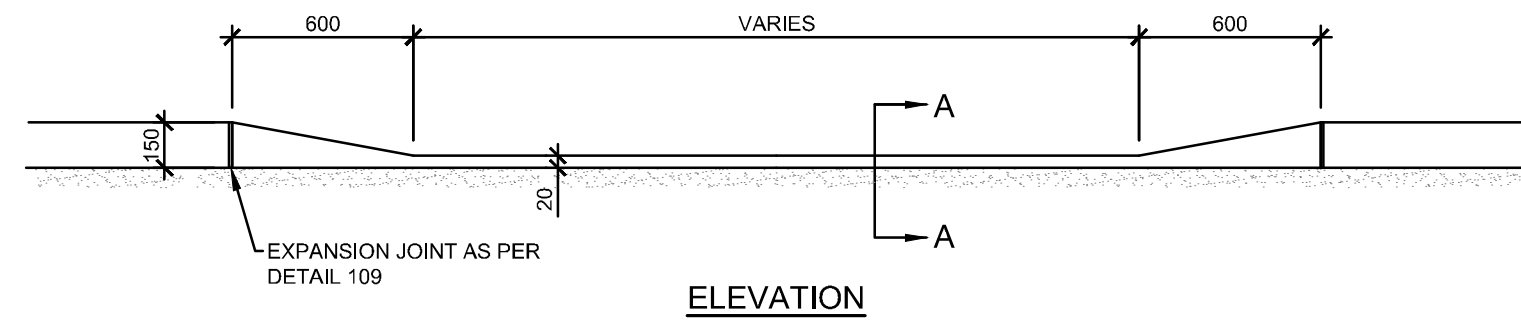
CONSTRUCTION AND EXPANSION JOINT

- 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.

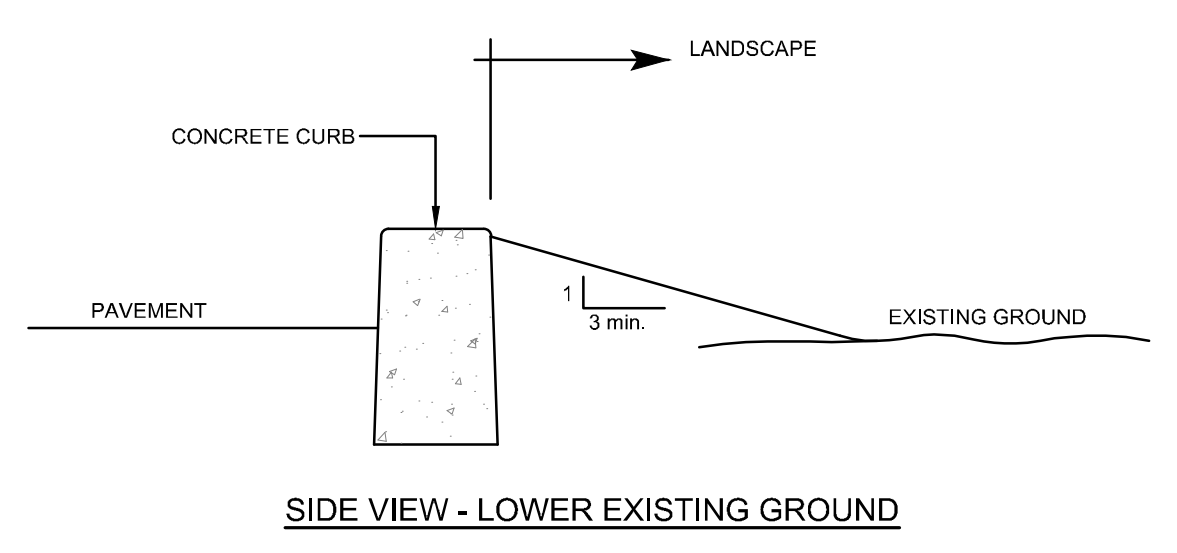


- NOTES:
- WHERE THE CONCRETE CURB DOES NOT FINISH FLUSH WITH A SIDEWALK, A WALL OR ANY EXISTING CURB OR SIDEWALK, THE CURB SHOULD FINISH WITH A 3:1 SLOPE
 - CONTROL AND EXPANSION JOINTS AS PER DETAIL 109
- CONTINUOUS SLOPE TOWARDS THE NEAREST CATCHBASIN STRUCTURE

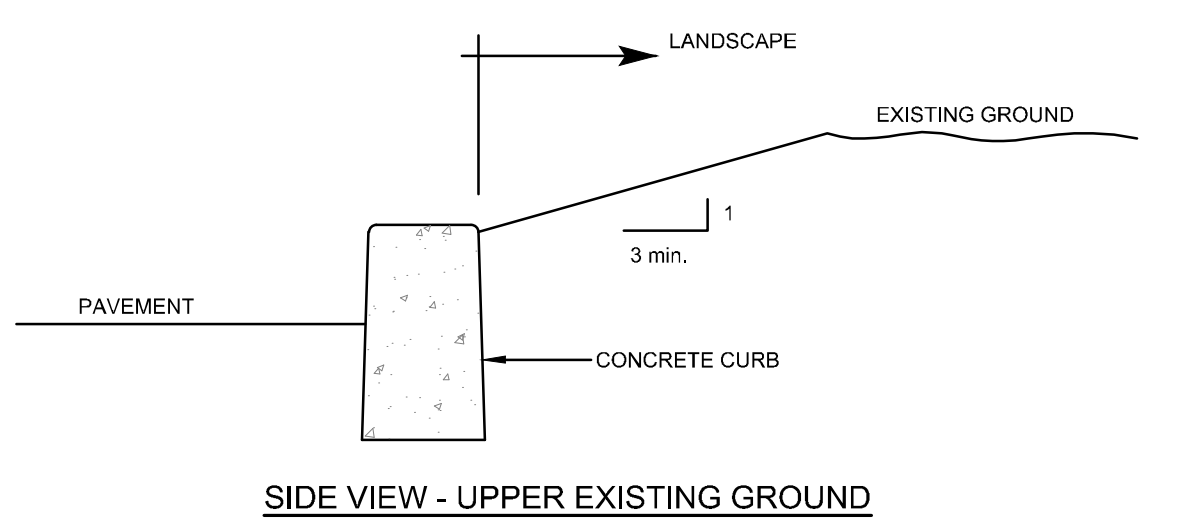
112A CONCRETE CURB DETAIL (TYPICAL)
AUCUNE / NTS



113 DEPRESSED CONCRETE CURB
AUCUNE / NTS



SIDE VIEW - LOWER EXISTING GROUND



SIDE VIEW - UPPER EXISTING GROUND

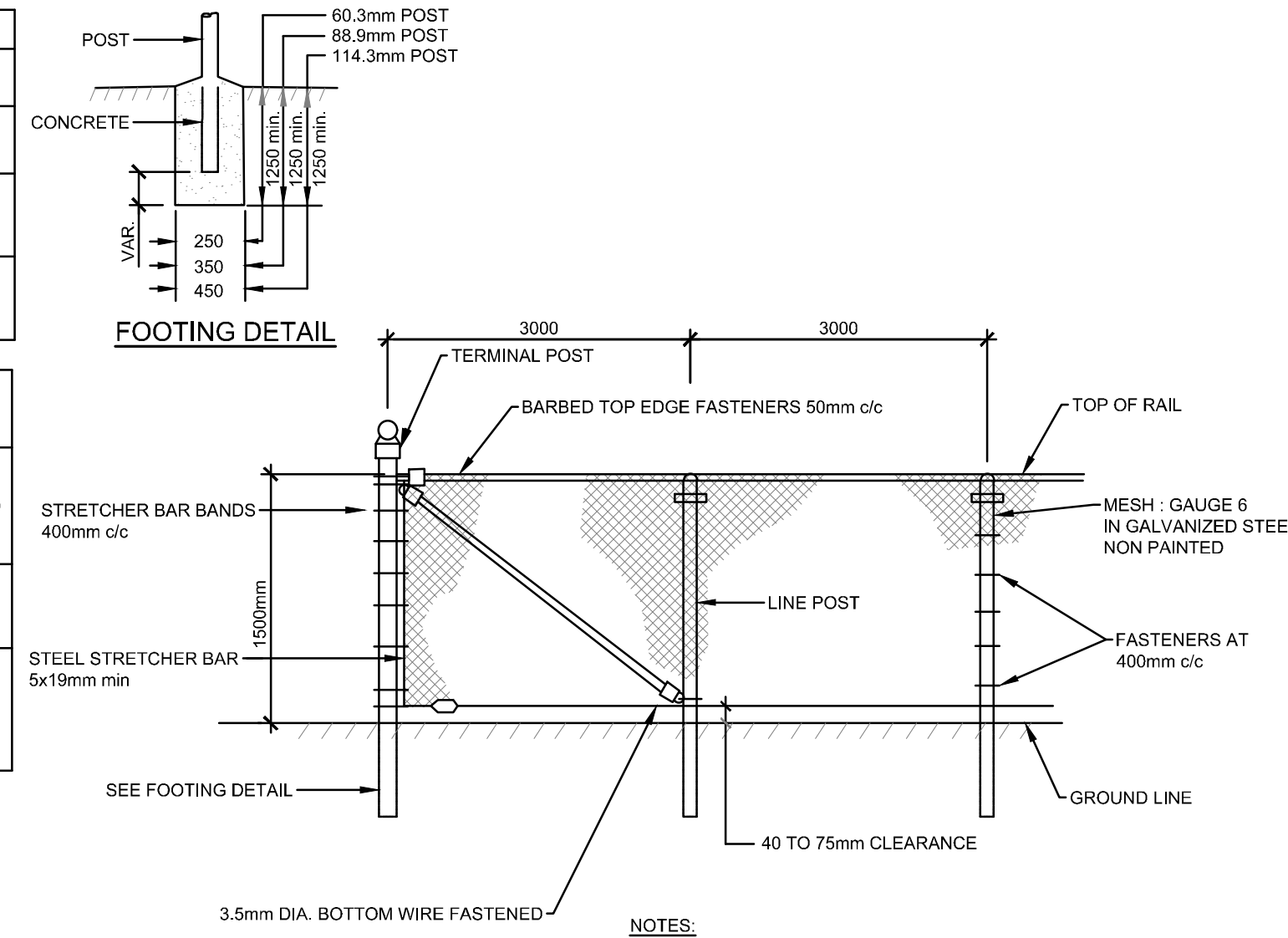
120 TYPICAL SECTION - LANDSCAPE CONCRETE CURB
AUCUNE / NTS

\\CIMA-PLUS\CIMA\CIMA-C1\DOTI_PROJECTS\A001000-A001499\A001083_FASTFRATE WAREHOUSE DEVELOPMENT\A001460_CVIL\REF

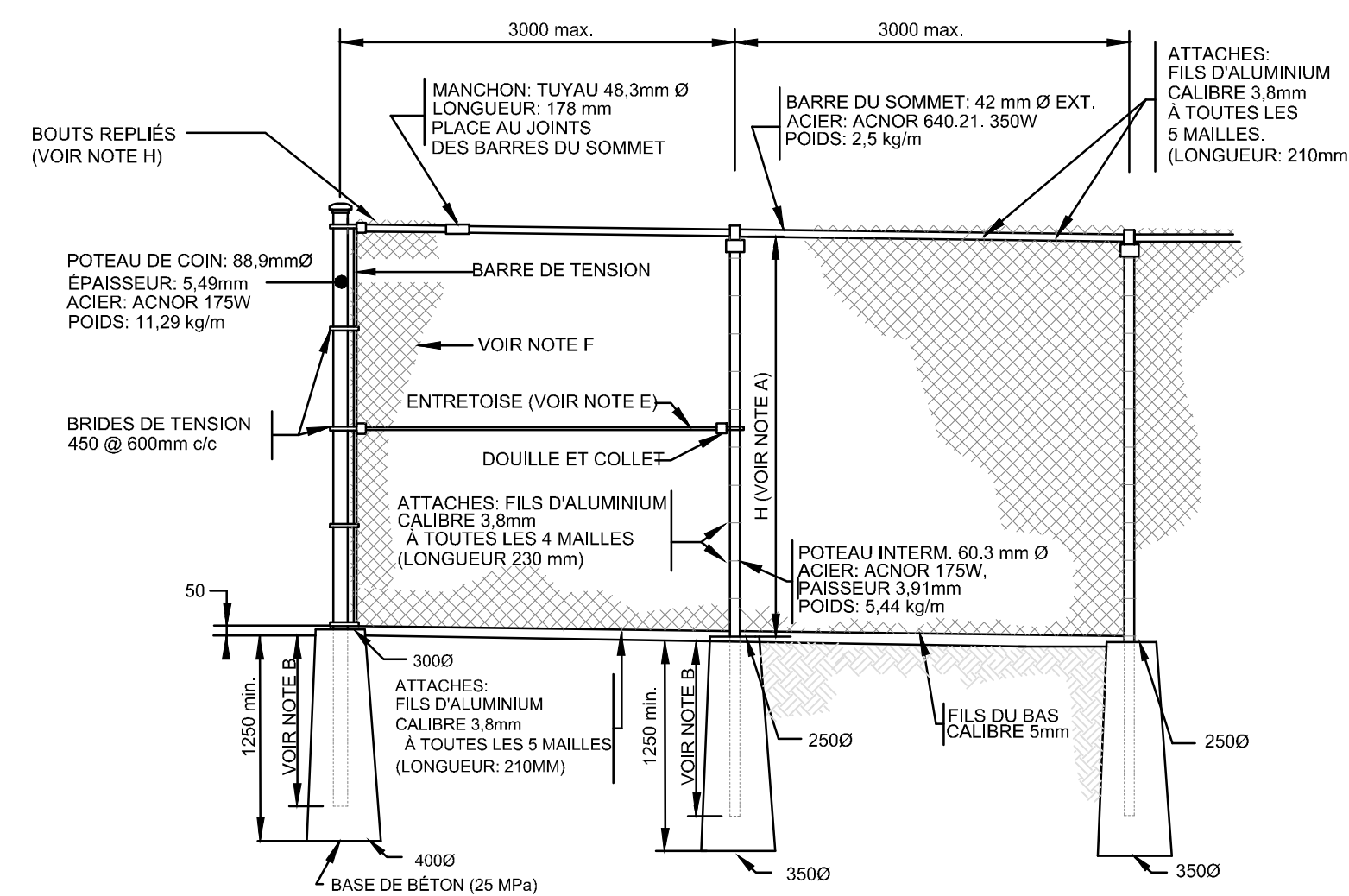
POST DETAILS				
POST TYPE	OUTSIDE DIA. (mm)	POST LENGTH		SLEEVES
		STANDARD (m)	RETAINING WALLS (m)	
LINE POST	60.3	2.6	2.0	88.9
END, CORNER, OR STRAINING POST	88.9	2.9	2.3	114.3

GATE AND GATE POST DETAILS			
GATE TYPE AND MAX. OPENING (m)	FRAME MEMBER REINFORC. MIN. OUT. DIA. (mm)	POST DIA. MIN. OD (mm)	LENGTH STANDART (m)
SINGLE SWING 4.5 SINGLE SWING 6.0 DOUBLE SWING 9.0	48.3	114.3	2.9

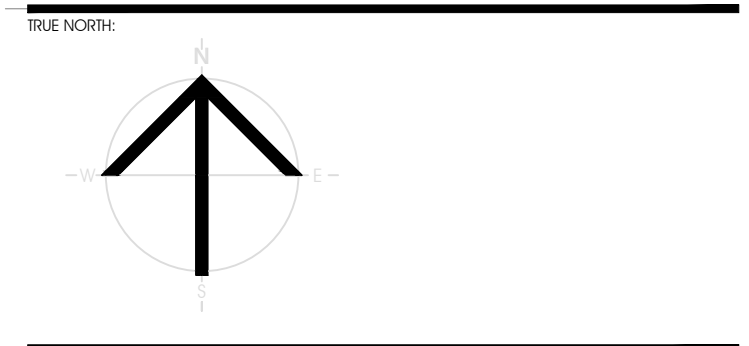
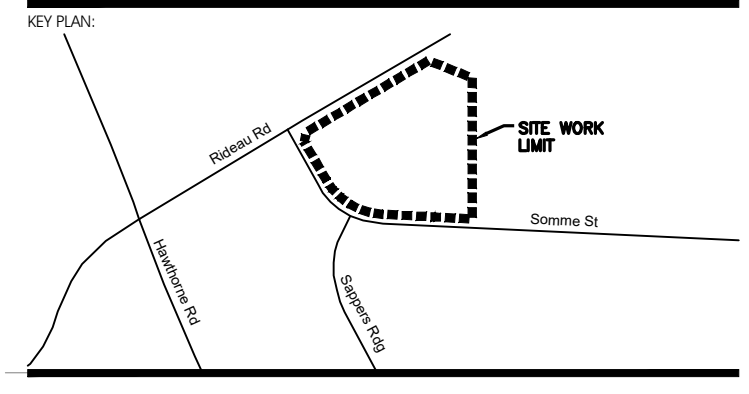
NOTE:
GATE LEAVES GREATER THAN 3.6m IN WIDTH ARE SUPPLIED WITH DIAGONAL BRACES.



- NOTES:
1. ALL FASTENERS MADE OF GALVANIZED STEEL (NO ALUMINUM)
 2. TOP OF RAIL TYPE "KNUCKLE/KNUCKLE" (NO POINTY EDGE)



- NOTES:
- A. FENCE HEIGHT: 1.5 m.
 - B. LENGTH OF UNDERGROUND POLES: 1.1 m
 - C. CORNER POST: 88.9 mm Ø WITH TWO SPACERS.
 - D. REINFORCING POST: 88.9 mm Ø EVERY 60 m WITH TWO SPACERS.
 - E. SPACERS: 42.2 mm Ø, 350W ACNOR STEEL.
 - F. GALVANIZED GRILLING-008, COVERED WITH VINYL (BLACK) FOR A TOTAL GAUGE #16-008, CONFORMS TO CAN/CSG-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



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RECORD OF REVISIONS:

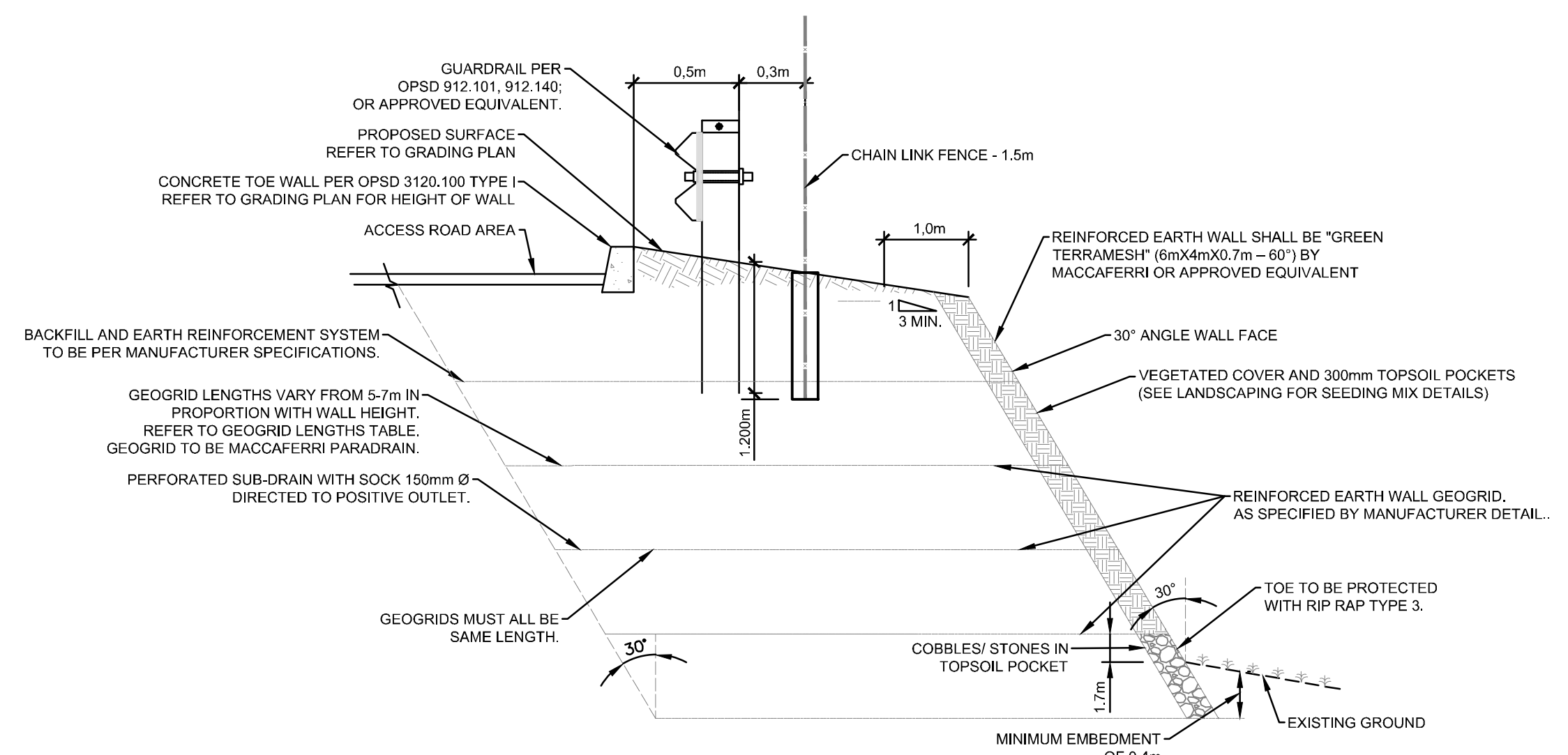
NO.	REVISION	DATE (MM/DD/YY)

ISSUED FOR SITE PLAN APPROVAL: AUGUST 13, 2021

NUMBER: REVISION: DATE (MM/DD/YY)

SIDE:

126 CHAIN LINK FENCE
AUCUNE / NTS



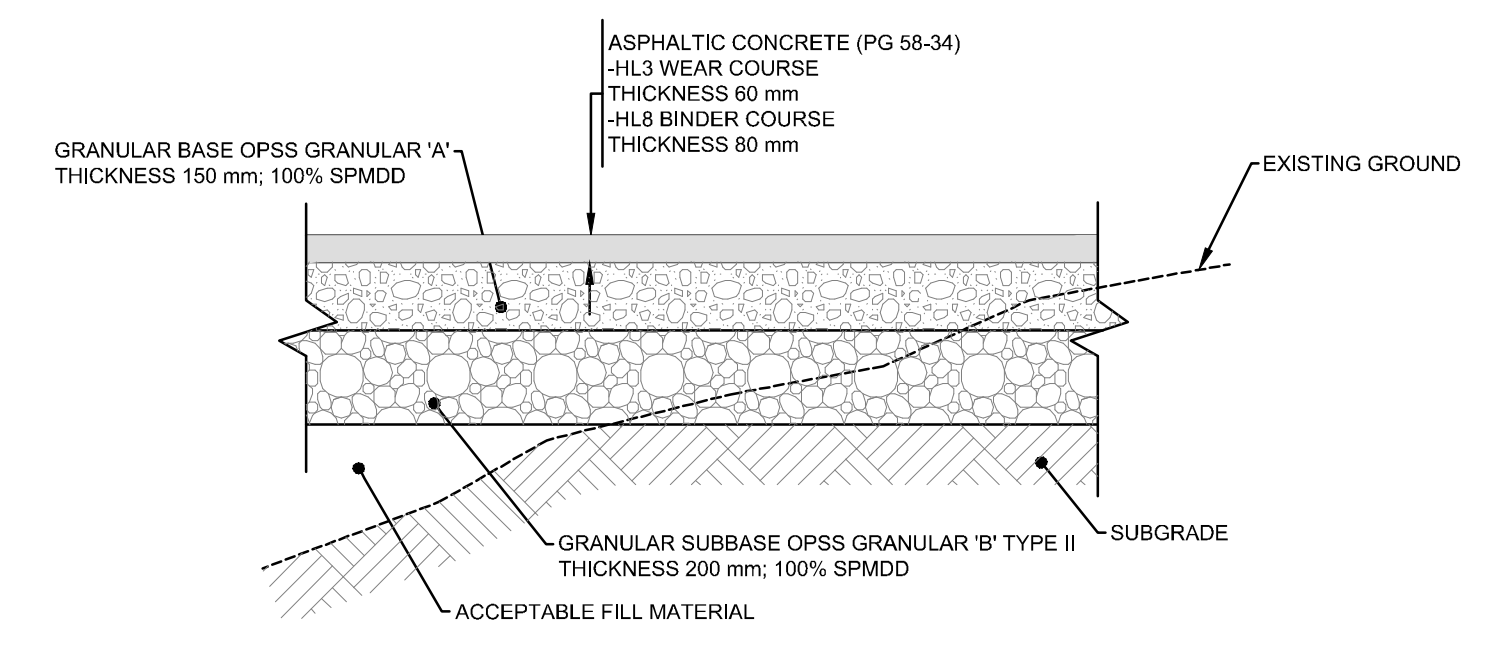
- NOTES:
- INSTALLATION OF GUARDRAIL AND FENCE POSTS BY AUGERING STRICTLY PROHIBITED.
 - STRUCTURE MUST BE FOUND ON APPROVED COMPETENT SOIL
 - APPLIED LOAD = 173kPa
 - SHOP DRAWINGS FOR EARTH WALL DESIGN, SIGNED AND SEALED BY AN ENGINEER LICENSED IN ONTARIO SHALL BE SUBMITTED.
 - A TRANSITION IS REQUIRED 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

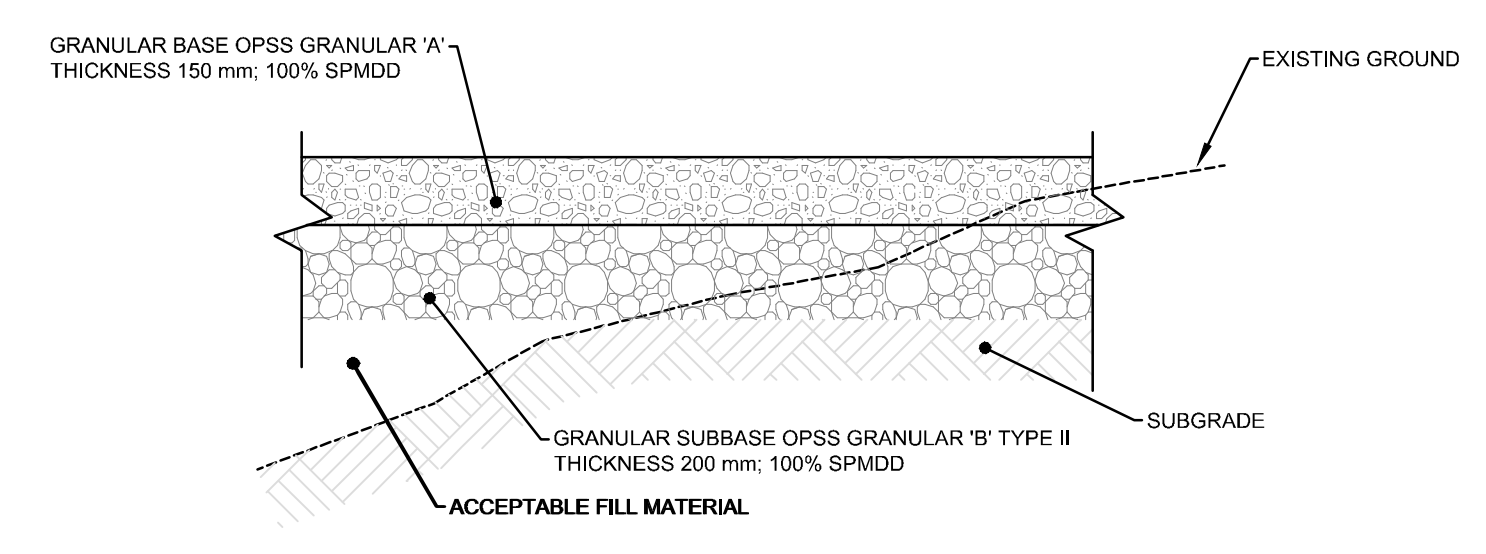
LOAD TABLE			
PARAMETERS	REINFORCED SOIL	RETAINED SOIL	FOUNDATION SOIL
UNIT WEIGHT, Kn/m ³	21.2	19	20
ANGLE OF INTERNAL FRICTIONS, φ	32	30	30
COHESION, KPA	0	0	0
SURCHARGE LOAD AWAY FROM BACKSLOPE, KPA	17.00		

138 TYPICAL SECTION - RETAINING WALL, GUARDRAIL AND FENCE
AUCUNE / NTS

141A GALVANIZED METAL MESH FENCE 1.8m HIGH
AUCUNE / NTS



202 TYPICAL SECTION - GRANULAR FOUNDATION AND ASPHALT PAVEMENT (HEAVY DUTY)
AUCUNE / NTS



202A TYPICAL SECTION - GRANULAR PAD
AUCUNE / NTS

PROFESSIONAL STAMP: J.A. SAUVE 10020/100 PROVINCE OF ONTARIO

PROFESSIONAL STAMP: C. LAVOIE J.E.BEL 10006/7842 PROVINCE OF ONTARIO

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAN AVENUE, SUITE 101 OTTAWA, ON CANADA K1S 1V9 1-813-742-7482 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: J.SAUVÉ

REVIEWED BY: J.SAUVÉ

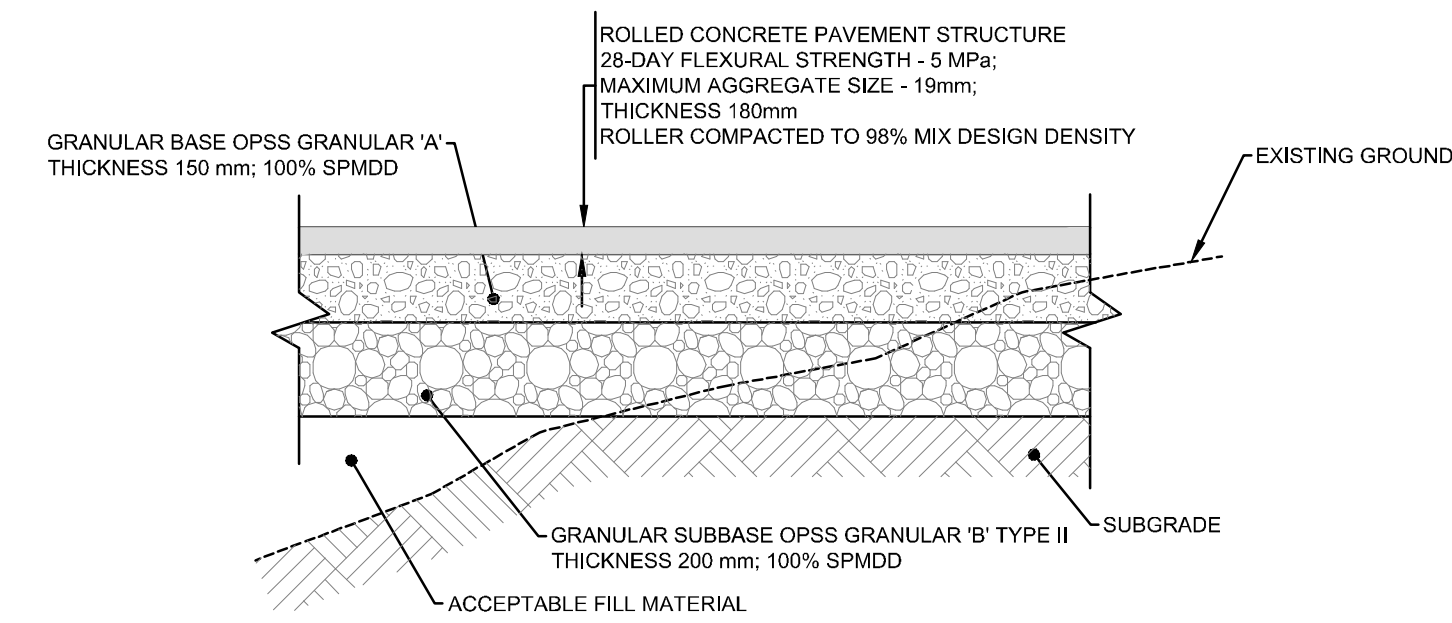
APPROVED BY: J.SAUVÉ

PRINT DATE: AUGUST 13, 2021 REVISION NUMBER:

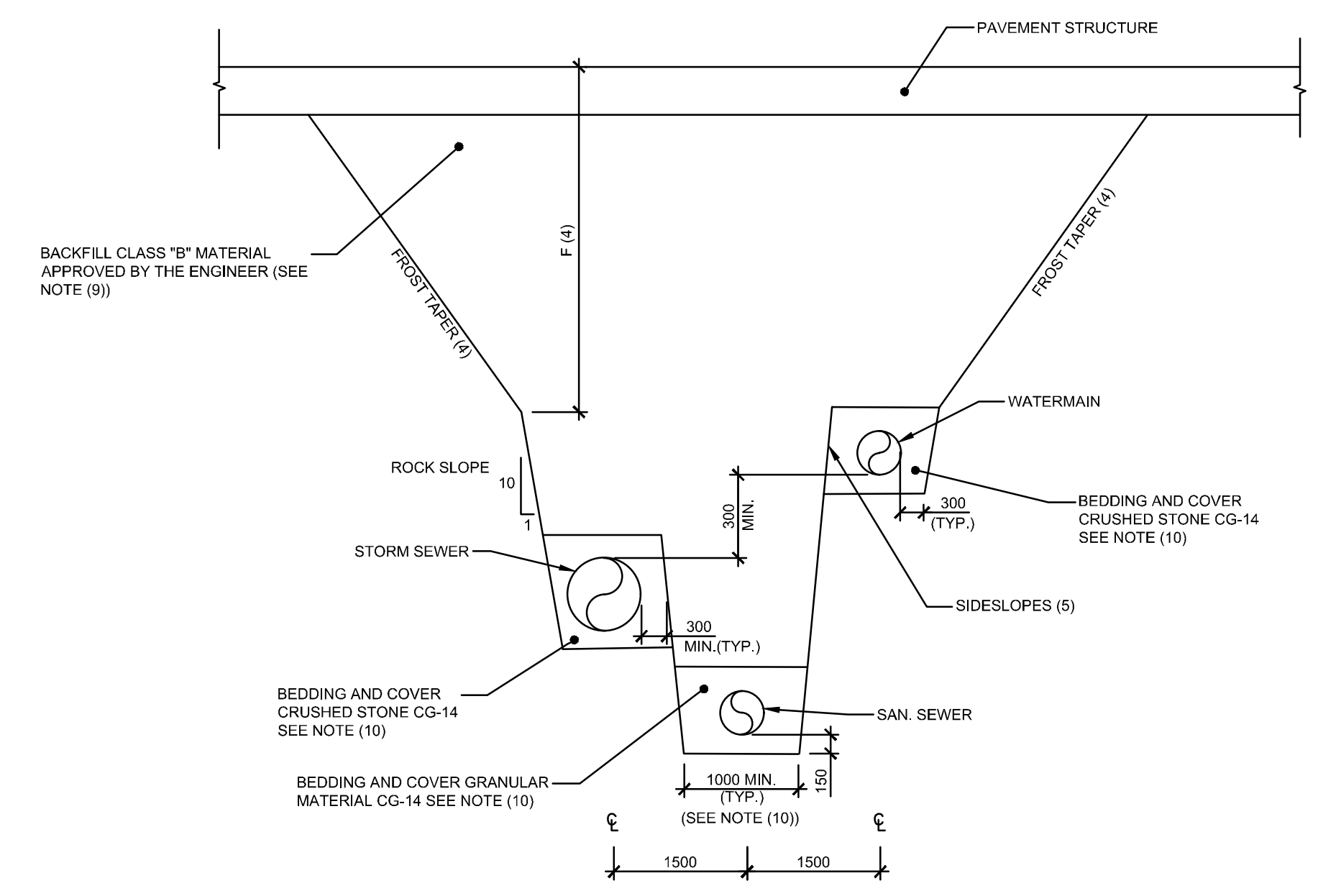
ISSUED DATE: AUGUST 13, 2021

CLIENT PROJECT #: **A001083** PROJECT #:

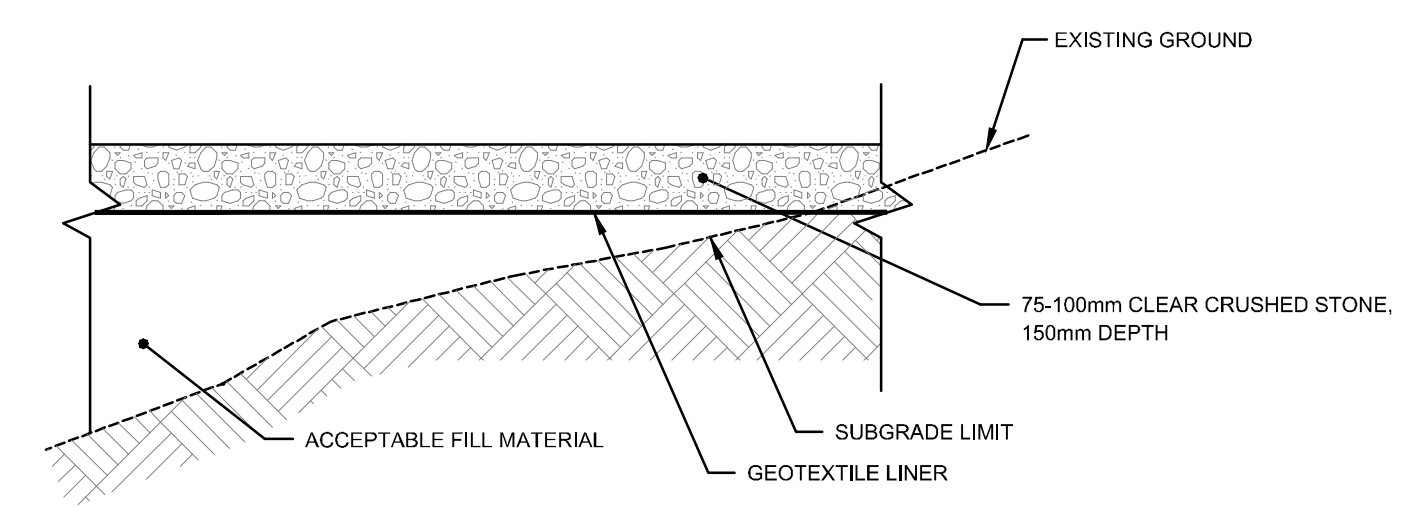
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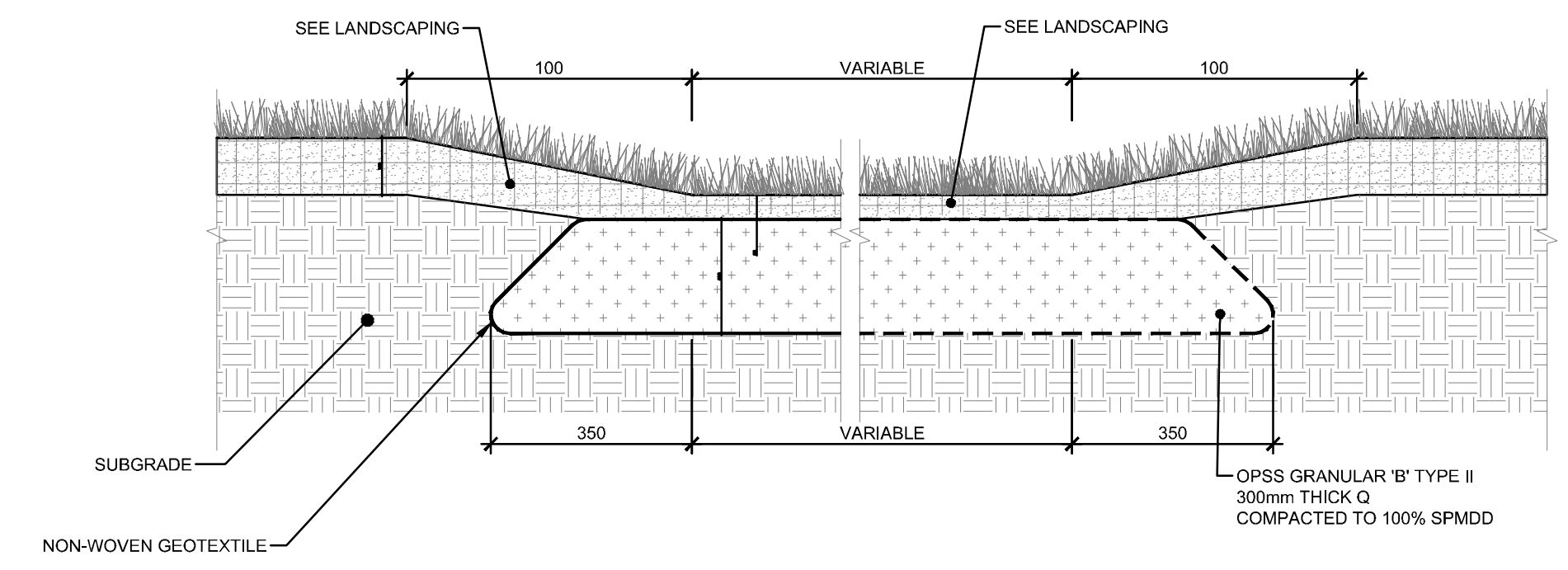
203
TYPICAL SECTION - GRANULAR FOUNDATION AND CONCRETE PAVEMENT (HEAVY DUTY)
AUCUNE / NTS



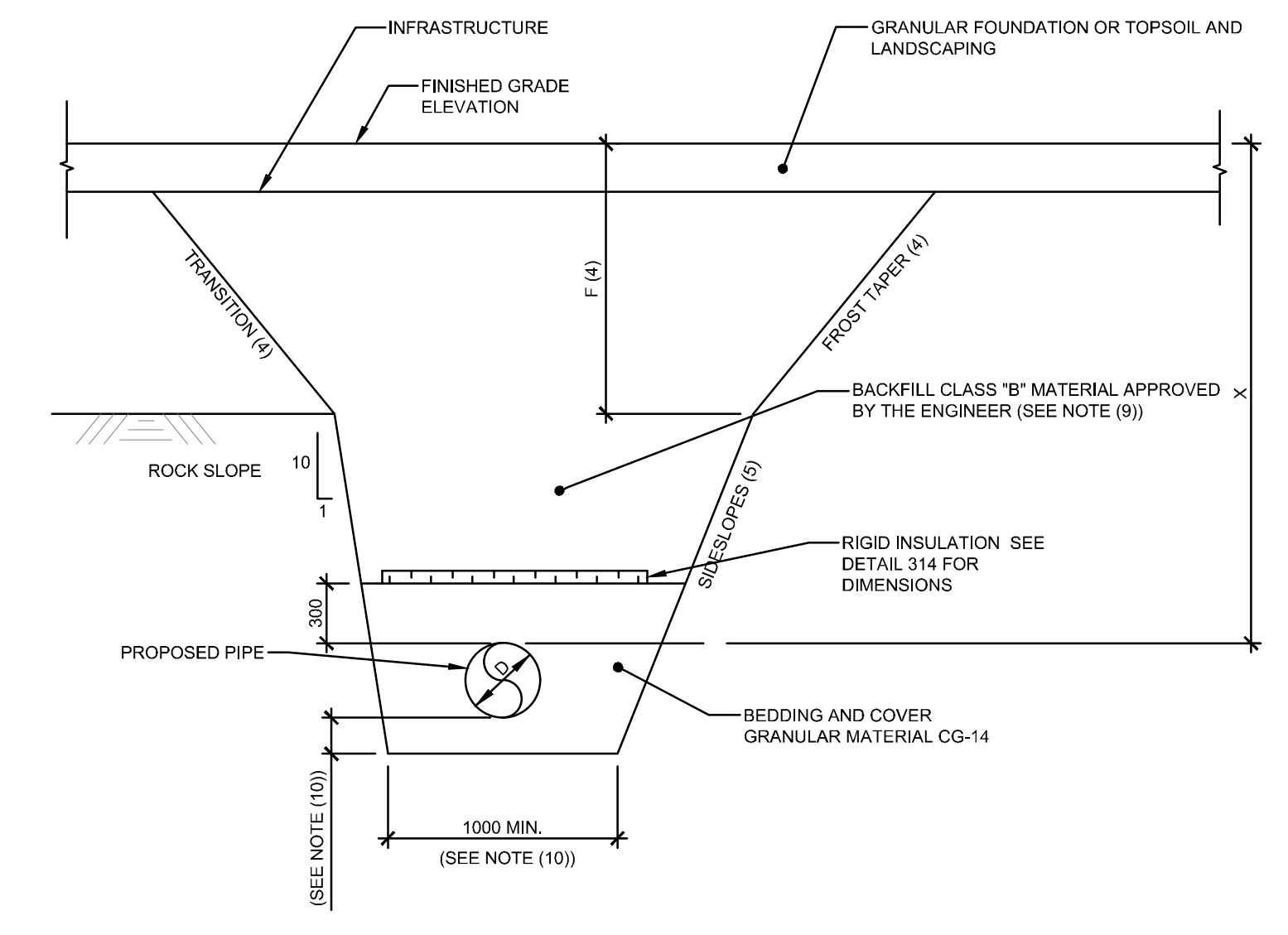
308
TYPICAL SECTION SINGLE TRENCH - MULTIPLE PIPES
AUCUNE / NTS



212
TYPICAL SECTION - TEMPORARY CONSTRUCTION ENTRANCE
AUCUNE / NTS

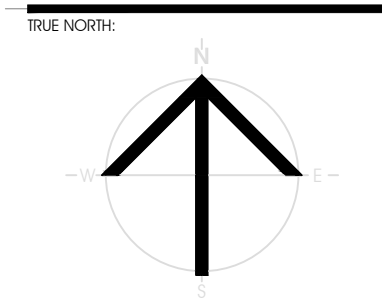
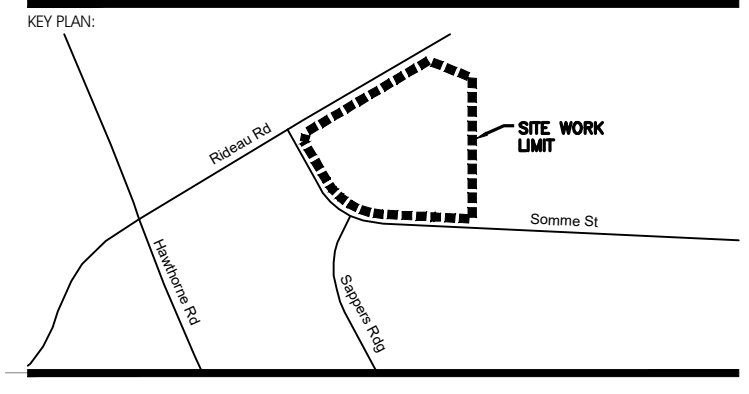


215
SEPTIC SYSTEM MAINTENANCE TRUCK ACCESS AREA
AUCUNE / NTS



NOTES:
A - WHEN X < 1.8m, INSULATION IS REQUIRED FOR WATERMAIN
B - WHEN X < 1.5m, INSULATION IS REQUIRED FOR SEWER

309
TYPICAL SECTION FROST PROTECTION FOR SEWERS, CATCHBASIN LEAD AND WATERMAIN
AUCUNE / NTS



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ISSUED FOR SITE PLAN APPROVAL AUGUST 13, 2021
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SITE:



CONSULTANT LOGO:



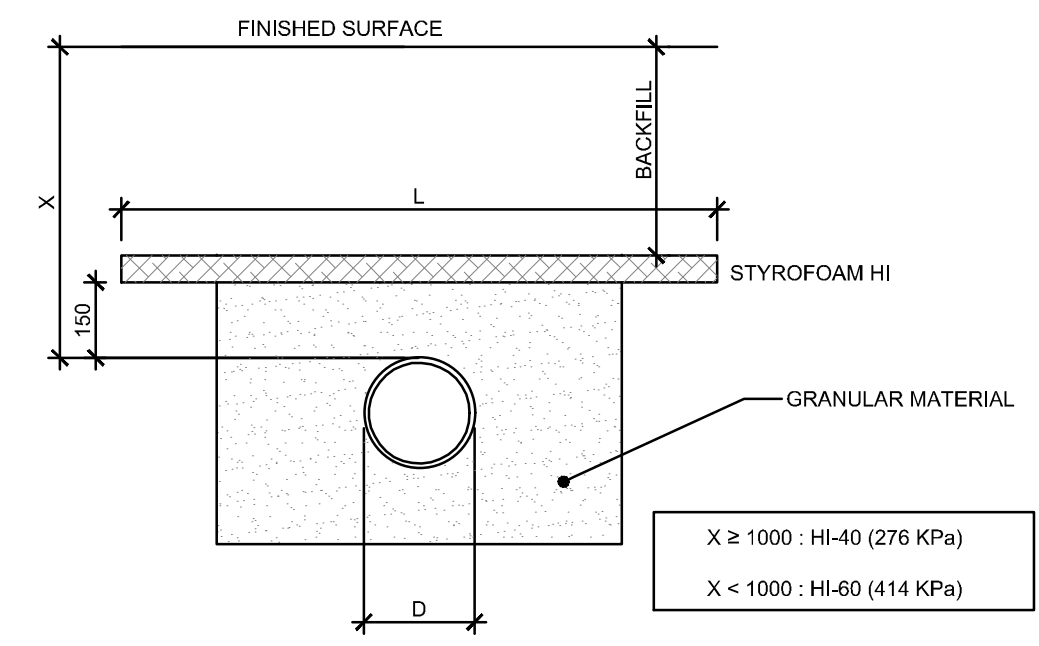
PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOMME ST, OTTAWA, ON

DETAILS

DRAWN BY: D.CANN DRAWING NUMBER: **C012**
DATE: REVIEWED BY: J.SALVE
APPROVED BY: PRINT DATE: REVISION NUMBER:
ISSUED DATE: AUGUST 13, 2021
CLIENT PROJECT #: PROJECT #:

A001083
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\\CIMA-PLUS\CIVITAS\CIVITAS-CL\DOT\PROJECTS\A001000-A001499\A001083_FASTFRATE WAREHOUSE DEVELOPMENT\A001490_CIVIL\REF

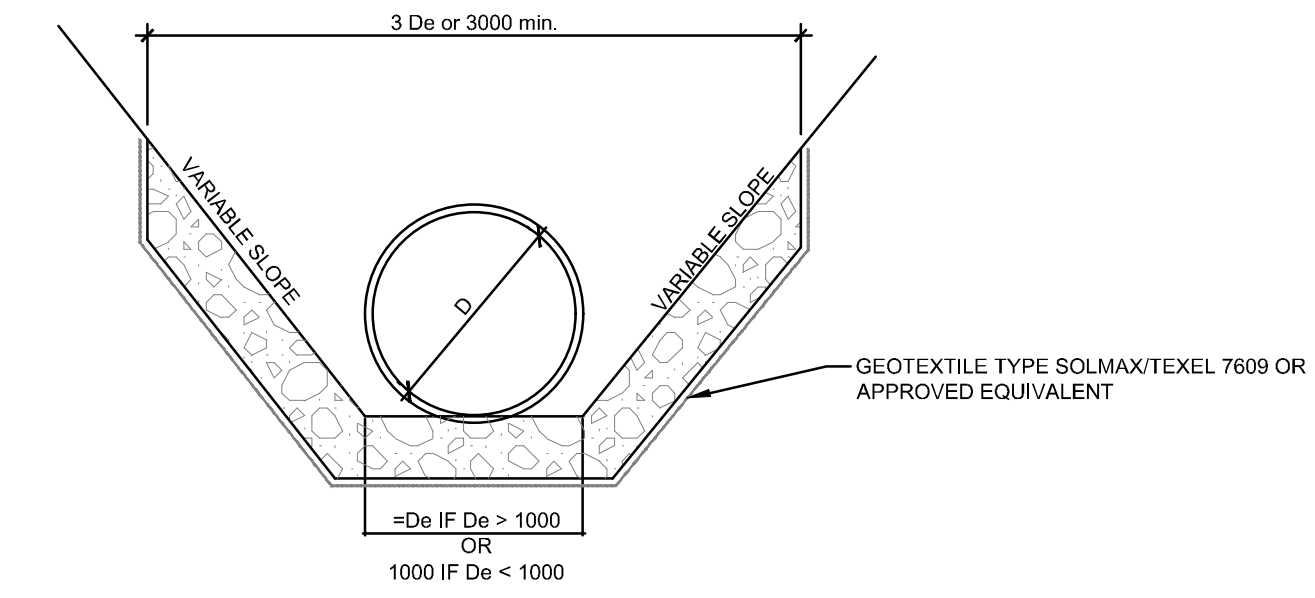
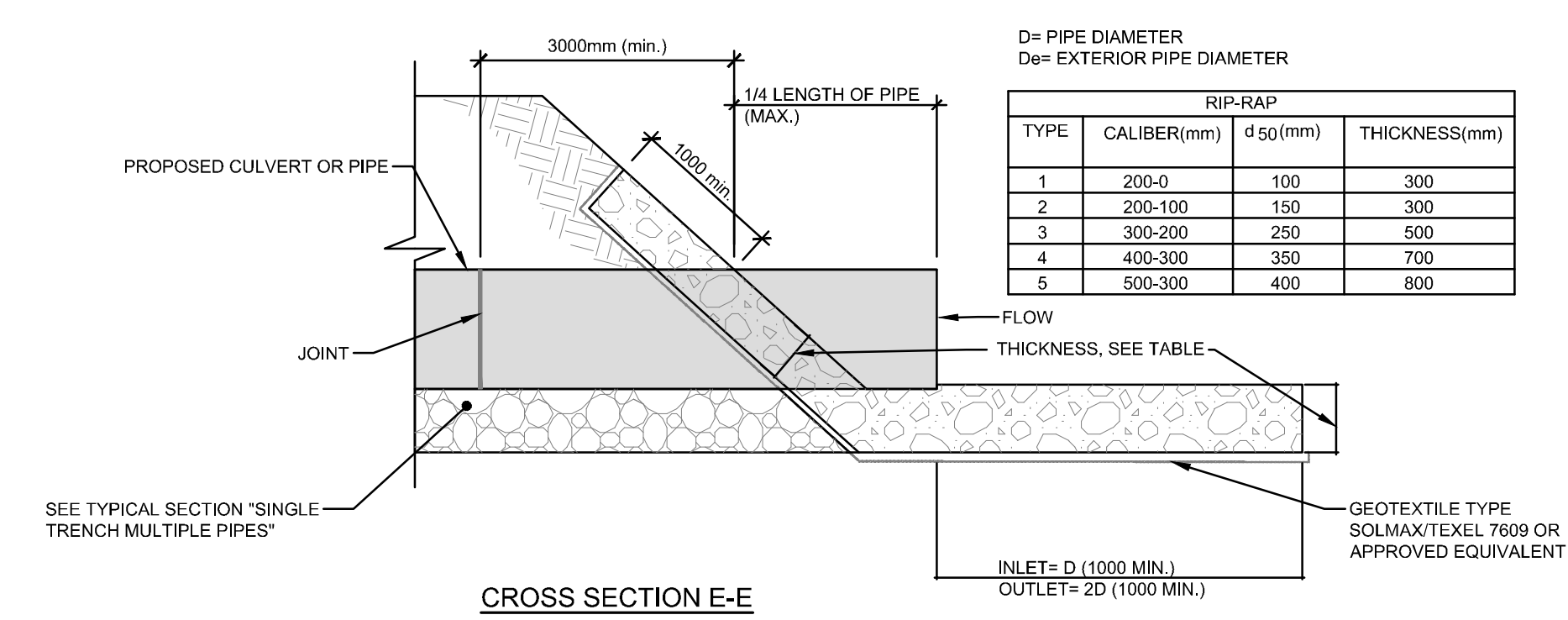


MINIMUM WIDTH OF INSULATION TABLE (L)

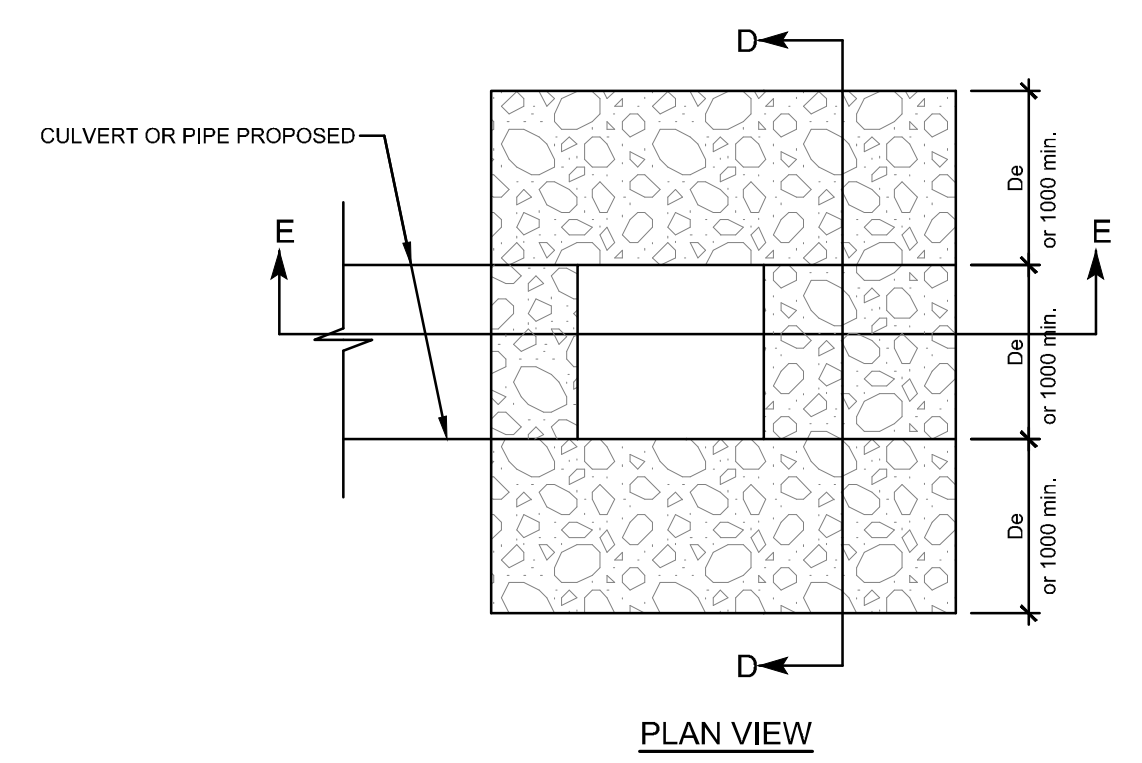
X	Q	150	200	250	300	375	450	525	600	INSULATION THICKNESS
750	1650	1700	1750	1800	1875	1950	2025	2100		100
1000	1150	1200	1250	1300	1375	1450	1525	1600		100
1250	650	700	750	800	875	950	1025	1100		75
1500	600	600	600	600	600	600	600	600		75
1750	600	600	600	600	600	600	600	600		50

L = INSULATION WIDTH (mm)
D = PIPE DIAMETER (mm)

314A PIPE INSULATION (1.8m COVER)
AUCUNE / NTS

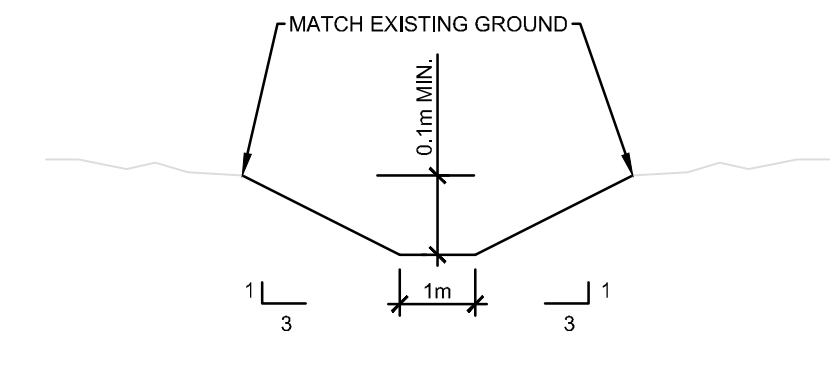


CROSS SECTION D-D

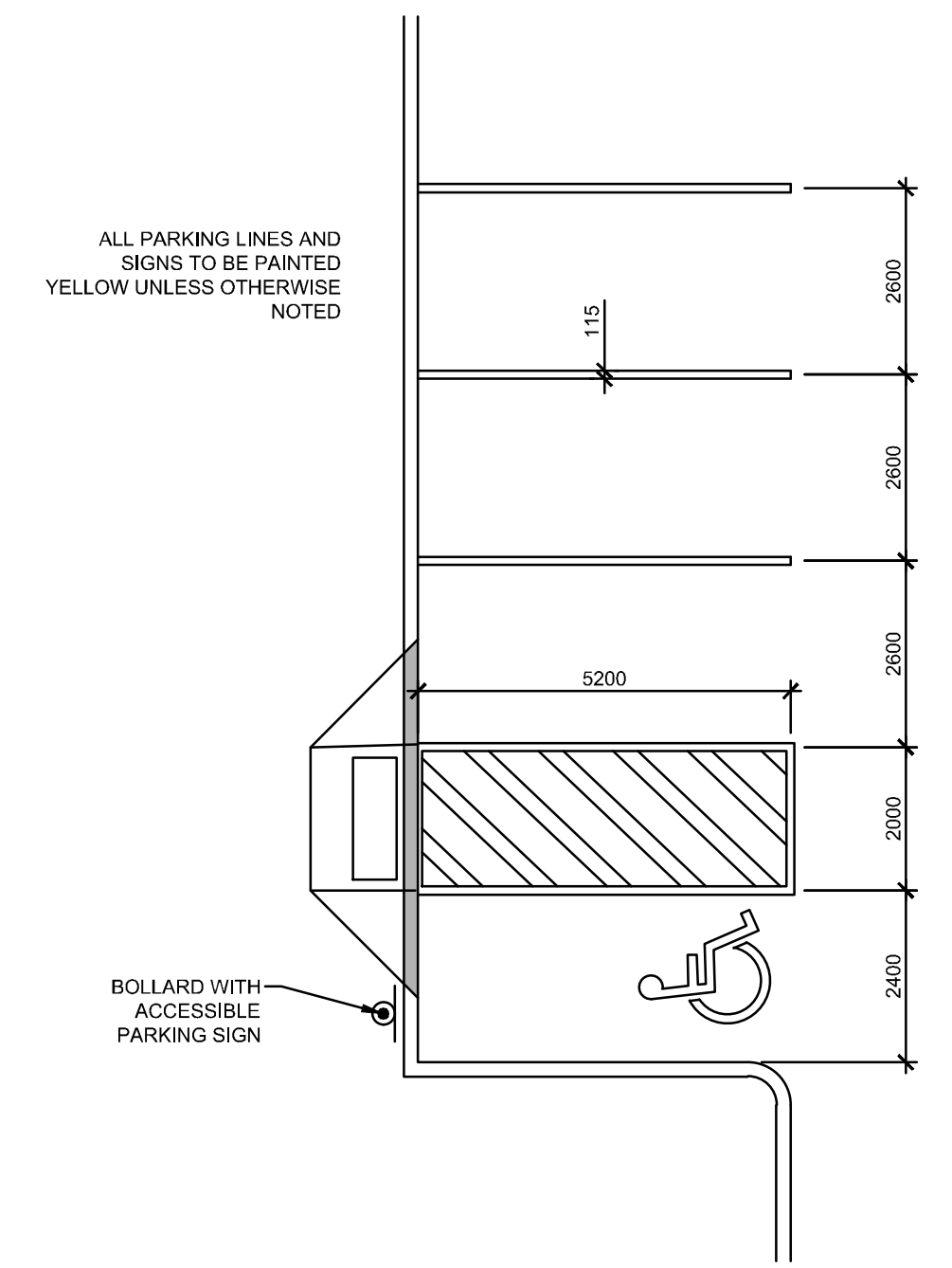


PLAN VIEW

319 INLET/OUTLET FOR CULVERT OR PIPE DETAIL (TYPICAL)
AUCUNE / NTS

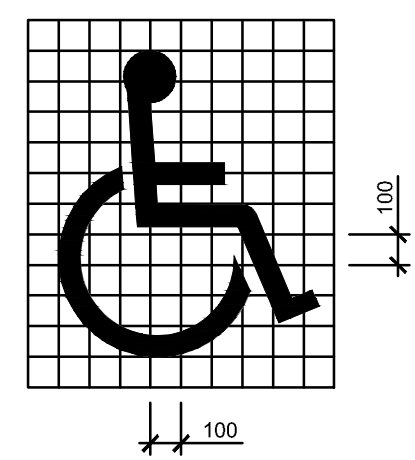
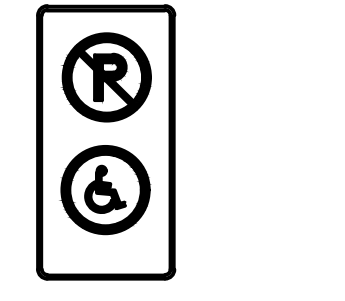


333 SWALE (TYPICAL)
AUCUNE / NTS

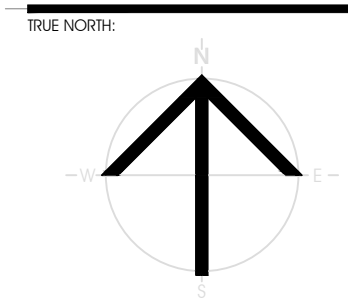
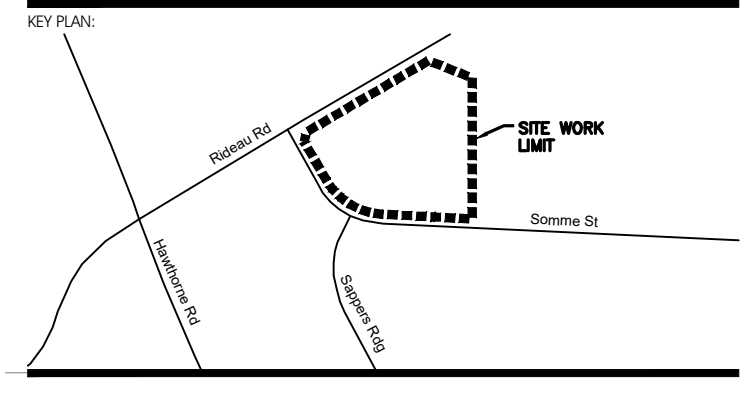


408 TYPICAL PARKING STALLS
AUCUNE / NTS

ACCESSIBLE PARKING SIGN



409B ACCESSIBLE PARKING SIGN AND MARKING



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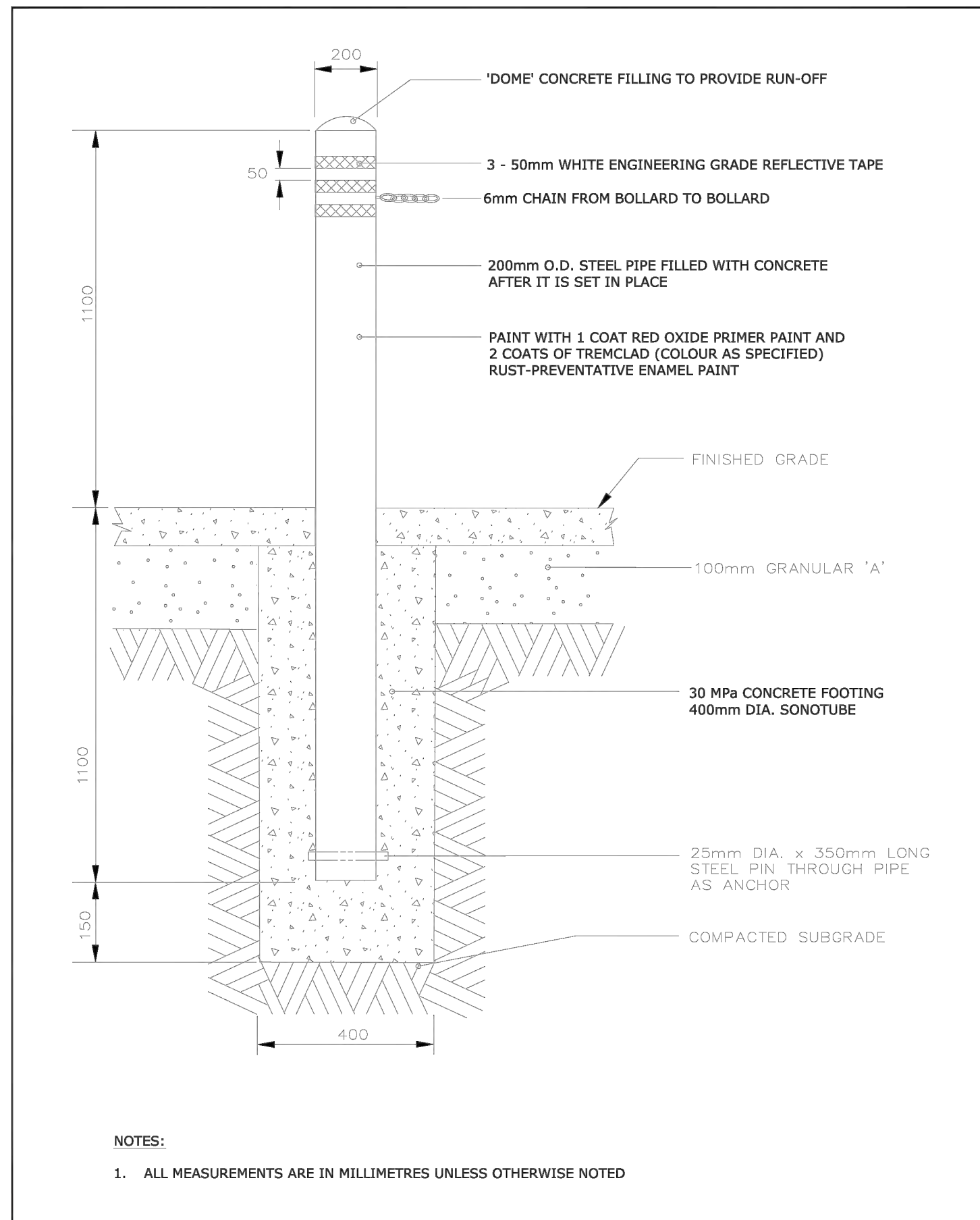


PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOMME ST, OTTAWA, ON
DRAWING TITLE:

DETAILS

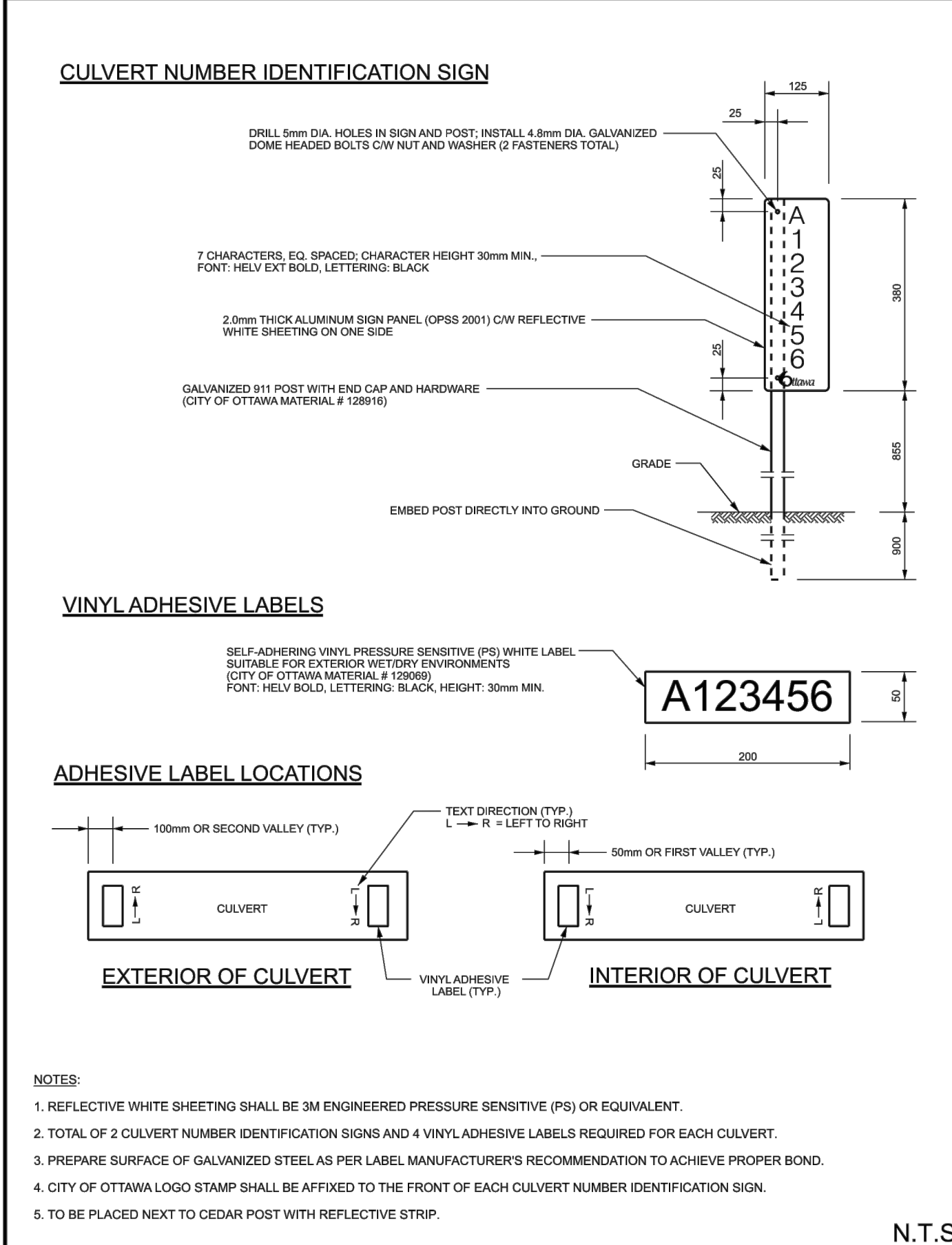
DRAWN BY: D.CANN DRAWING NUMBER: **C013**
DATE: APPROVED BY: J.SAUVE
FIRST DATE: ISSUED DATE: AUGUST 13, 2021 REVISION NUMBER:
CLIENT PROJECT #: PROJECT #:

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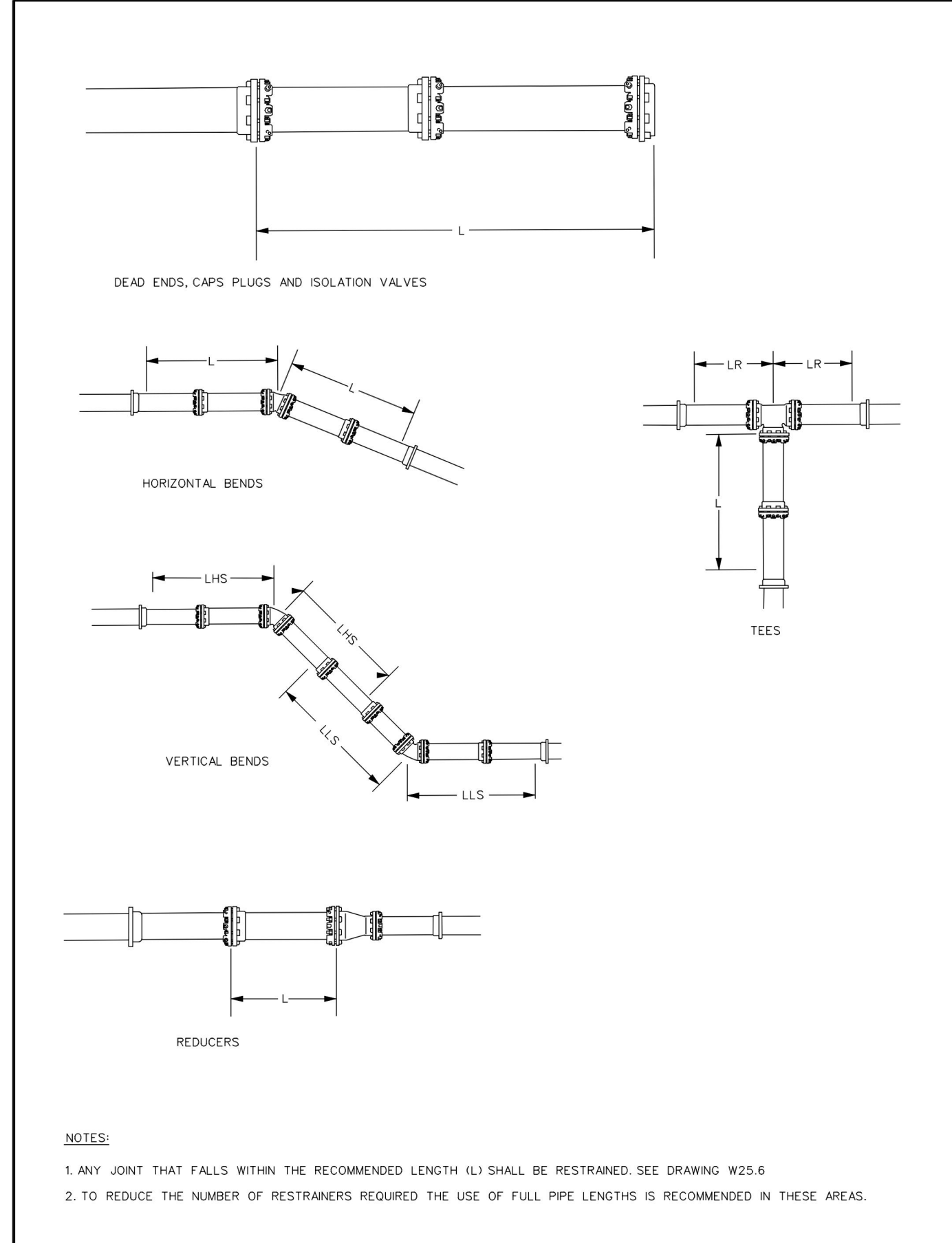
200mm DIAMETER STEEL BOLLARD INSTALLATION FOR ROAD CLOSURE

DATE: MAY 2001
REV: JAN 2015
DWG No: F4



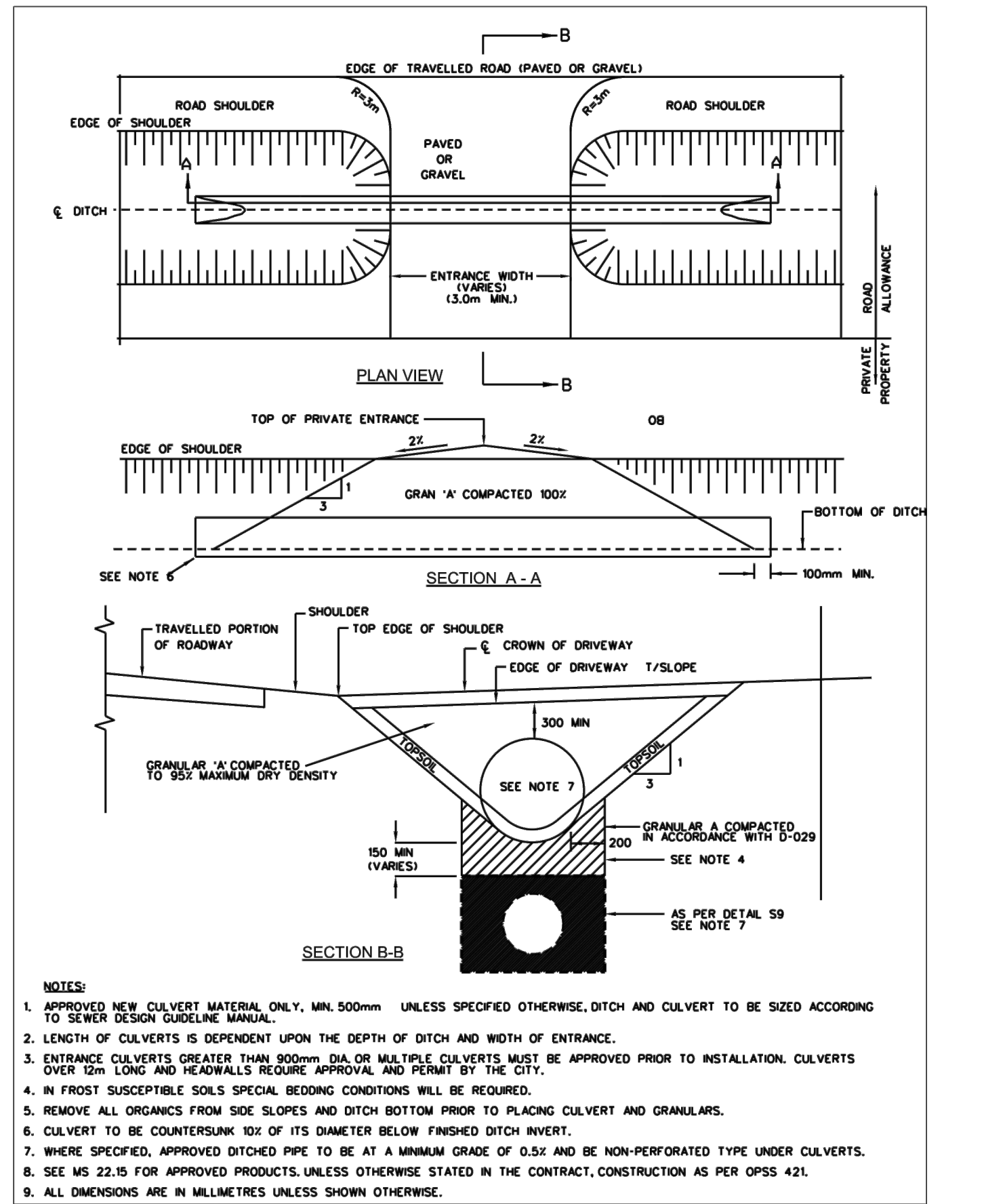
CULVERT IDENTIFICATION SIGN FOR CULVERTS OWNED BY CITY OF OTTAWA

DATE: SEPTEMBER 2006
REV: DATE: MARCH 2021
DWG No: S34



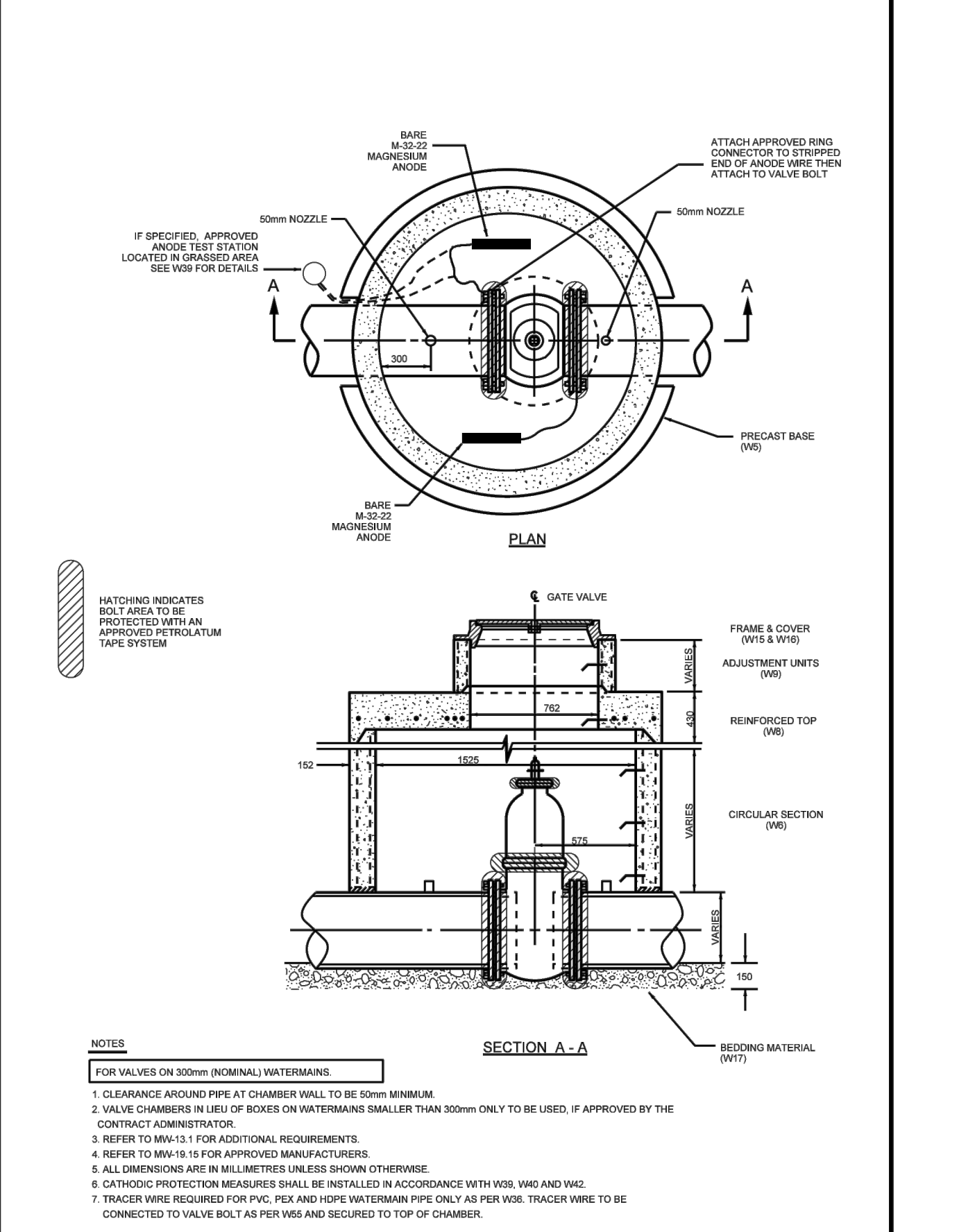
RESTRAINING AND RETAINING RINGS FOR PVC AND DI PIPE 400mm AND UNDER

DATE: MAY 2001
REV: NONE
DWG No: W25.5



PRIVATE ENTRANCE DETAIL - RURAL

DATE: MAY 2001
REV: MARCH 2016
DWG No: S26



CIRCULAR CHAMBER GATE VALVES

DATE: MAY 2001
REV: MARCH 2021
DWG No: V3

TABLE OF RESTRAINING 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)					
	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

DEAD ENDS, CAPS, PLUGS, VALVES	PIPE DIAMETER					
	100mm	150mm	200mm	250mm	300mm	400mm
BEFORE CAPS AND EITHER SIDE OF VALVES - L	5	6	9	10	12	16

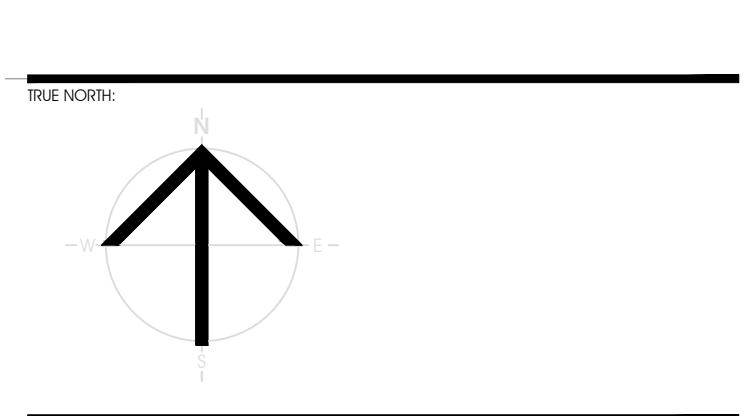
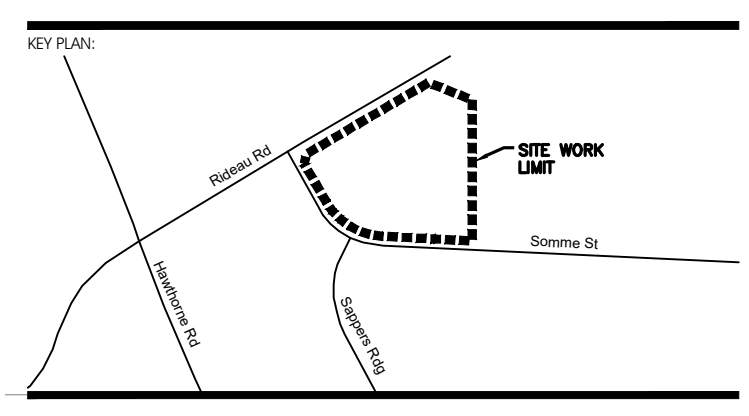
VERTICAL BENDS	PIPE DIAMETER					
	100mm	150mm	200mm	250mm	300mm	400mm
LENGTH HIGH SIDE - LHS	3	4	5	6	7	9
LENGTH LOW SIDE - LLS	1.5	2	2.5	3	3.5	4.5

TEES	PIPE DIAMETER					
	100mm	150mm	200mm	250mm	300mm	400mm
LENGTH ALONG THE BRANCH - L	1	1	1	1	1	1
LENGTH ALONG THE RUN - Lr	3	3	3	3	3	3

HORIZONTAL BENDS	PIPE DIAMETER					
	100mm	150mm	200mm	250mm	300mm	400mm
11.25, 22.5, AND 45 DEGREE BENDS	1	1.5	1.5	2	2	2.5

TABLES OF RESTRAINING LENGTHS FOR PVC AND DI PIPE 400mm AND UNDER

DATE: MAY 2001
REV: MARCH 2011
DWG No: W25.6



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4		
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6		
7		
8		

NUMBER: REVISION: DATE: (MM/DD/YY)

PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER
J.A. SAUVE
10020100
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
C. LAVOIE/LEBEL
100067842
PROVINCE OF ONTARIO

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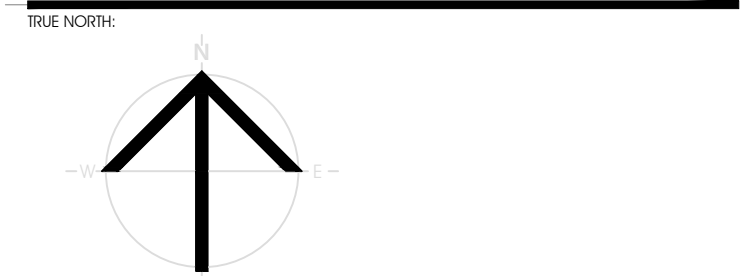
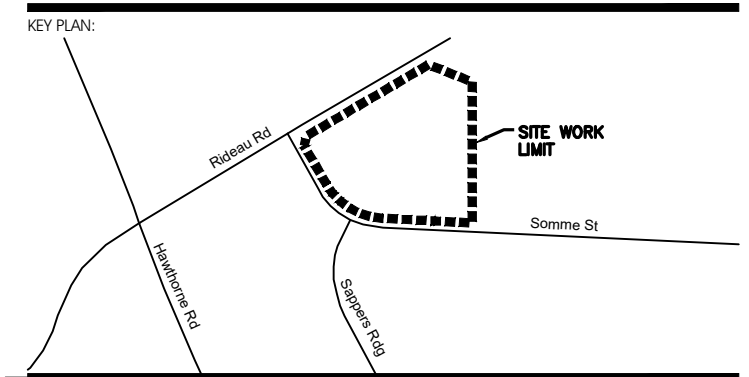
PROJECT FILE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOMMIE ST. OTTAWA, ON
DRAWING TITLE:

DETAILS

DRAWN BY: D.CANN DRAWING NUMBER: **C014**
DATE:
REVIEWED BY: J.SAUVE
APPROVED BY:
PROJECT DATE: AUGUST 13, 2021 REVISION NUMBER:
CLIENT PROJECT #: PROJECT #:

A001083

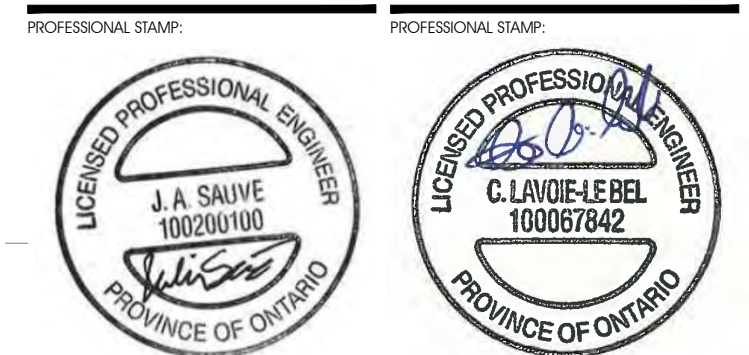
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 NUMBER: REVISION: DATE (MM/DD/YY)



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CONSULTANT LOGO:



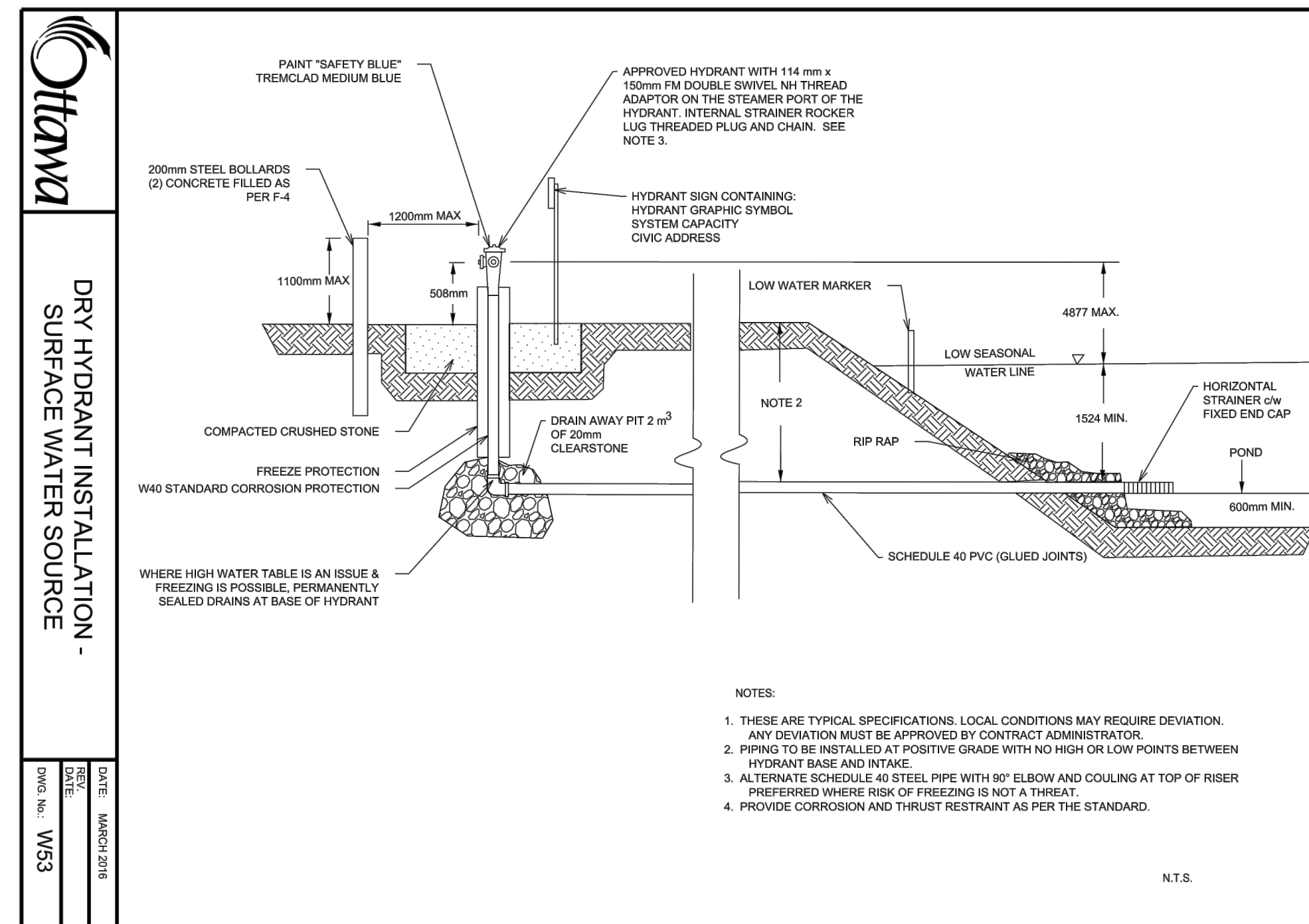
PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
 SCALE: NONE
 SOMME ST, OTTAWA, ON

DETAILS

DRAWN BY: D.CANN	DRAWING NUMBER: C015
DATE: _____	REVIEWED BY: J.SAUVÉ
APPROVED BY: _____	PROJECT #:
PRINT DATE: _____	REVISION NUMBER: _____
ISSUED DATE: AUGUST 13, 2021	PROJECT #:
CLIENT PROJECT #:	PROJECT #:

A001083

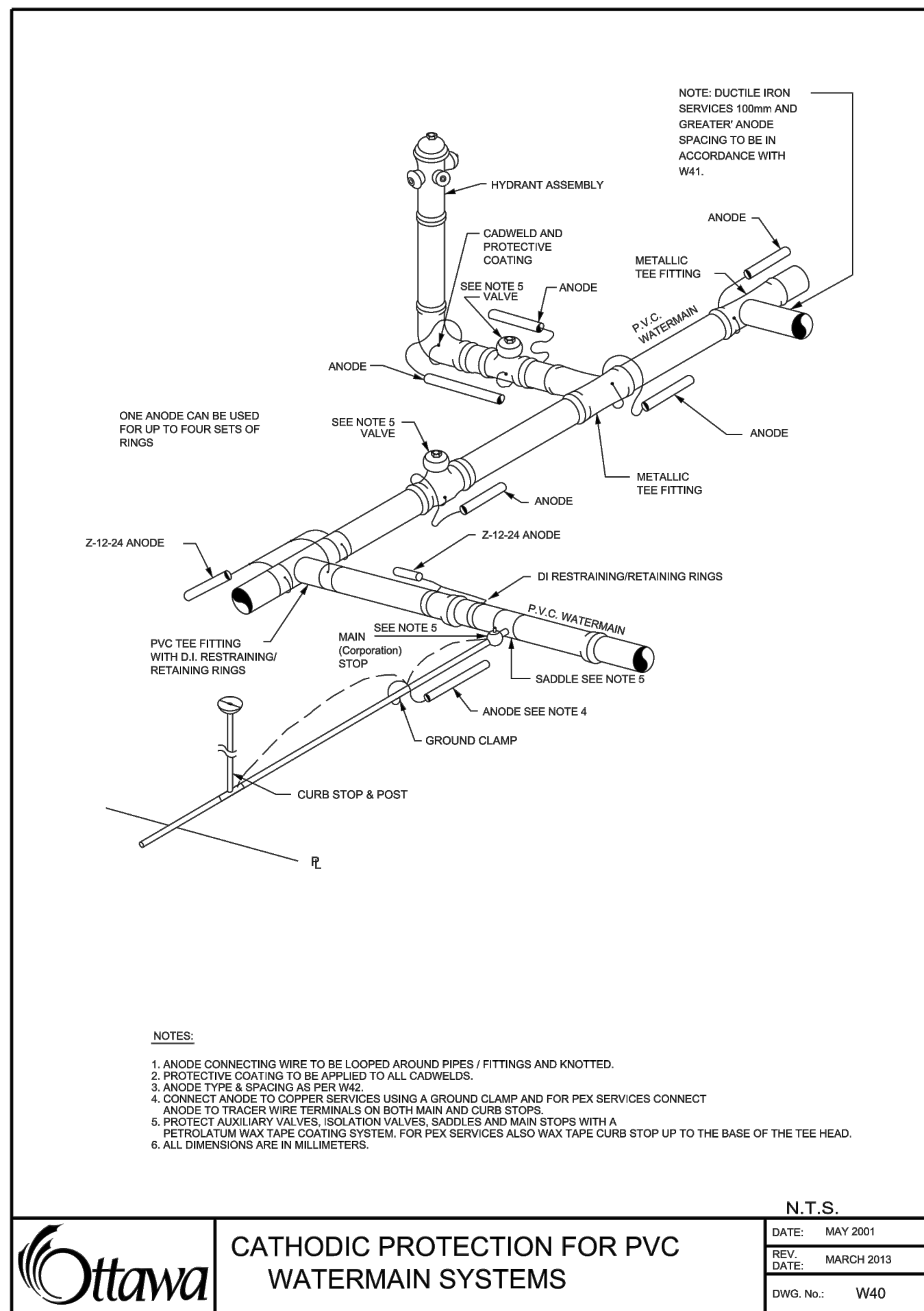
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DATE: MARCH 2013
 DWG. No.: W53

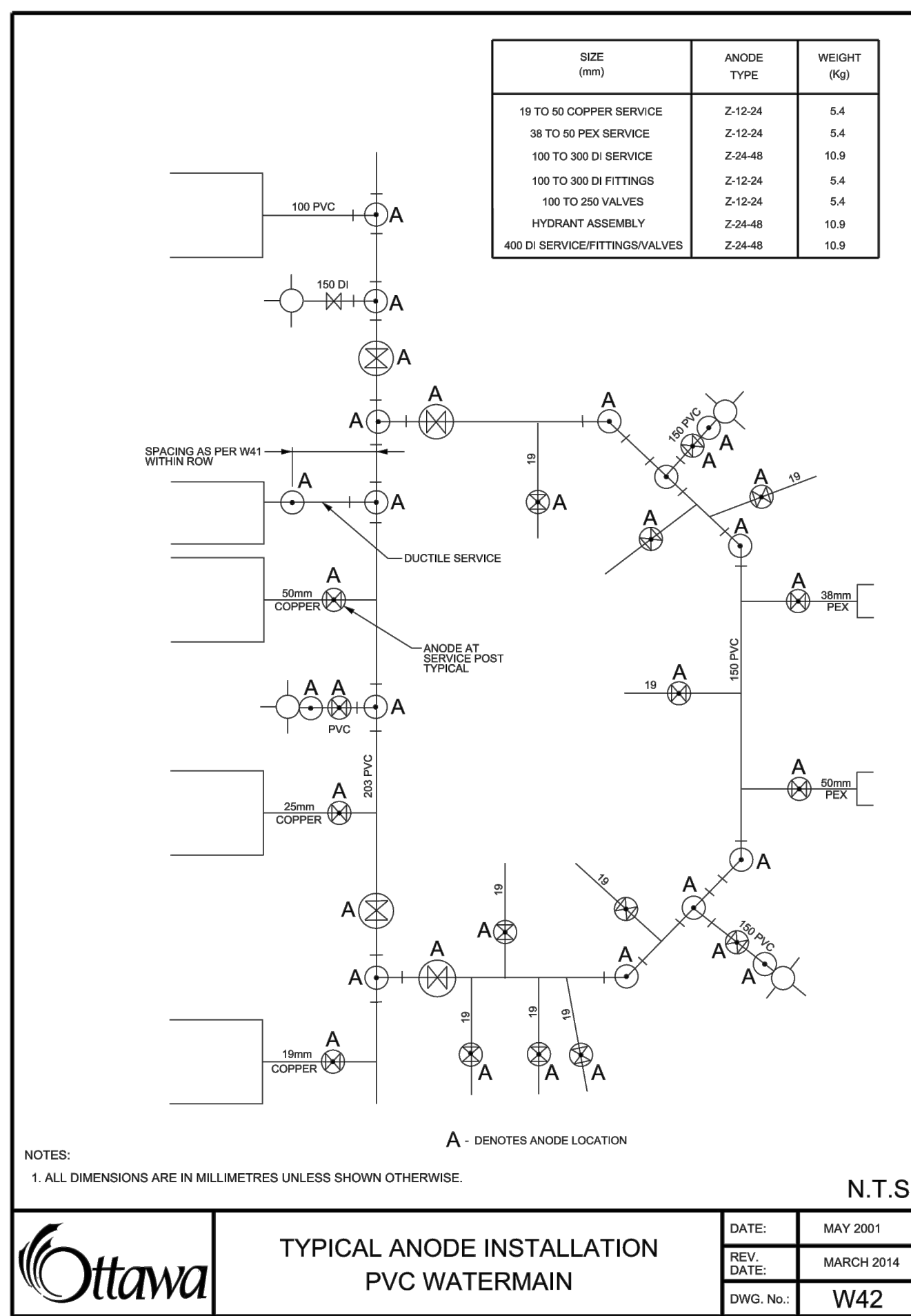
- NOTES:
1. THESE ARE TYPICAL SPECIFICATIONS. LOCAL CONDITIONS MAY REQUIRE DEVIATION. ANY DEVIATION MUST BE APPROVED BY CONTRACT ADMINISTRATOR.
 2. PIPING TO BE INSTALLED AT POSITIVE GRADE WITH NO HIGH OR LOW POINTS BETWEEN HYDRANT BASE AND INTAKE.
 3. ALTERNATE SCHEDULE 40 STEEL PIPE WITH 90° ELBOW 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.



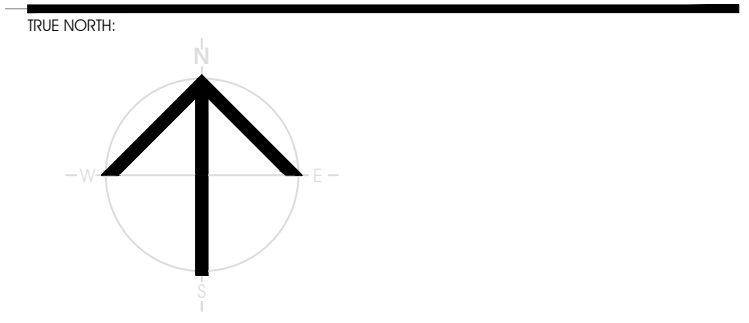
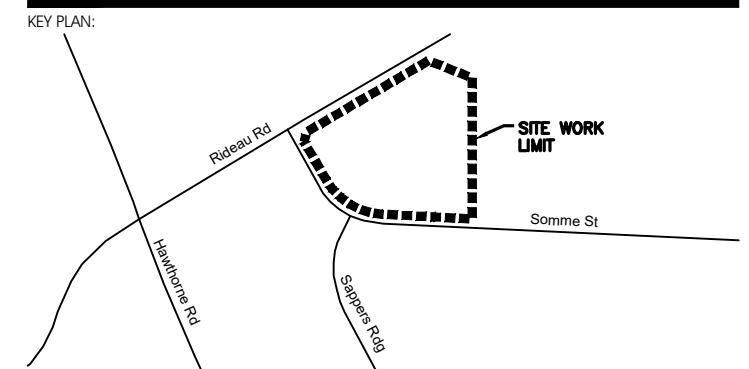
N.T.S.

DATE: MAY 2001
 REV. DATE: MARCH 2013
 DWG. No.: W40



N.T.S.

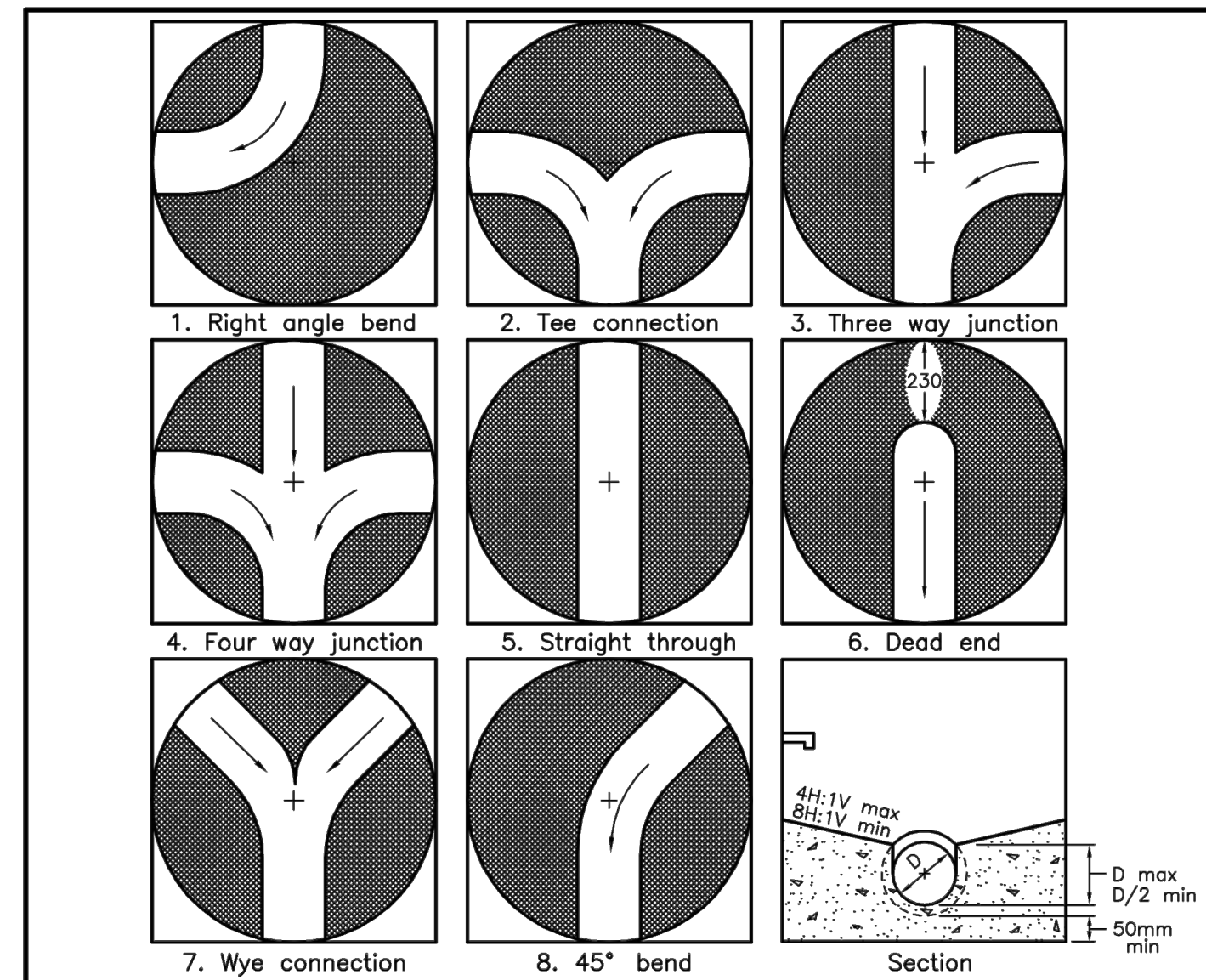
DATE: MAY 2001
 REV. DATE: MARCH 2014
 DWG. No.: W42



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MAXIMUM SIZE HOLE IN THE WALL IN PRECAST RISER SECTIONS

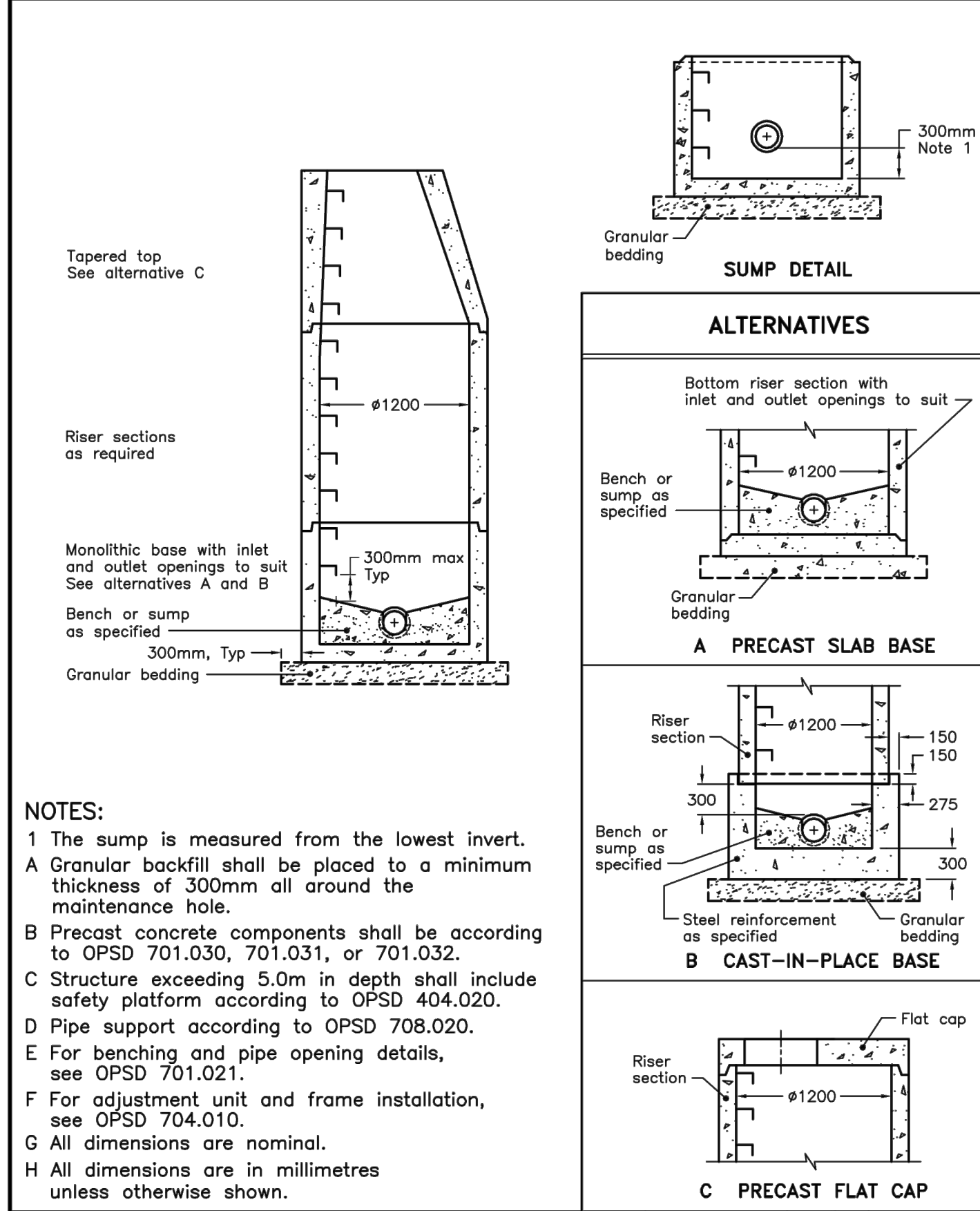
Maintenance Hole Diameter	No. 1-4	No. 5 and 6	No. 8	No. 7	
				Inlet Hole	Outlet Hole
1200	700	860	780	700	860
1500	860	1220	960	860	1170
1800	1220	1485	1220	1220	1485
2400	1485	2020	1760	1485	2020
3000	1930	2450	2300	1930	2450
3600	2470	3085	2730	2470	3085

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-finished, it shall be given wood float finish, channel shall be given steel trowel finish.
 C Benchings 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

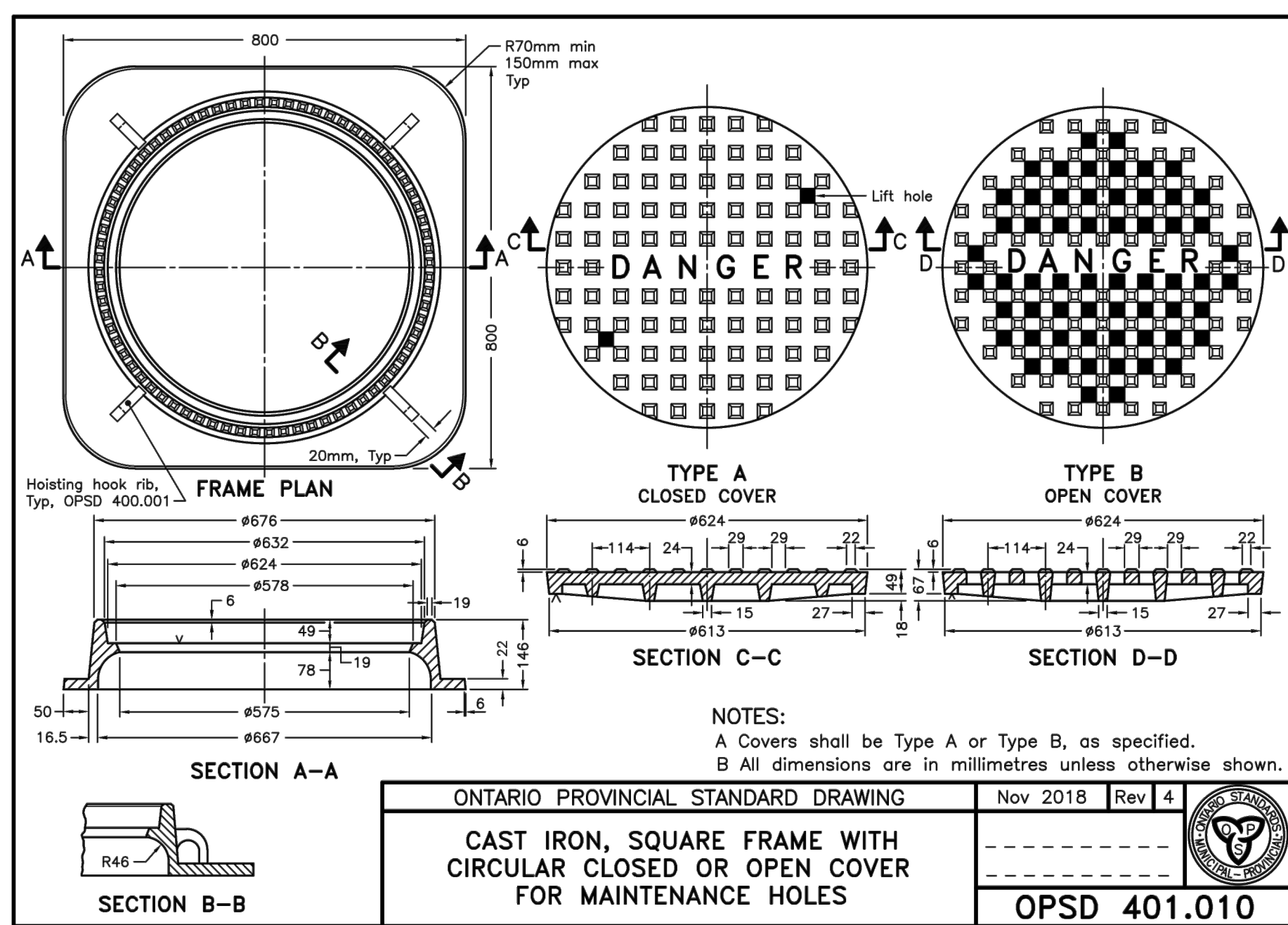


NOTES:
 1 The sump is measured from the lowest invert.
 A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
 B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
 C Structure exceeding 5.0m in depth shall include safety 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

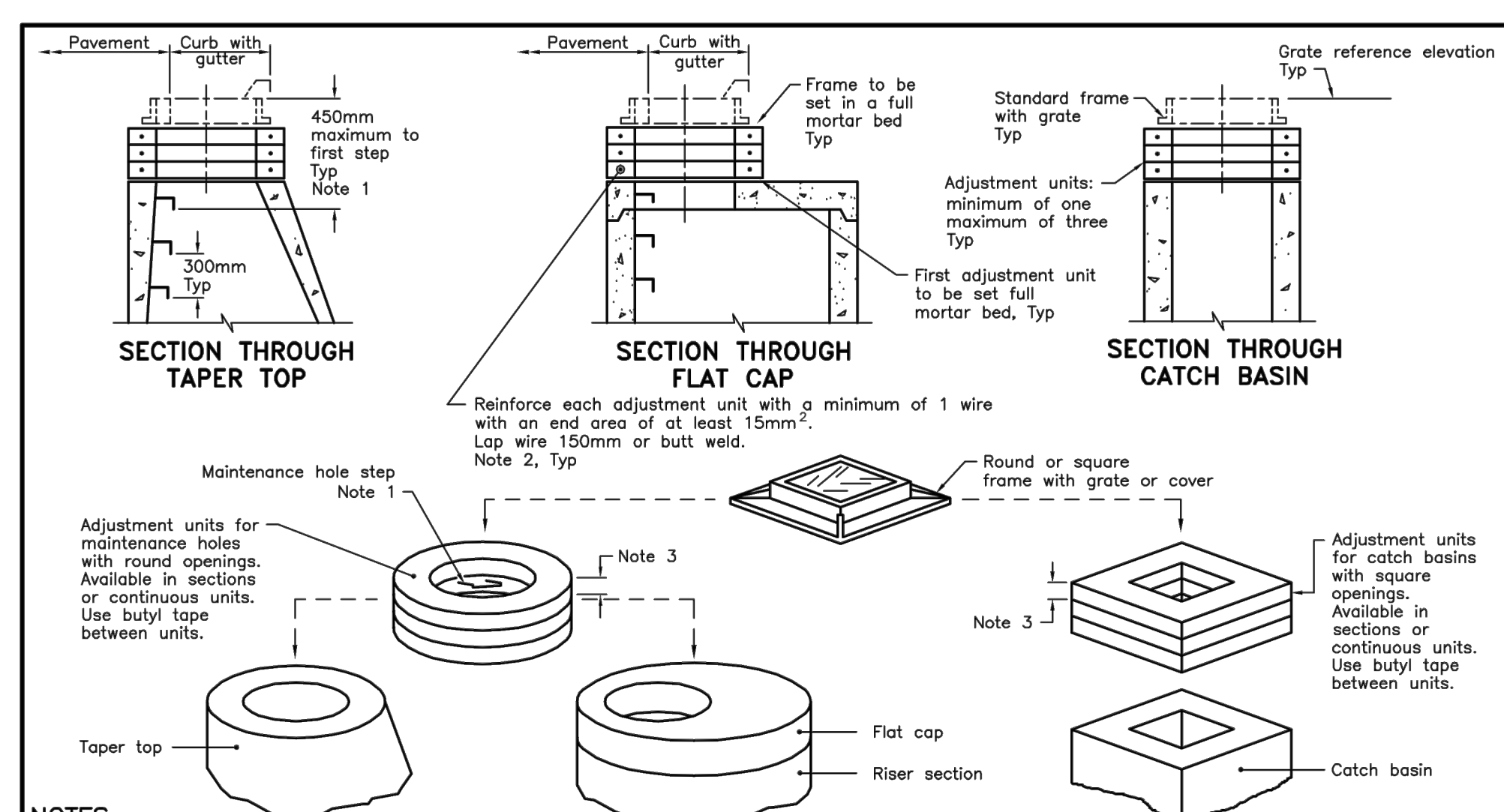


NOTES:
 A Covers shall be Type A or Type B, as specified.
 B All dimensions are in millimetres unless otherwise shown.

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

PROFESSIONAL STAMP

CIVITAS GROUP
 ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAN AVENUE, SUITE 101 OTTAWA, ONT. CANADA K1S 1V9 1-813-742-7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO

CIMA+

PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

SOMME ST. OTTAWA, ON

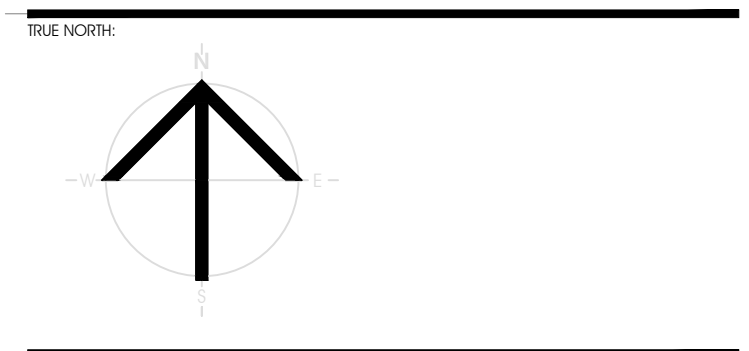
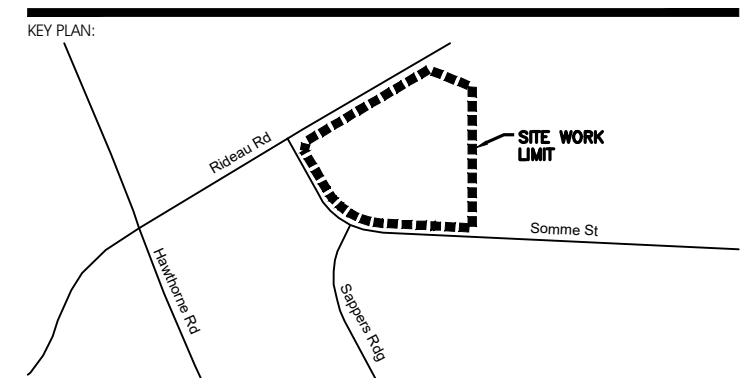
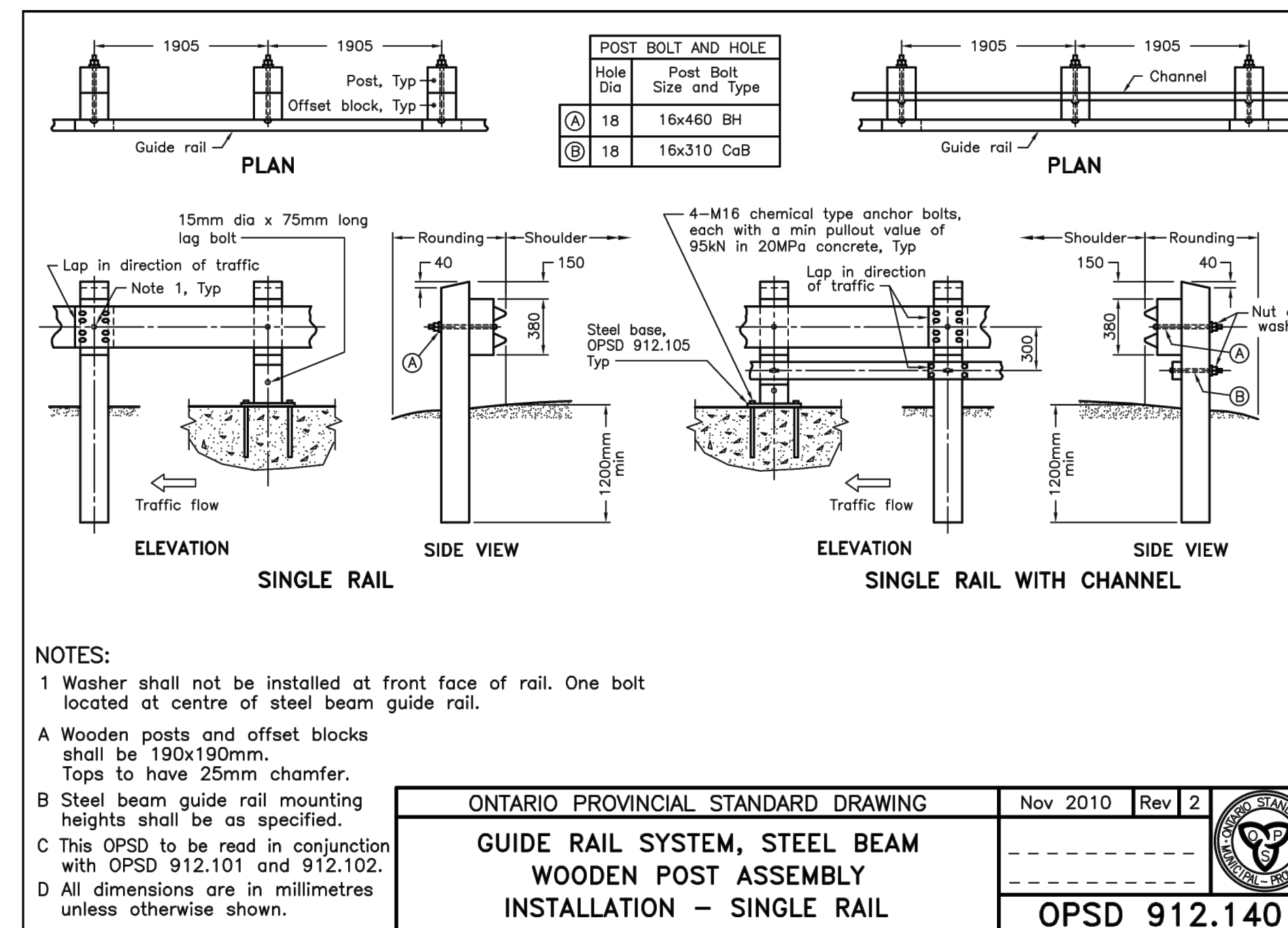
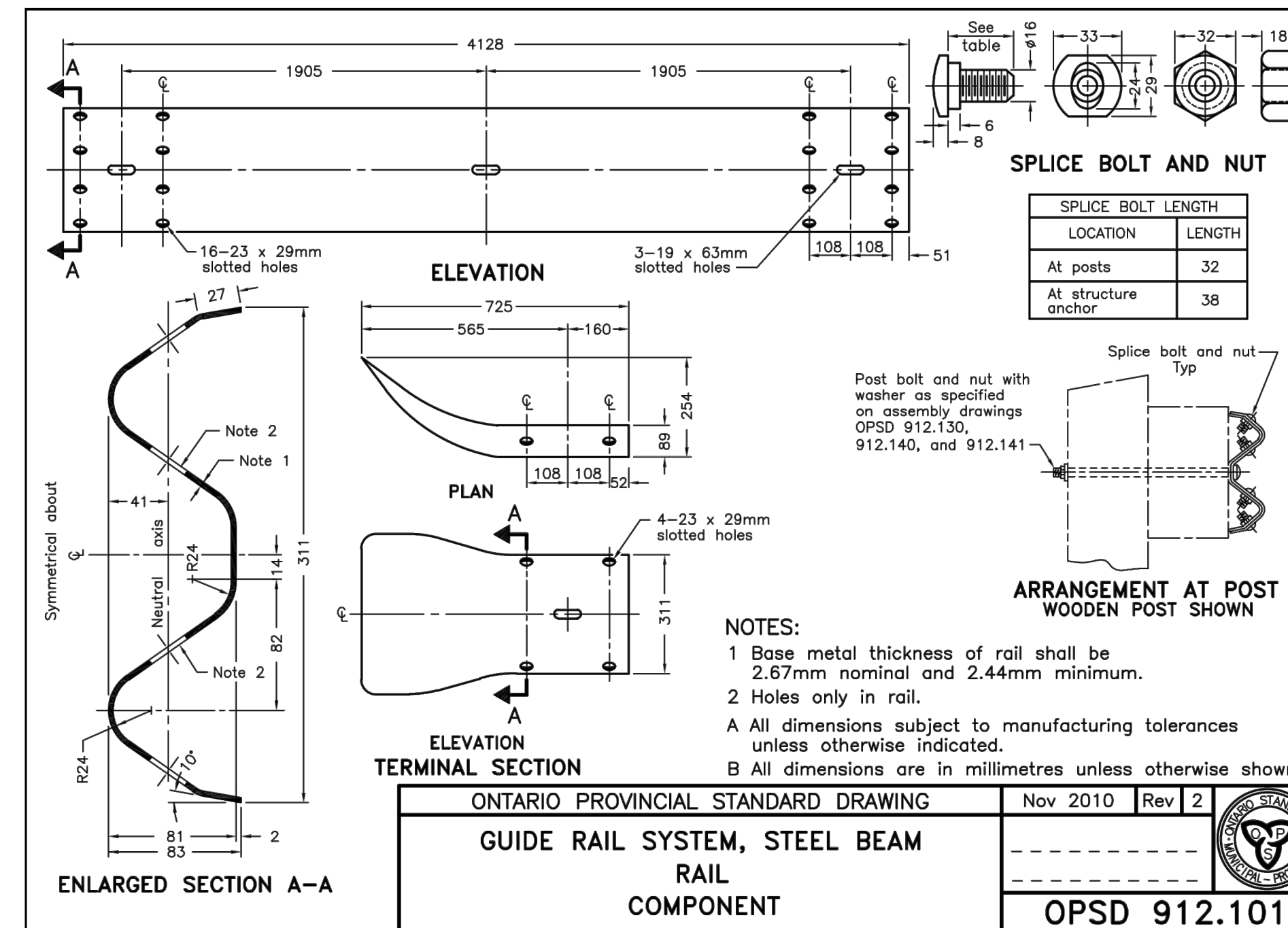
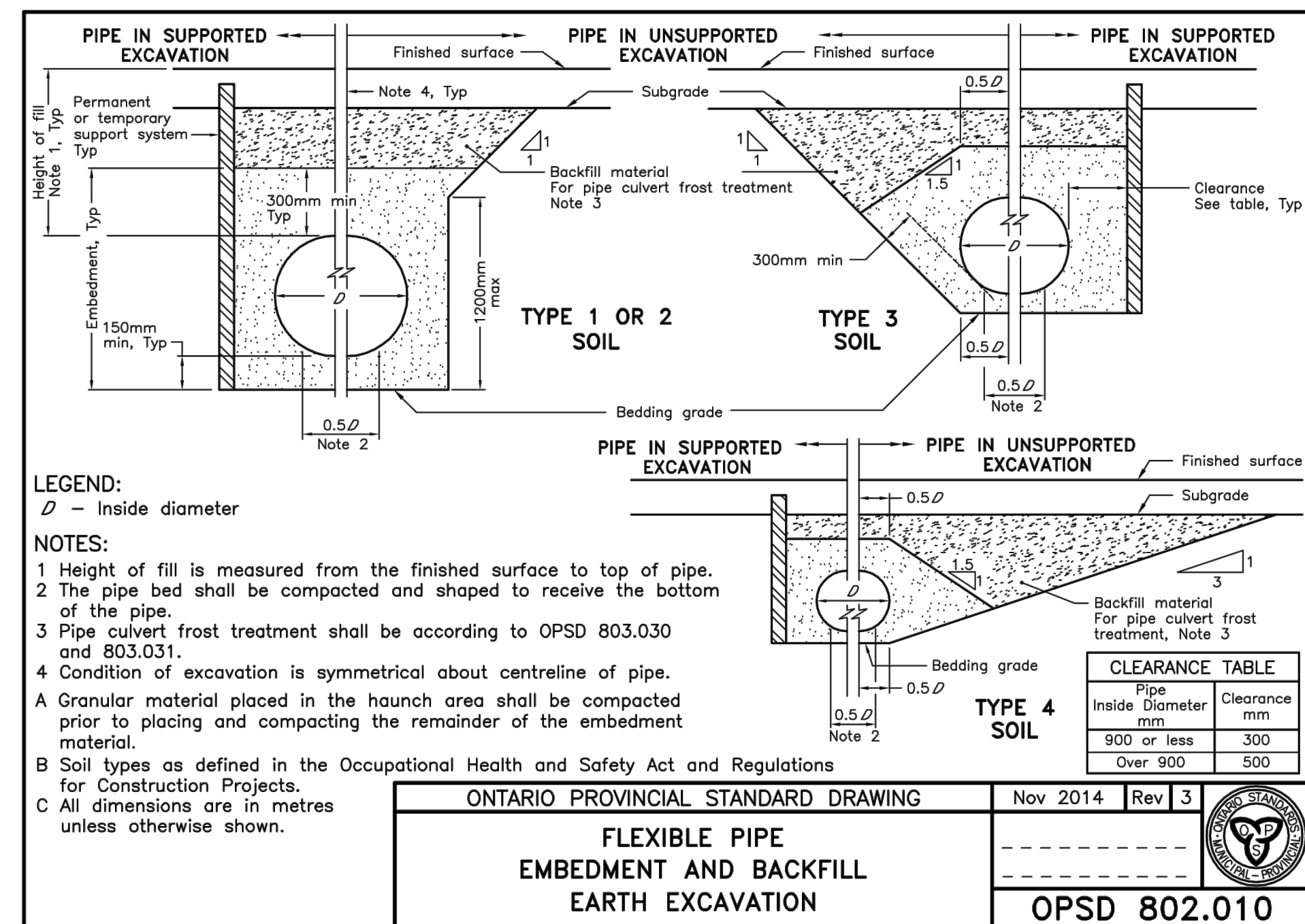
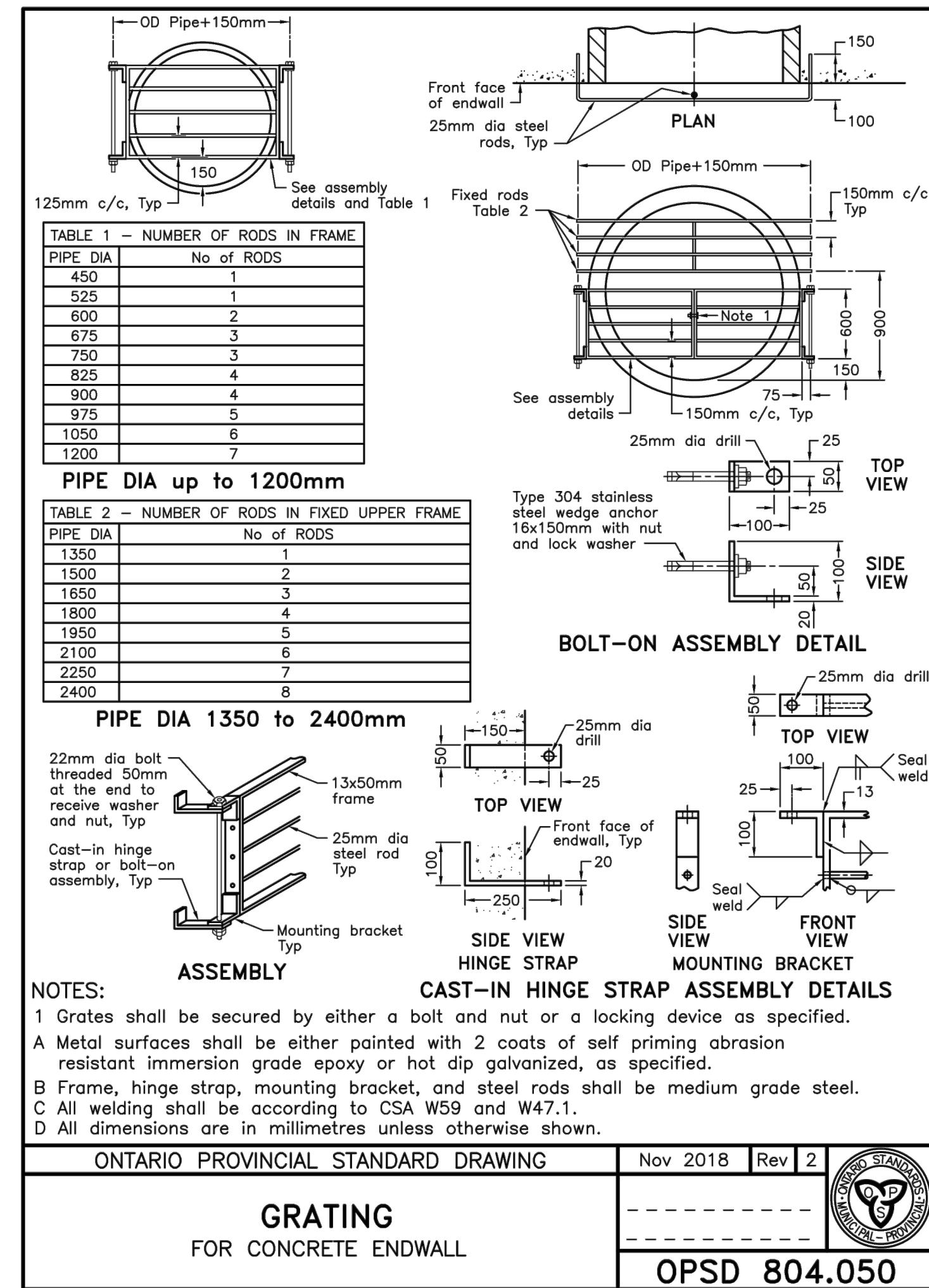
DRAWING TITLE:

DETAILS

DRAWN BY: D. CANN DRAWING NUMBER: **C016**
 DATE: _____
 REVIEWED BY: J. SALIVE
 APPROVED BY: _____
 PRINT DATE: _____
 ISSUED DATE: AUGUST 13, 2021 REVISION NUMBER: _____
 CLIENT PROJECT #: _____ PROJECT #:

A001083

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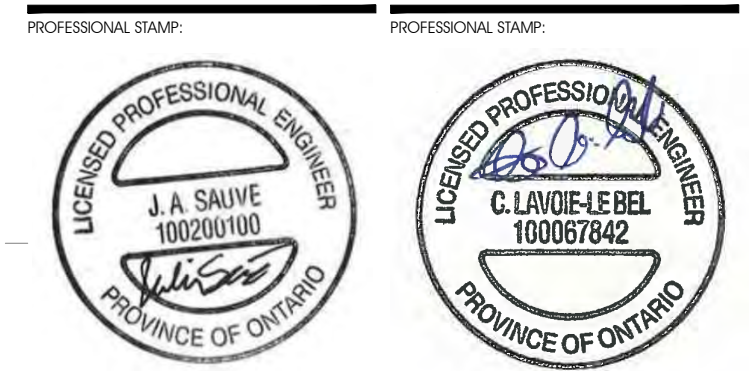


PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS

NO.	DESCRIPTION	DATE

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



CIVITAS ARCHITECTURE INC. 14 CHAMBERLAN AVENUE, SUITE 101 OTTAWA, ON CANADA K1S 1V9 1-813-742-7482 WWW.CIVITAS-INC.CA

CONSULTANT LOGO



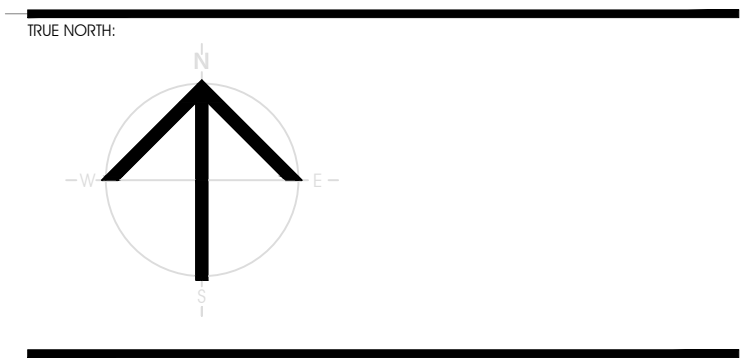
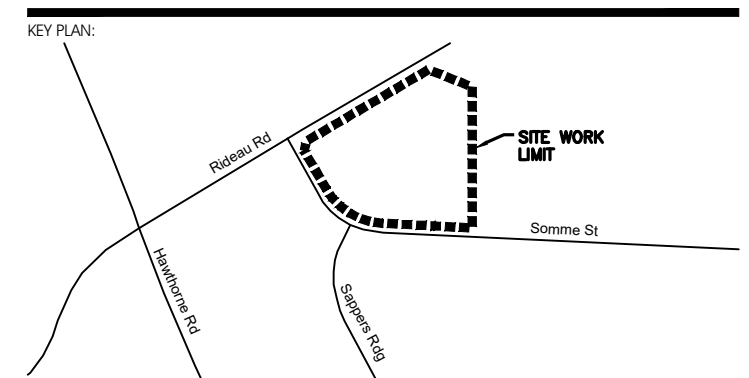
PROJECT TITLE:
FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY
SCALE: NONE
SOMME ST. OTTAWA, ON
DRAWING TITLE:

DETAILS

DRAWN BY: D.CANN DRAWING NUMBER: C017
DATE: J.SAUVE
REVIEWED BY: J.SAUVE
APPROVED BY: J.SAUVE
PRINT DATE: AUGUST 13, 2021 REVISION NUMBER:
ISSUED DATE: AUGUST 13, 2021
CLIENT PROJECT #: PROJECT #:

A001083

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PRELIMINARY
NOT FOR CONSTRUCTION

RECORD OF REVISIONS:

NO.	REVISION	DATE (MM/DD/YY)

ISSUED FOR SITE PLAN APPROVAL: AUGUST 13, 2021

NUMBER: REVISION: DATE (MM/DD/YY):

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		

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		

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		

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		

PROFESSIONAL STAMP:

CIVITAS GROUP
ARCHITECTURE & LANDSCAPE ARCHITECTURE

CIVITAS ARCHITECTURE INC. 14 CHAMBERLAN AVENUE, SUITE 101 OTTAWA, ON CANADA K1S 1V9 1-813-742-7482 WWW.CIVITAS-INC.CA

CIMA+

PROJECT TITLE: FASTFRATE OTTAWA WAREHOUSE AND DISTRIBUTION FACILITY

SCALE: NONE

SOMMIE ST. OTTAWA, ON

DETAILS

DRAWN BY: D. CANN	DRAWING NUMBER: C018
DATE:	REVIEWED BY: J. SALVE
APPROVED BY:	PRINT DATE:
ISSUED DATE: AUGUST 13, 2021	REVISION NUMBER:
CLIENT PROJECT #:	PROJECT #:

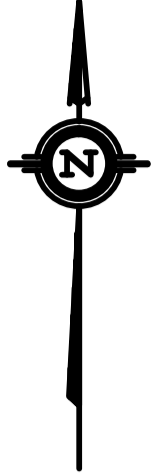
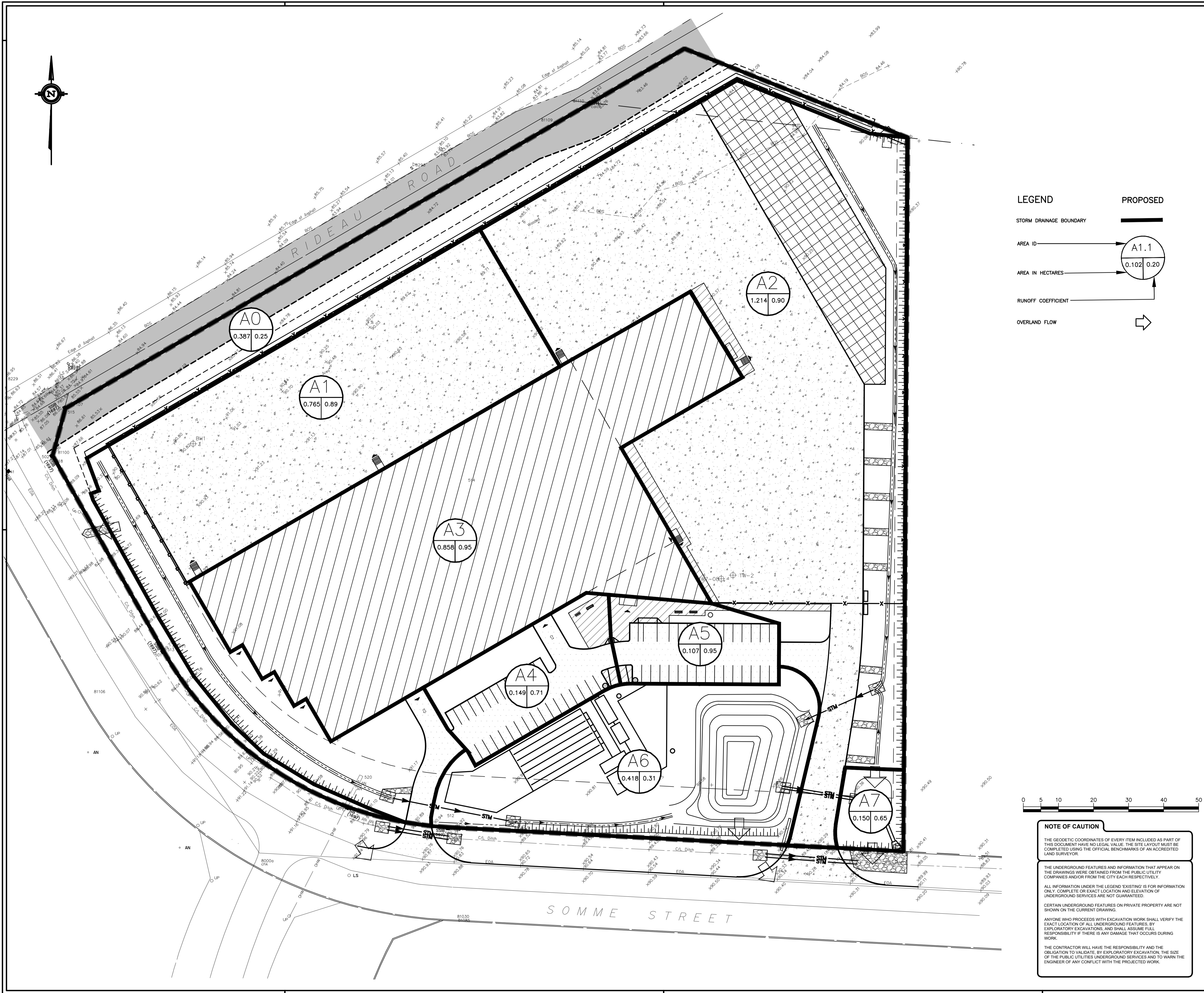
A001083

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G

Appendix G - Stormwater Management Plan





LEGEND

STORM DRAINAGE BOUNDARY

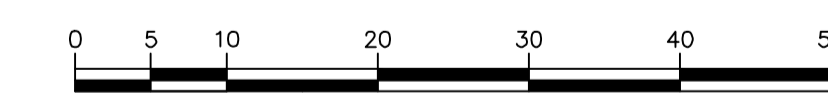
AREA ID

AREA IN HECTARES

RUNOFF COEFFICIENT

OVERLAND FLOW

PROPOSED



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.

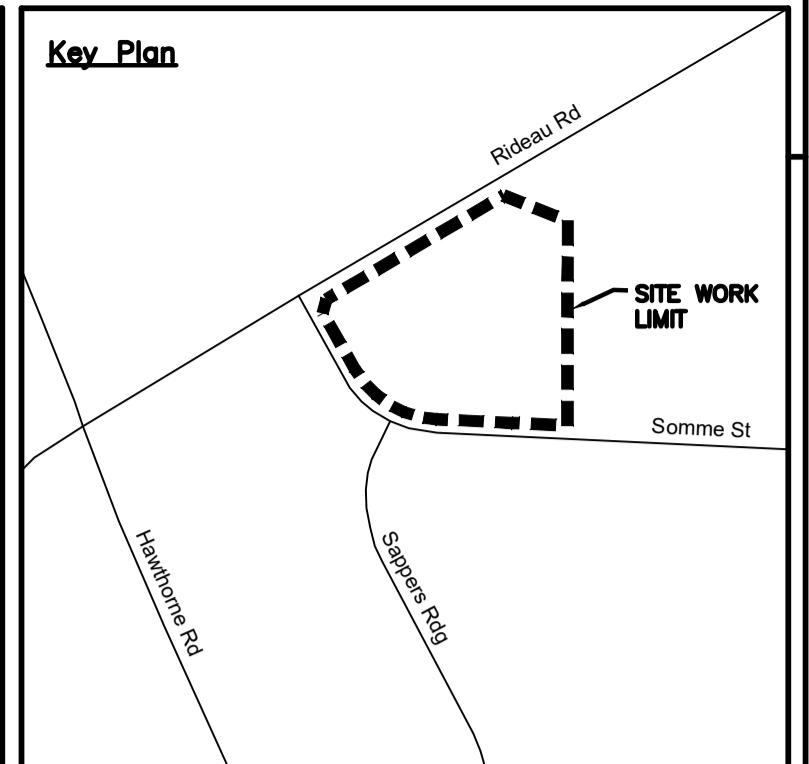
THE UNDERGROUND FEATURES AND INFORMATION THAT APPEAR ON THE DRAWINGS WERE OBTAINED FROM THE PUBLIC UTILITY COMPANIES AND/OR FROM THE CITY EACH RESPECTIVELY.

ALL INFORMATION UNDER THE LEGEND 'EXISTING' IS FOR INFORMATION ONLY. COMPLETE OR EXACT LOCATION AND ELEVATION OF UNDERGROUND SERVICES ARE NOT GUARANTEED.

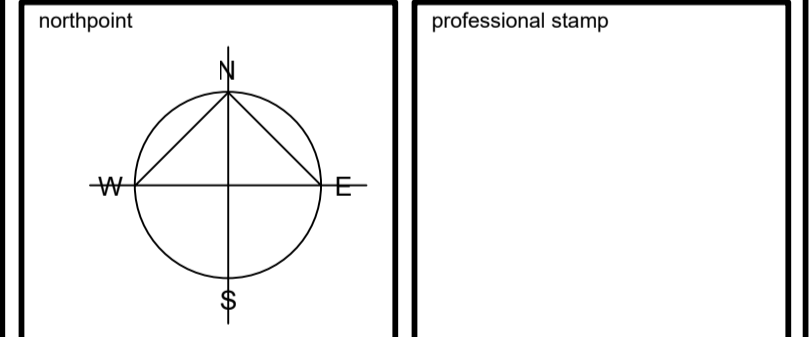
CERTAIN UNDERGROUND FEATURES ON PRIVATE PROPERTY ARE NOT SHOWN ON THE CURRENT DRAWING.

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.



no.	date	revision/issue	by
1	JULY 26, 2021	ISSUED FOR REVIEW	



project title

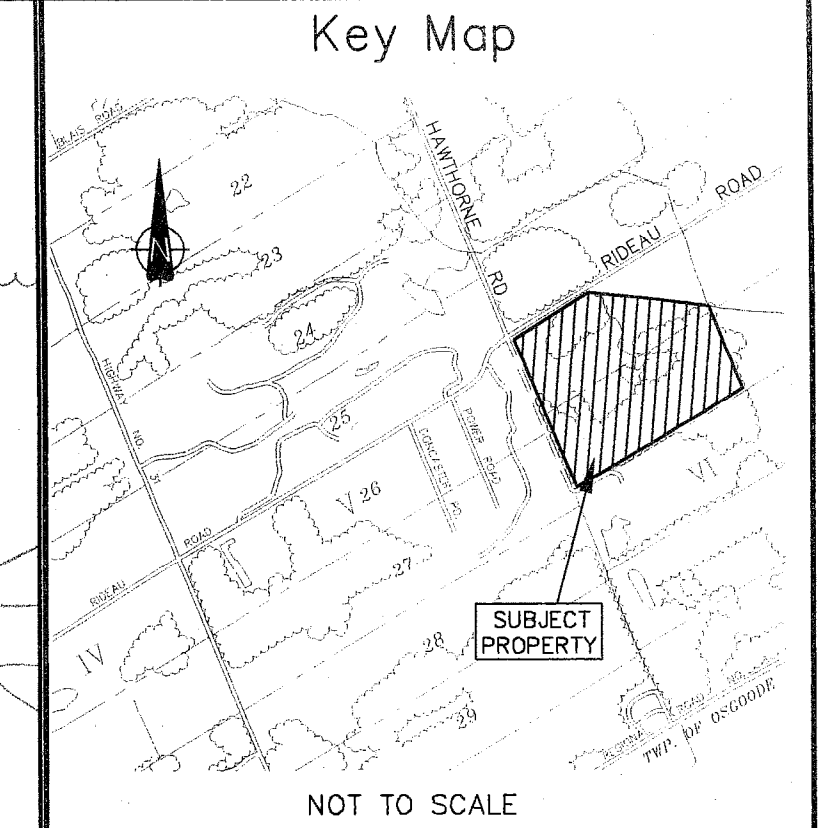
SOMME STREET, OTTAWA, ONTARIO FASTRATE FACILITY

drawing title

STORMWATER MANAGEMENT PLAN

date	MARCH 08, 2021	job no.	A001083
scale	1 : 500	drawing no.	SWM
drawn	D.CANN		
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



NOT TO SCALE

LEGEND

- DRAINAGE BOUNDARY
- (2.91 / 0.70) AREA IN HECTARES
- (10.14 / 132.0 / 283.0 / ORGAWORLD) DRAINAGE AREA (ha)
- (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

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SCALE: 1:2000

J.L. Richards & Associates Limited 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

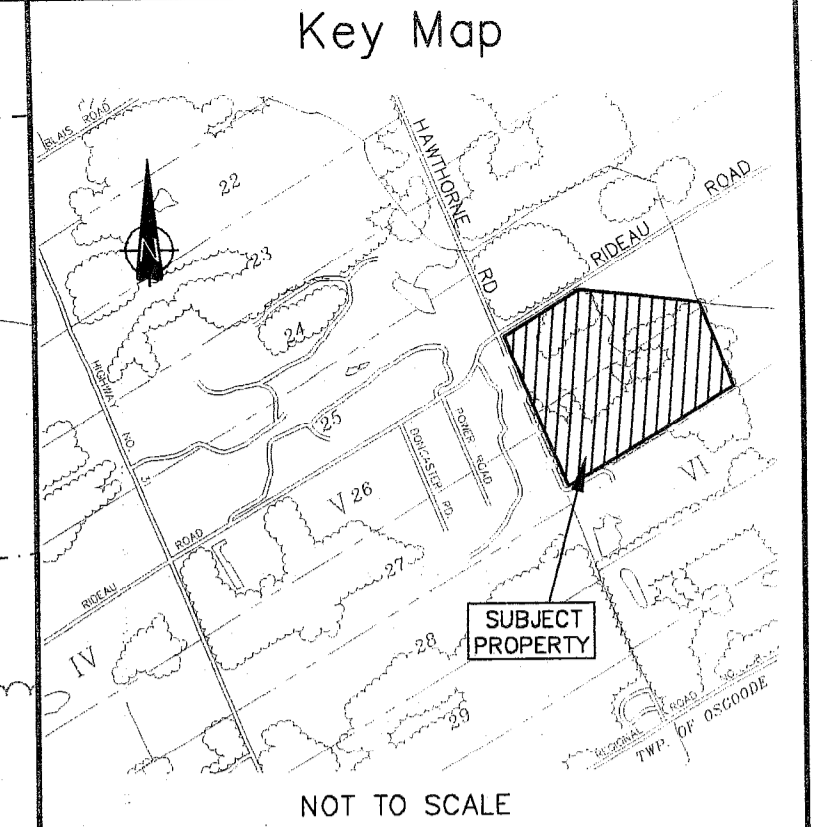
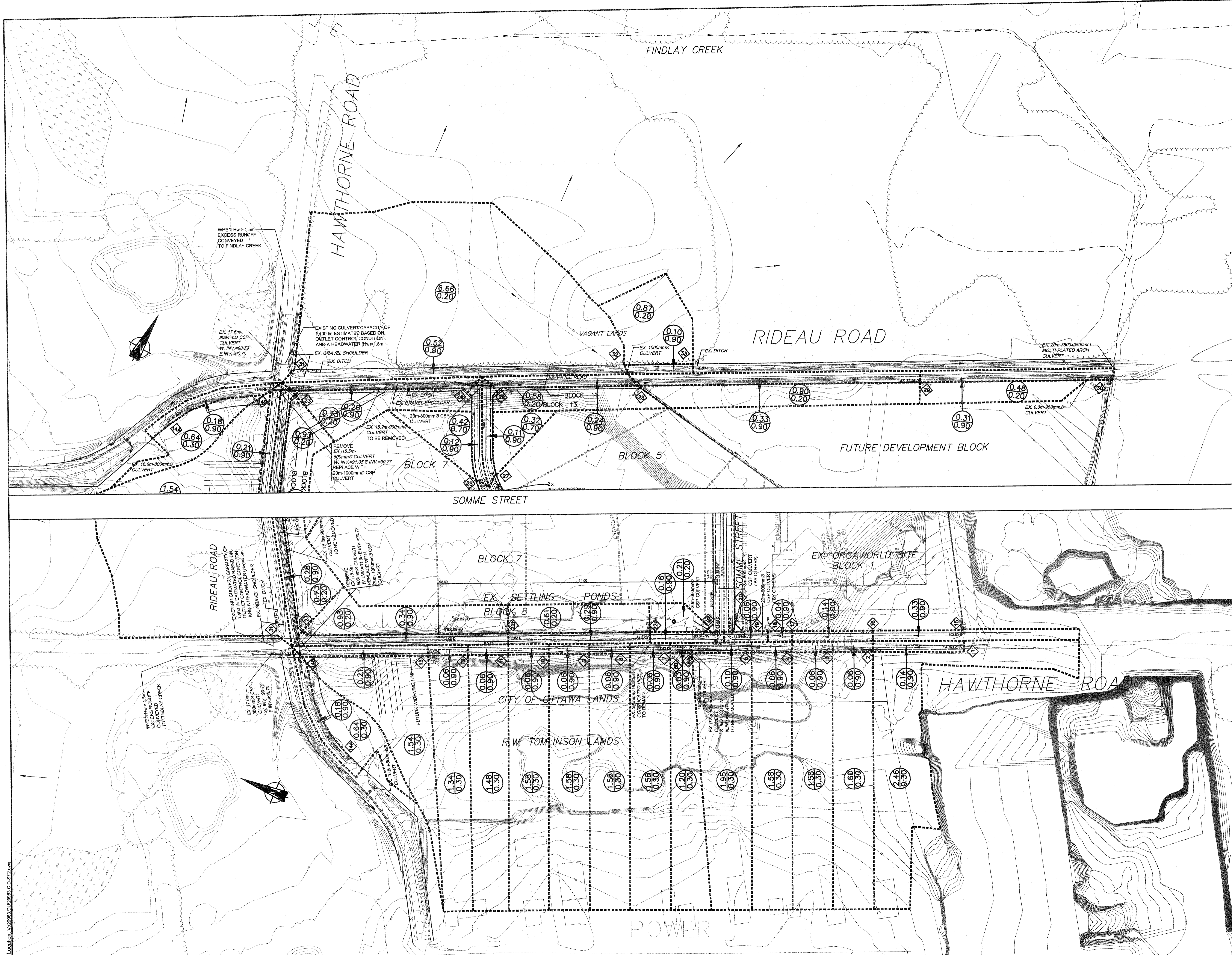
PROFESSIONAL STAMP 	PROJECT NORTH
------------------------	-------------------

PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
STORM DRAINAGE AREA PLAN

DESIGN: M.B.	DRAWING NO.: D-ST1
DRAWN: T.S.	JLR NO:
CHECKED: D.U.	20983
PLOTTED: May 28, 2009	

File Location: V:\2009\05\200905_C.D-ST1.dwg



LEGEND

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

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

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

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J.L. Richards & Associates Limited
 203-863 Princess Street
 Kingston, ON Canada
 K7L 5N4
 Tel: 613 544 1424
 Fax: 613 544 5679

J.L. Richards
 ENGINEERS ARCHITECTS-PLANNERS

PROFESSIONAL STAMP

 PROJECT NORTH

PROJECT:
HAWTHORNE INDUSTRIAL PARK

DRAWING:
STORM DRAINAGE AREA PLAN

DESIGN: M.B.	DRAWING NO.: D-ST2
DRAWN: T.S.	JLR NO:
CHECKED: D.U.	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)

Checked by: G. Forget, P.Eng.

1:10 year Ottawa International Airport IDF Curve

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		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	Inv	Inv
			0.70 (ha)	0.90 (ha)																								(min)	(m)	(m)
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	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	2	9		0.00	0.00	0.00	0.35	0.00	0.97	19.28	84.12	81.3					0.50				20.00	1	600	----	NO	YES	0.52	1.16	92.50	92.40
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	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	28	29A	3.46	0.32	3.78	2.71	5.15	7.53	14.33	24.77	71.65	1026.7	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	29A	29B	0.77	0.11	0.88	0.64	5.79	1.78	16.11	28.58	65.15	1049.5	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	29B	30	0.32	0.12	0.44	0.33	6.13	0.92	17.03	29.92	63.16	1075.8	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	30	22	0.75	0.16	0.91	0.67	6.80	1.86	18.89	31.25	61.31	1158.5	0.00	0.58	1.20	3.00	0.97	1402.6	9748.4	1.39	124.55							1.49	87.96	86.75
										32.74																				
CULVERT CROSSING	22	19		0.00	0.00	0.00	15.59	0.00	43.33	32.74	59.38	2573.1					0.50				20.00	2	----	1.03 X 0.74	YES	NO	1.30	0.08	86.85	86.75
										32.82																				
POND INLET	19	POND		0.00	0.00	0.00	35.97	0.00	100.06	38.67	52.87	5422.6	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	POND	DITCH	1:10 year controlled post development peak flow = 696 l/s, see SWMHYMO output of this Report										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 Capacities 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)

Checked by: G. Forget, P.Eng.

1:100 year Ottawa International Airport IDF Curve

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		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							
			0.70 (ha)	0.90 (ha)																											
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				0.73	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				0.54	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				0.53	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				0.70	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				0.97	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				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																												

Note: Conveyance Capacities 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

Checked by: G. Forget, P.Eng.

10 year Ottawa International Airport IDF Curve

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				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)	
			0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)																											
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		0.00	0.58	1.50	3.00	1.93	1974.3	24880.1	1.96	400.00							3.41	90.71	83.01	
												23.41																					
EXISTING CULVERT CROSSING	32	28				0.00	0.00	0.00	2.06	0.00	5.74	23.41	87.93						-0.15				20.00	1	1000						0.14	83.01	83.04
SOUTH CATCHMENT AREA																																	
SOUTH SIDE RIDEAU ROAD	28	29	0.90			0.33	1.23	0.48	13.16	1.33	36.58	37.84	53.68	3363.5	0.00	1.17	2.20	3.00	0.14	3437.1	18513.7	0.84	347.24							6.91	83.04	82.56	
SOUTH SIDE RIDEAU ROAD	29	30	0.48			0.31	0.79	0.38	13.53	1.04	37.62	44.76	47.64	3192.1	0.00	0.90	2.20	3.00	0.51	3287.0	35640.2	1.35	236.20							2.91	82.56	81.35	

Note: Conveyance Capacities 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

Checked by: G. Forget, P.Eng.

1:100 year Ottawa International Airport IDF Curve

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				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											
			0.20 (ha)	0.30 (ha)	0.70 (ha)	0.90 (ha)																																		
NORTH CATCHMENT AREA																																								
Existing 900 mm dia. Culvert Capacity before ditch flows to Findlay Creek																																								
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																					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																							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				0.14	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				0.51	35640.2	2.45	236.20																	1.60	82.56	81.35

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

HAWTHORNE INDUSTRIAL PARK

1:10 YEAR ROADSIDE CULVERT DESIGN

CONVENTIONAL CULVERT DESIGN

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

Station	DESIGN DATA							CULVERT DATA					INLET CONTROL			OUTLET CONTROL					GOVERNING HW	VEL V _o				
	Q (m ³ /s)	d (m)	d _o (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)
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	
<p>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</p> <p>8 Culvert Slope 10a/b D (circular) or B x H (arch) 11 Number of Barrels 13 Area per barrel 14 For box only</p> <p>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)</p> <p>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</p> <p>26 Outlet velocity if required (Subsection 3.2.3)</p>																										

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 (m ²)	Runoff Coefficient	Hard Surface Area (m ²)	Runoff Coefficient	Total Area (m ²)	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
 PEO No.: 100530467

Date: 2021-07-20

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: 2021-07-20



PROJECT NAME: Fastrate Warehouse Development
 Industrial/Commercial Development
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastrate
PROJECT STATUS: Detailed Design

STORM POST-DEVELOPMENT FLOW (UNCONTROLLED)
Proposed Stormwater Management

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

PRE-DEVELOPMENT FLOW DETERMINATION:

DESIGN CRITERIA:

Design Storm (year):	10	
IDF Regression Constants: (a)	1174.184	
(b)	6.014	
(c)	0.816	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	$Q = 2.78C \cdot I \cdot A$	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:

- 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.
- IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)

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):	10	
IDF Regression Constants: (a)	1174.184	
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IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	$Q = 2.78C \cdot I \cdot A$	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)

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STORM POST-DEVELOPMENT FLOW (UNCONTROLLED)
Proposed Stormwater Management

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

PRE-DEVELOPMENT FLOW DETERMINATION:

DESIGN CRITERIA:

Design Storm (year):	100	
IDF Regression Constants: (a)	1735.688	
(b)	6.014	
(c)	0.820	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	$Q = 2.78C \cdot I \cdot A$	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.

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Date: July 20, 2021

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 PEO No.: 100067842

Date: July 20, 2021



PROJECT NAME: Fastrate Warehouse Development
 Industrial/Commercial Development
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastrate
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

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(c)	0.820	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	$Q = 2.78C \cdot I \cdot A$	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
 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)	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):	$Q = 2.78C \cdot I \cdot A$	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: Residual Release Rate:	18.072 133.695

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., EIT
 PEO No.: 100530467

Date: July 21, 2021

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 21, 2021



Date: 2021-08-06

**Fastrate 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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<p>Legend:</p> <p>NC = Non-controlled areas (no storage available)</p> <p>Capacity Area = Area of water accumulated in sub-area at Max. Elev.</p> <p>Catchbasin Elev. = Elevation of catchbasin inlet (top of grate).</p> <p>Max. Elev. = Maximum elevation of water that may be accumulated within sub-area.</p> <p>Y_{max} = Maximum depth of water that may be accumulated within the sub-area.</p> <p>V_{max} = Maximum volume of water (capacity) that may be accumulated within the sub-area.</p> <p>V_{rain} = Volume of water generated by rainfall.</p> <p>Difference = Difference between V_{max} and V_{rain} (remaining capacity of sub-area)</p> <p>V_{acc} = Total volume of water accumulated within the sub-area in the event of a specific rainfall.</p> <p>Y_{rain} = Depth of water generated by rainfall.</p> <p>Elev$_{rain}$ = Elevation of water generated by rainfall.</p> <p>A_{rain} = Area of water generated by rainfall.</p> <p>Q_{ave} = Average flow (for drawdown time calculation).</p> <p>Drawdown Time = Time required for the total volume of water accumulated within sub-area to evacuate (following rainfall event).</p>	<p>Design Criteria:</p> <p>1) Maximum Allowable Release Rate = 247.78 L/s/ha</p> <p>2) Pipe size for 10 years</p> <p>3) Rainfall event of 100 years</p> <p>4) Pre-development flow (5 year) = _____ L/s (or _____ L/s/ha)</p>
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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

STORM WATER MANAGEMENT - AVERAGE FLOW CALCULATION FOR DRAWDOWN TIME

Date:

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
 PEO No.: 100530467

Date: July 22, 2021

Vérifié par: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 22, 2021

2021-08-06



STORAGE VOLUME CALCULATIONS

Project: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station: OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:36

File: \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastrate Warehouse Development\300\360_Civil\01-SWM\210719_Storm Water Management - Storage and Drawdown_full
Location: [Redacted]

Description: Storage volume calculations with the rational method

Specified Release Rate: 241.9344526 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 : 0.184983082 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
 PEO No.: 100530467

Date: July 22, 2021

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

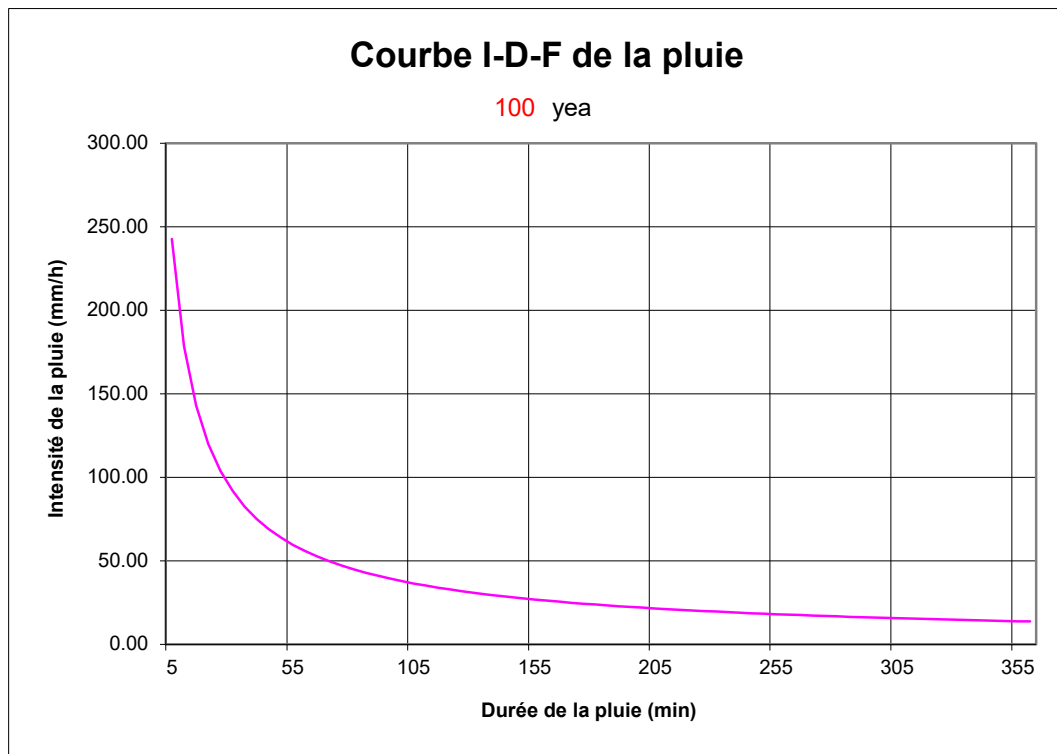
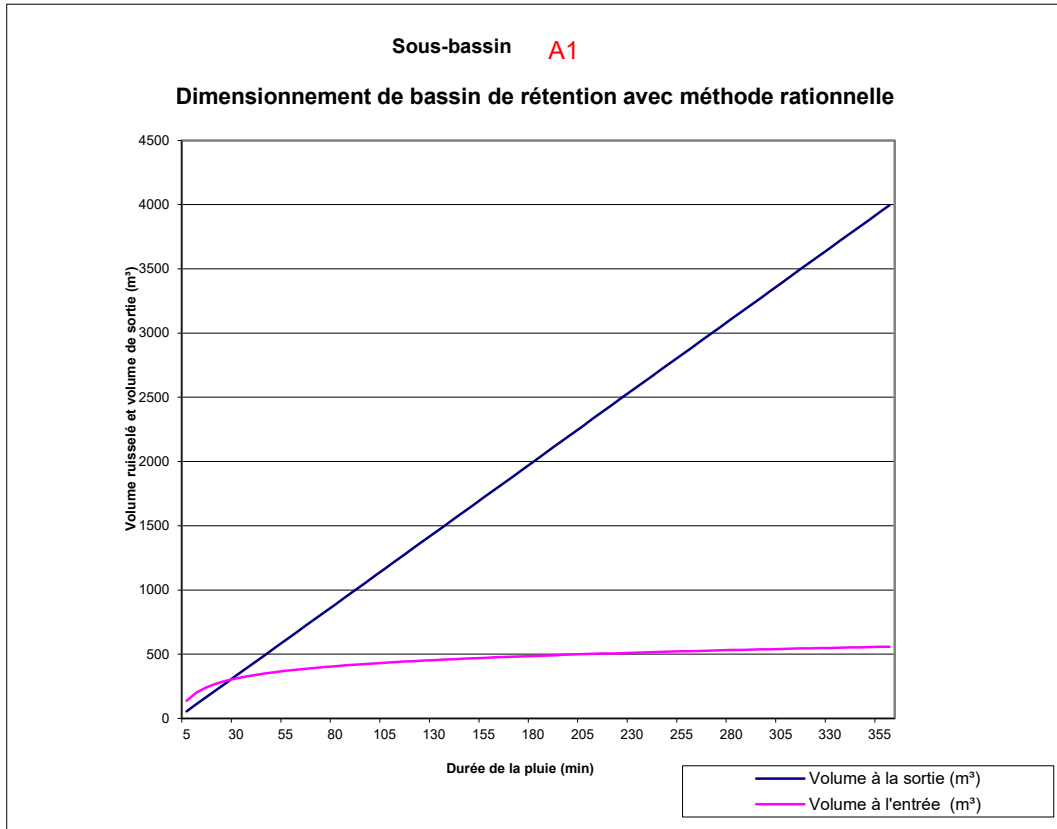
Date: July 22, 2021

Init. _____

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>C/AT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) <i>(4)-(5)</i> (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

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

Fastrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:36

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Location: 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 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
 PEO No.: 100530467

Date: July 22, 2021

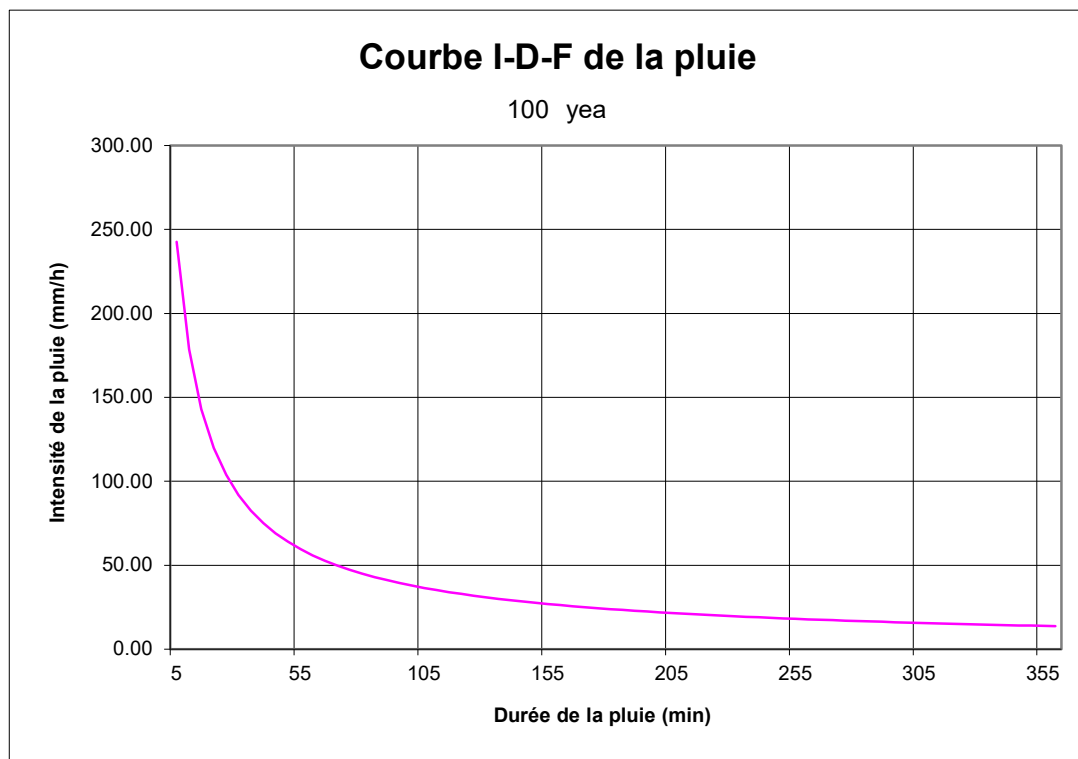
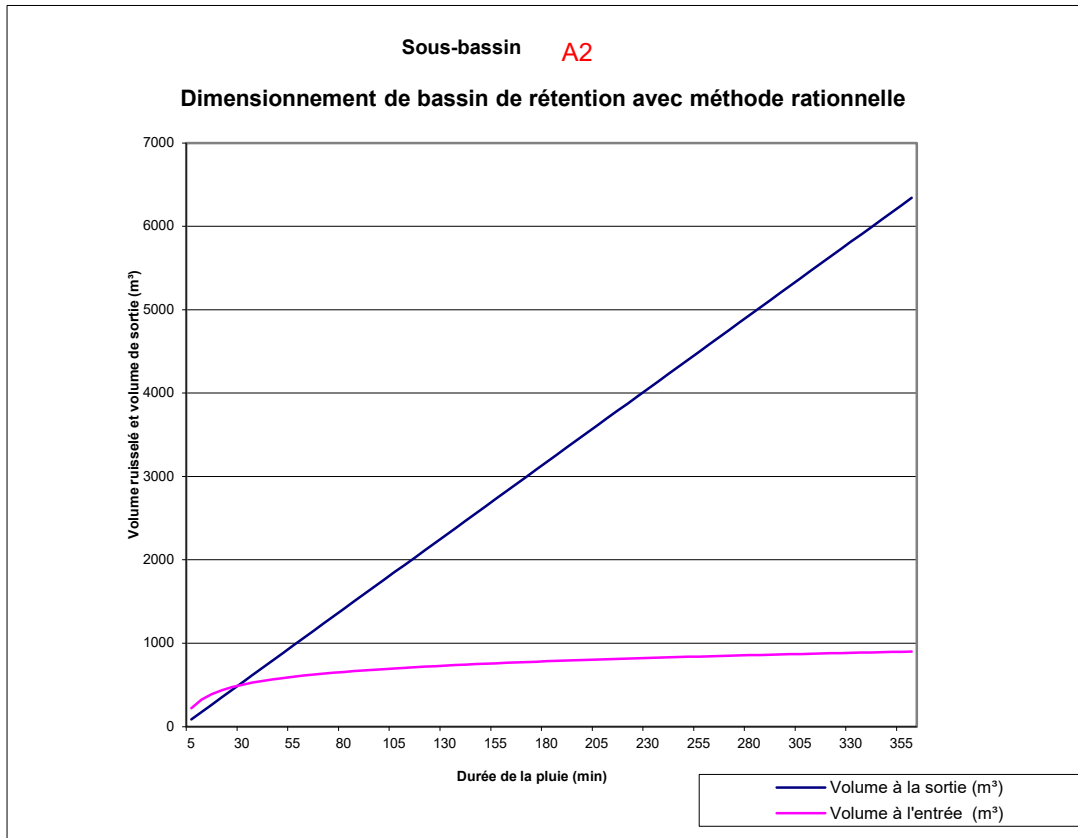
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 22, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) <i>(4)-(5)</i> (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: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:36

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Location: 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 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
 PEO No.: 100530467

Date: July 22, 2021

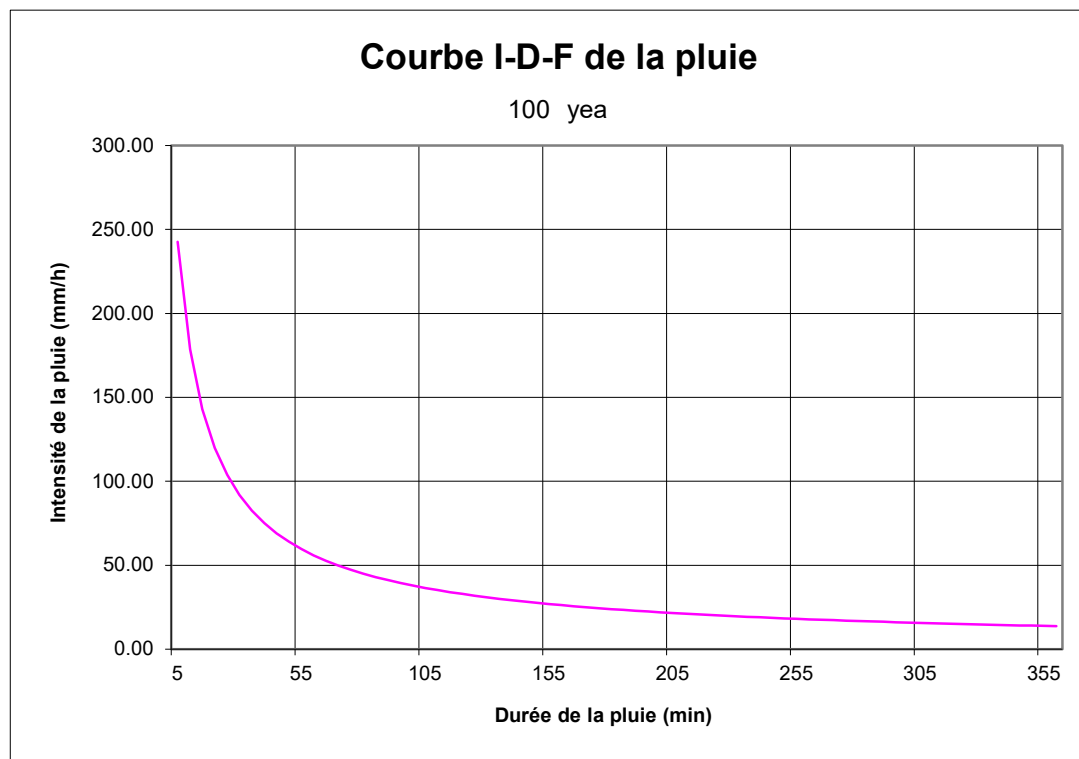
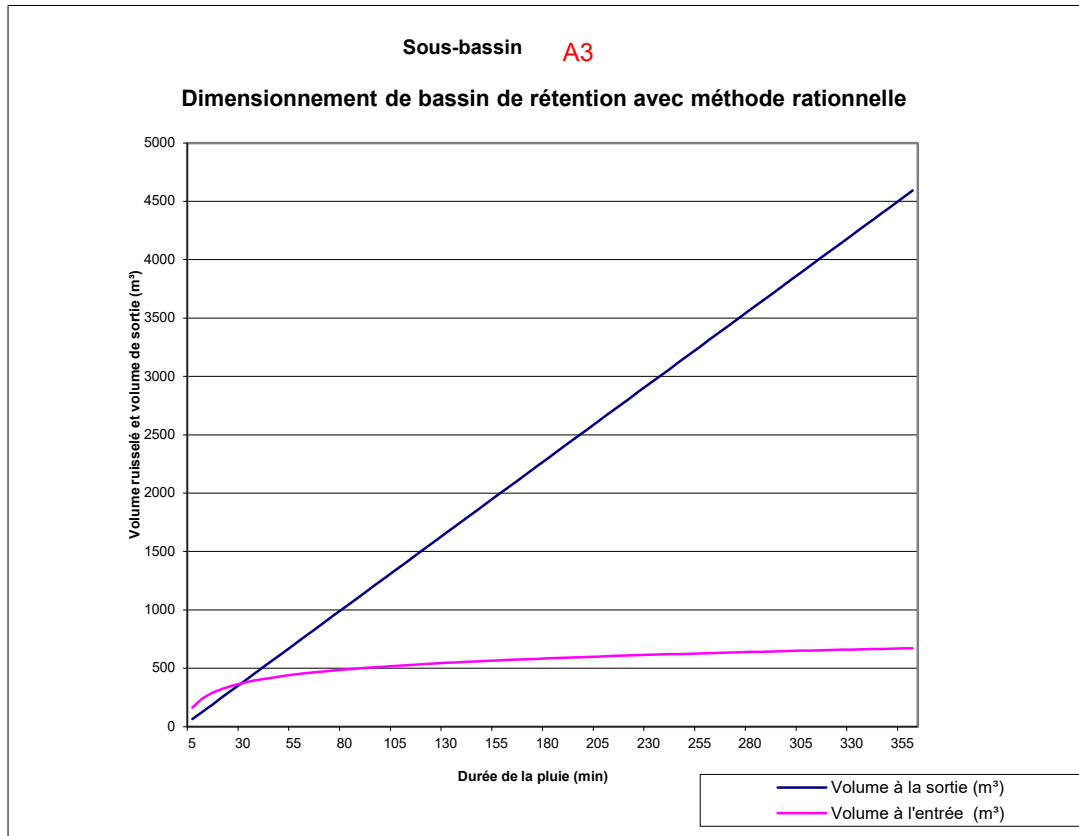
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 22, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (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 \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse
Location: 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 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
 PEO No.: 100530467

Date: July 22, 2021

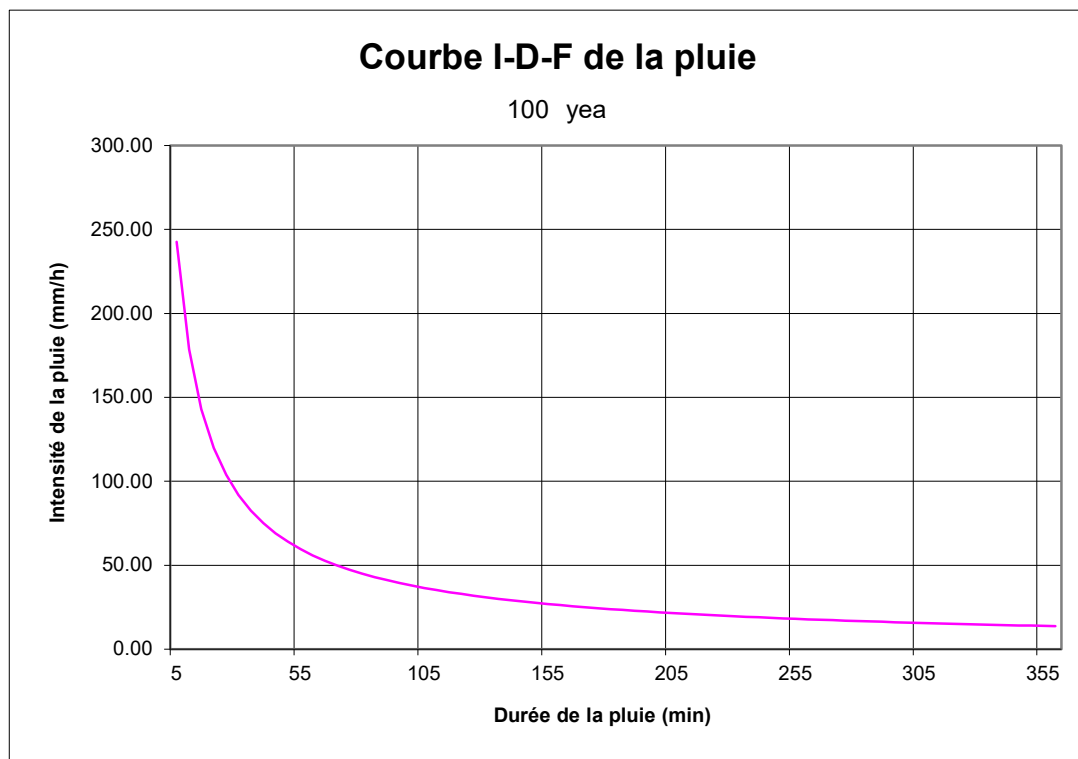
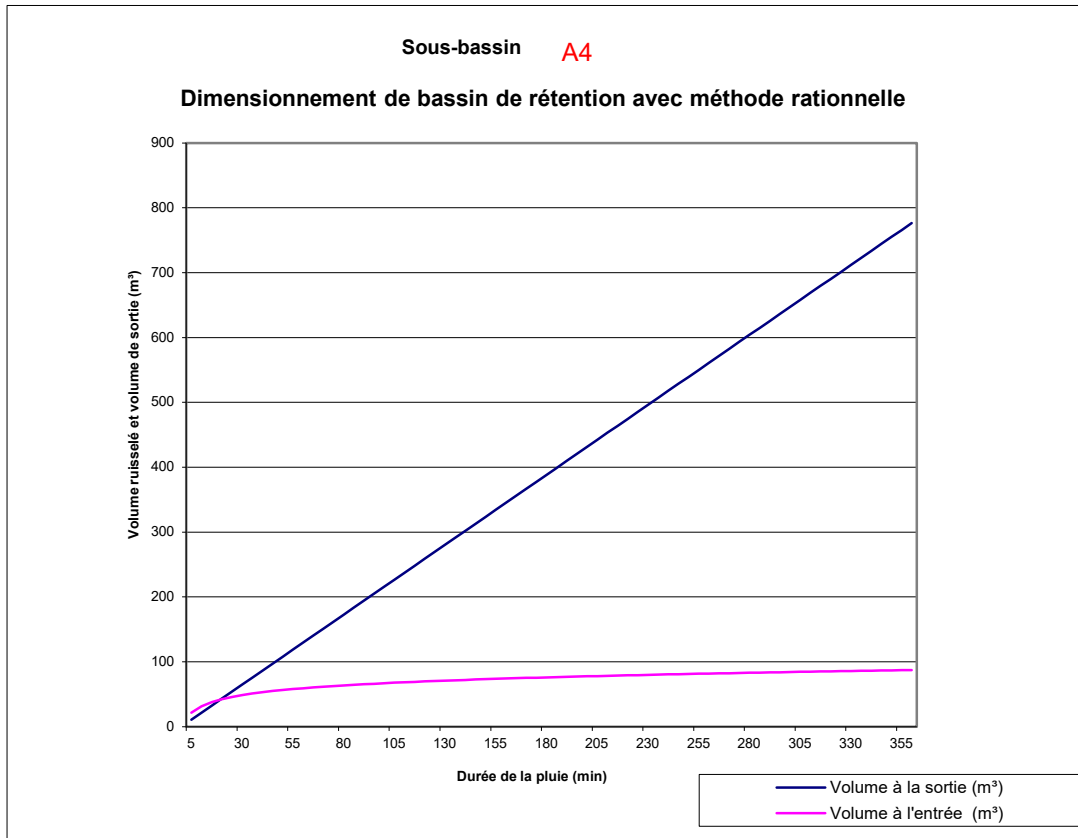
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 22, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) <i>(4)-(5)</i> (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 \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse
Location: 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
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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
 PEO No.: 100530467

Date: July 22, 2021

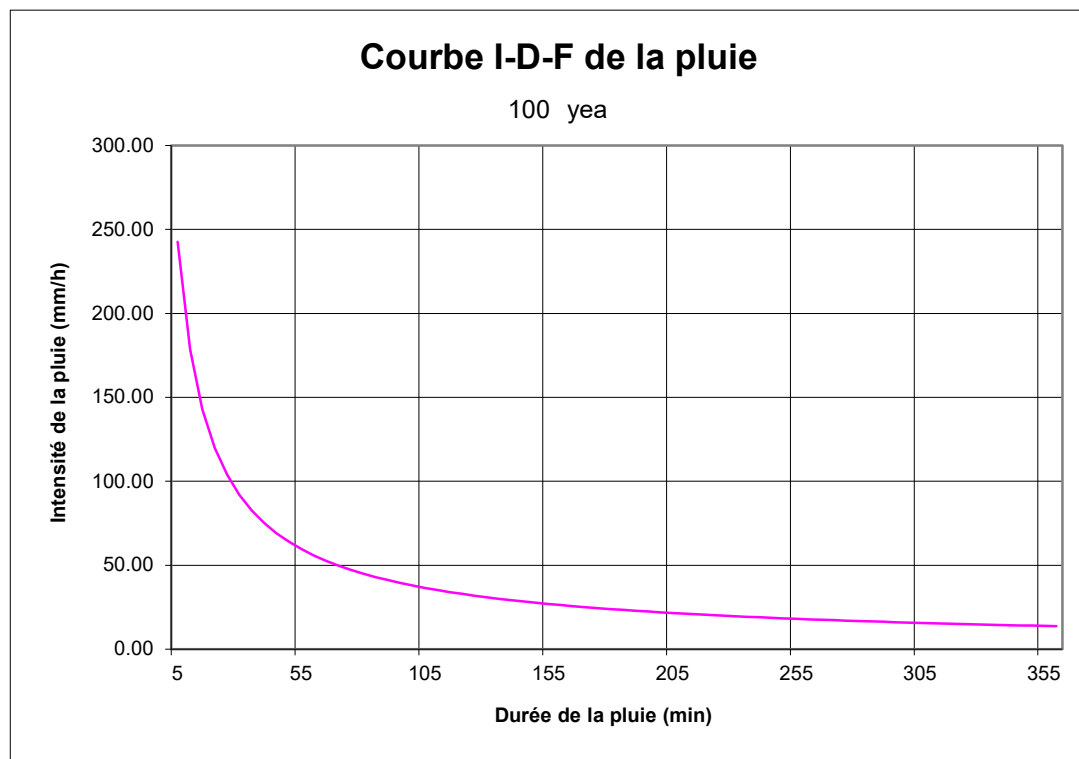
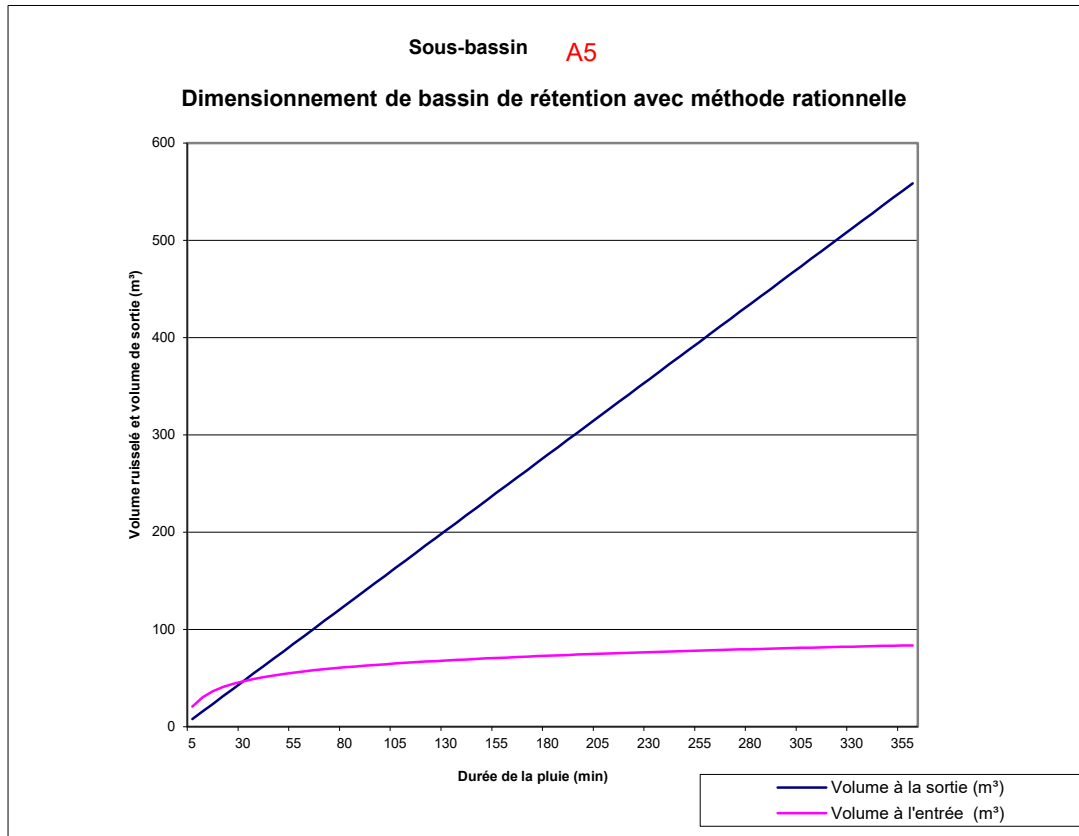
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 22, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (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: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:36

File \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastrate Warehouse
Location: 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 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
 PEO No.: 100530467

Date: July 22, 2021

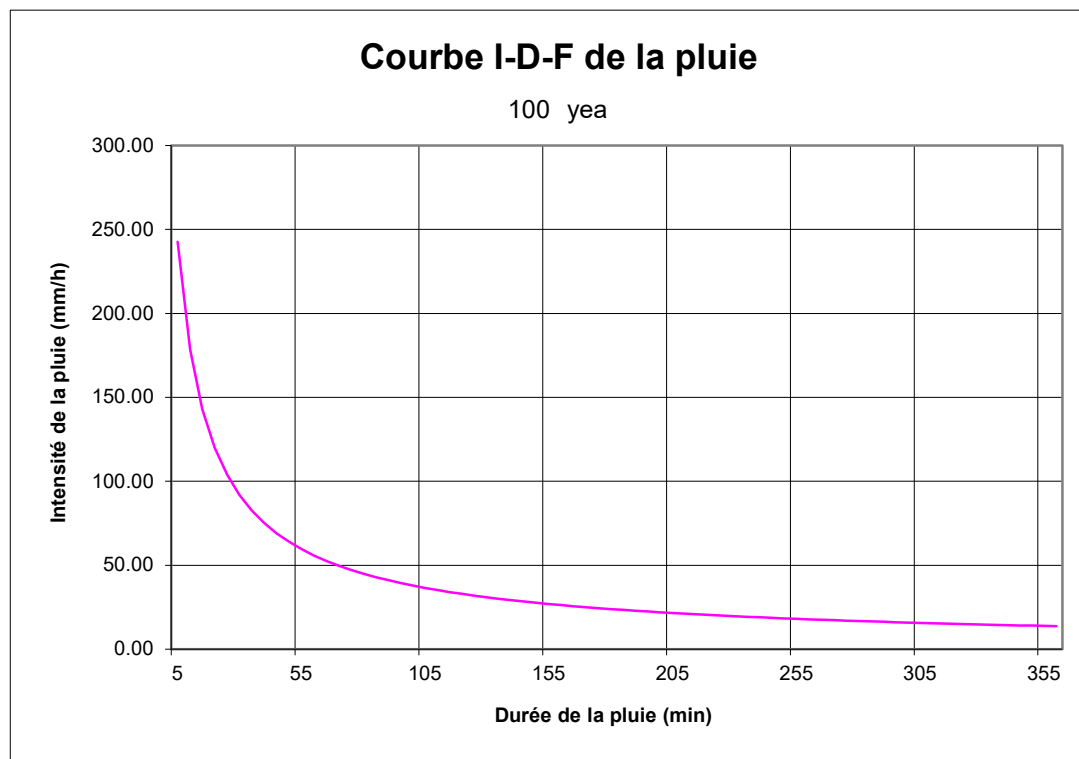
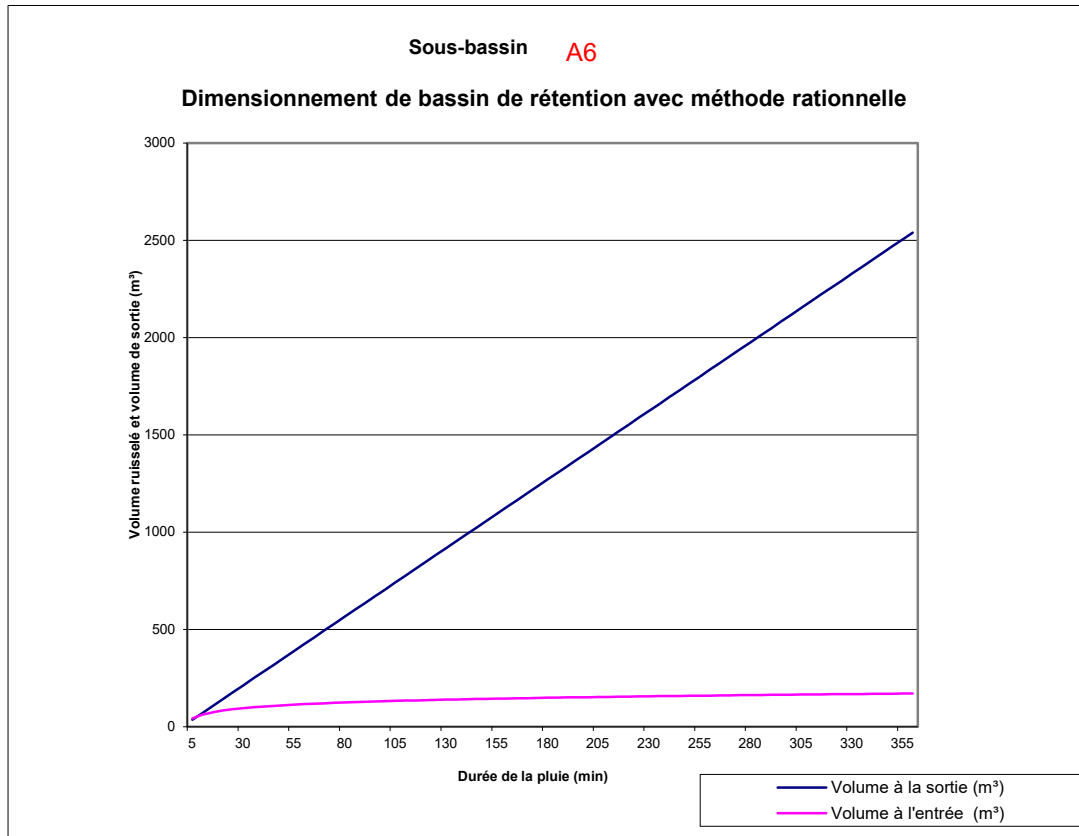
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 22, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (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: \\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
Location:

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 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
 PEO No.: 100530467

Date: July 22, 2021

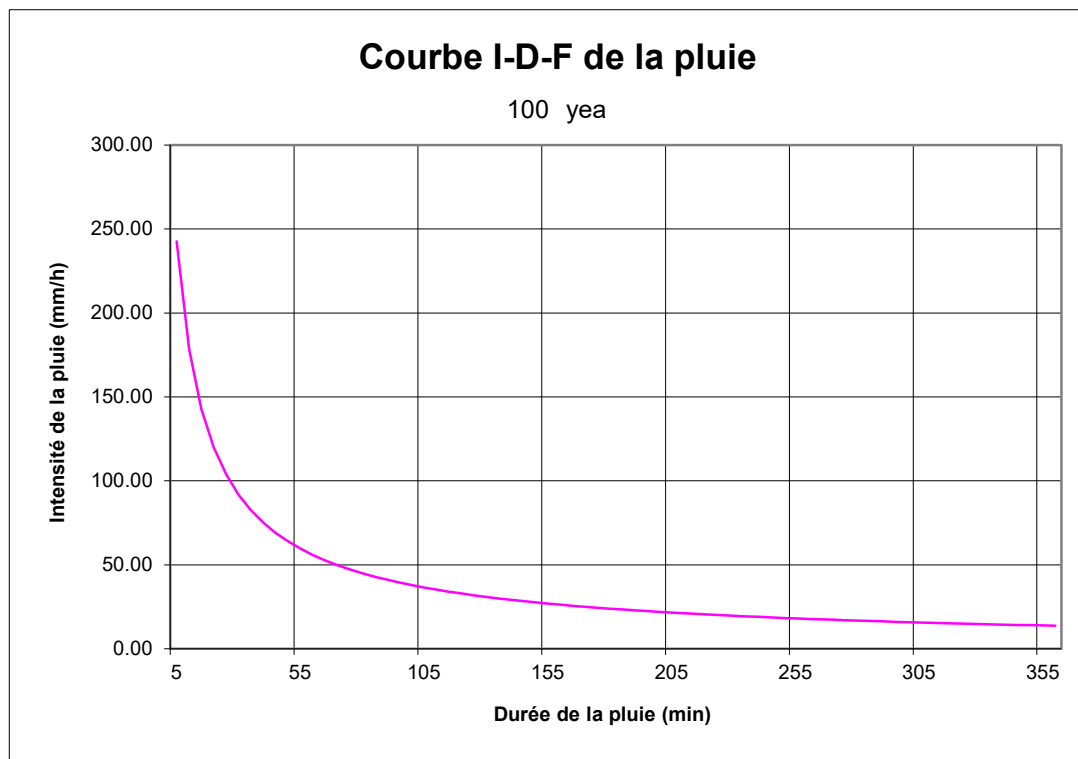
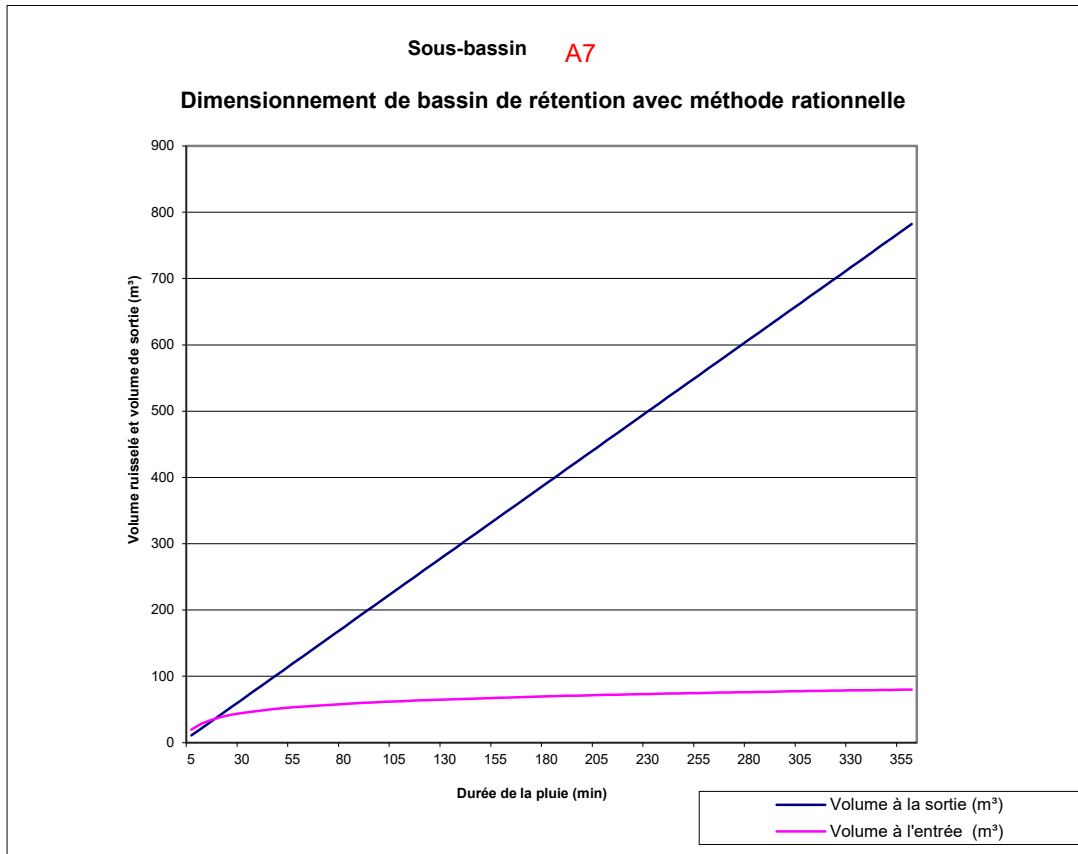
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 22, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) (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





**Fastfrate Warehouse Development
Industrial/Commercial Development
A001083 (360)**

Date: 2021-08-06

STORM WATER MANAGEMENT - SUMMARY - HALF RELEASE RATE

Rainfall event		100 years													
Sub-Area	Total Area (m ²)	Capacity Area (m ²)	Catchbasin Elev. (m)	Max. Elev. (m)	Y _{max} (m)	V _{max} (m ³)	V _{rain} (m ³)	Difference (m ³)	V _{acc} (m ³)	Y _{rain} (m)	Elev _{rain} (m)	A _{rain} (m ²)	Q _{ave} (L/s)	Drawdown Time (min)	Comments
A1	7646	2294	10.000	10.001	0.001	0.76	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_{acc} and V_{rain} (remaining capacity of sub-area)
- V_{acc} = Total volume of water accumulated within the sub-area in the event of a specific rainfall.
- Y_{rain} = Depth of water generated by rainfall.
- Elev_{rain} = Elevation of water generated by rainfall.
- A_{rain} = Area of water generated by rainfall.
- Q_{ave} = Average flow (for drawdown time calculation).
- Drawdown Time = Time required for the total volume of water accumulated within sub-area to evacuate (following rainfall event).

- Design Criteria:**
- 1) Maximum Allowable Release Rate = 124.04 L/s/ha
 - 2) Pipe size for 40 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
PEO No.: 100530467

Verified by: Christian Lavoie-Lebel, P. Eng.
PEO No.: 100067842

Date: July 23, 2021

Date: July 23, 2021

Date:

STORM WATER MANAGEMENT - AVERAGE FLOW CALCULATION FOR DRAWDOWN TIME

Catchment ID	Release Rate	Specified Flow rate	Calculated area (mm ²)
	L/s/ha	L/s	
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**
PEO No.: 100530467

Date: July 23, 2021

Vérfié par: **Christian Lavoie** | Pipe size for 10 years
PEO No.: 100067842

Date: July 23, 2021



STORAGE VOLUME CALCULATIONS

Project: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station: OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:33

File: \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastrate Warehouse
Location: 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 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
 PEO No.: 100530467

Date: July 23, 2021

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

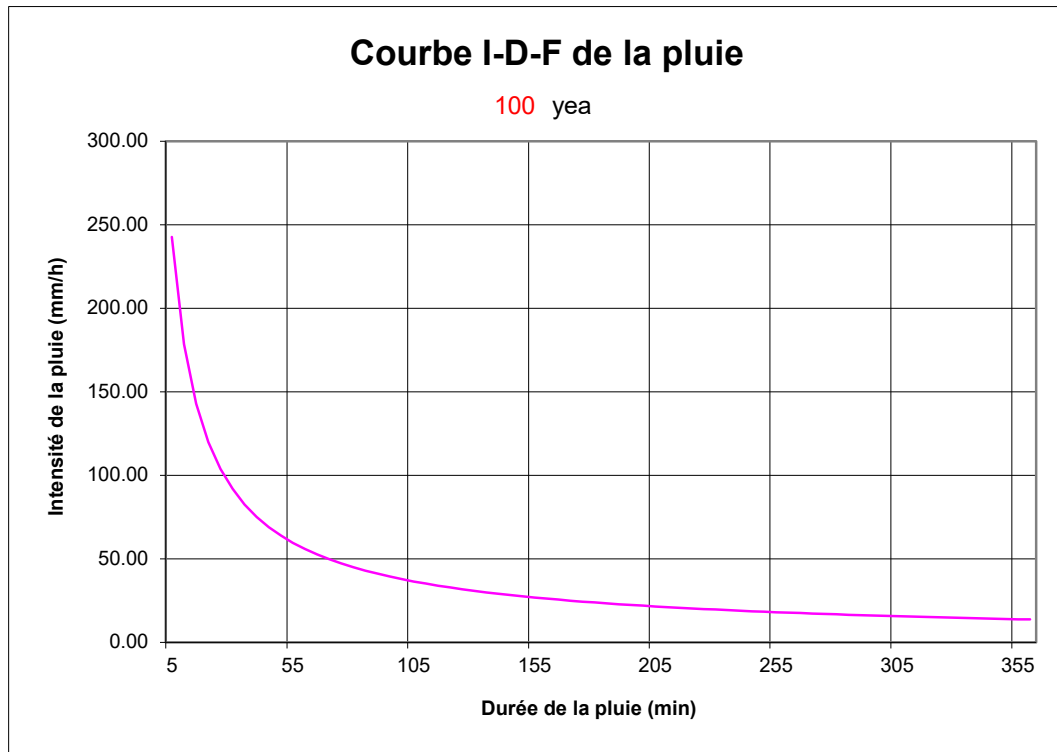
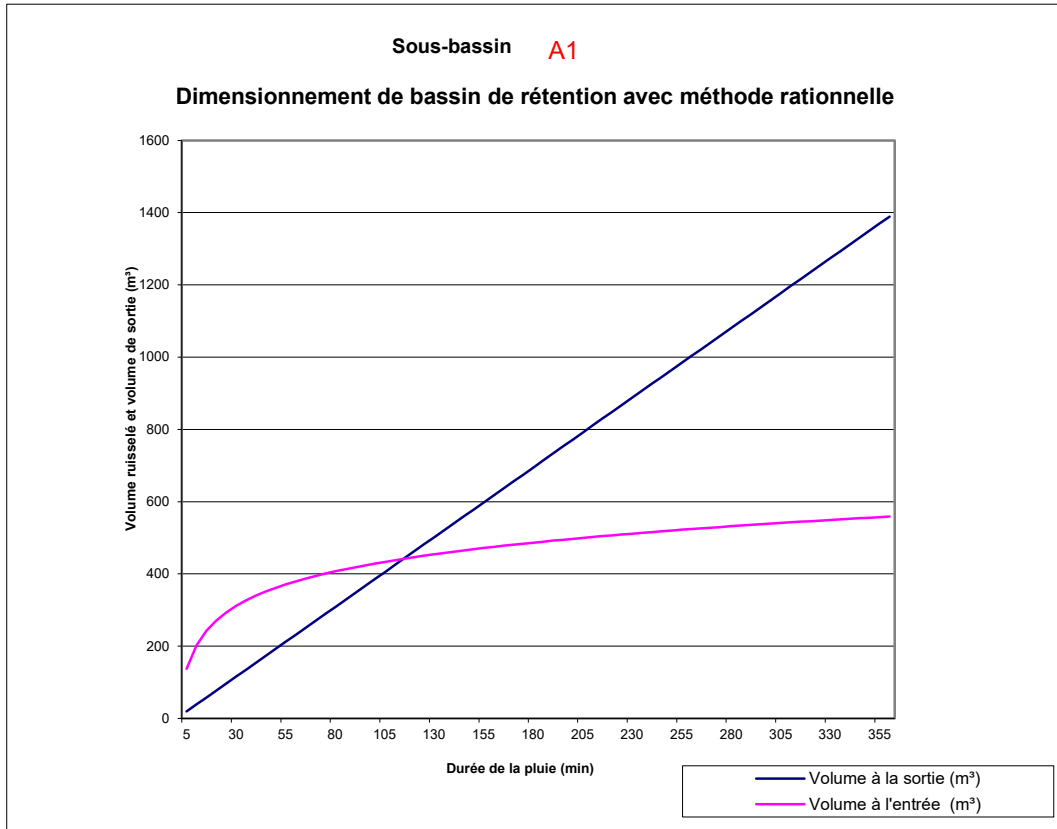
Date: July 23, 2021

Init. _____

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>C/IAT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) <i>(4)-(5)</i> (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

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:33

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Location: 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 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
 PEO No.: 100530467

Date: July 23, 2021

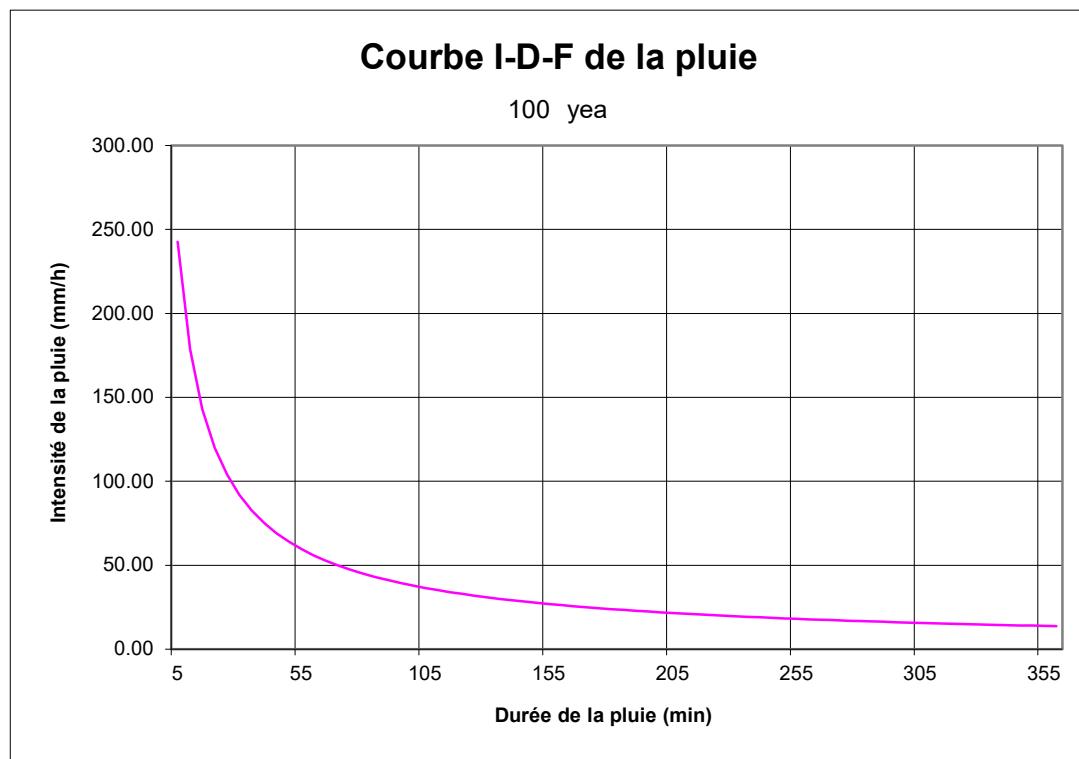
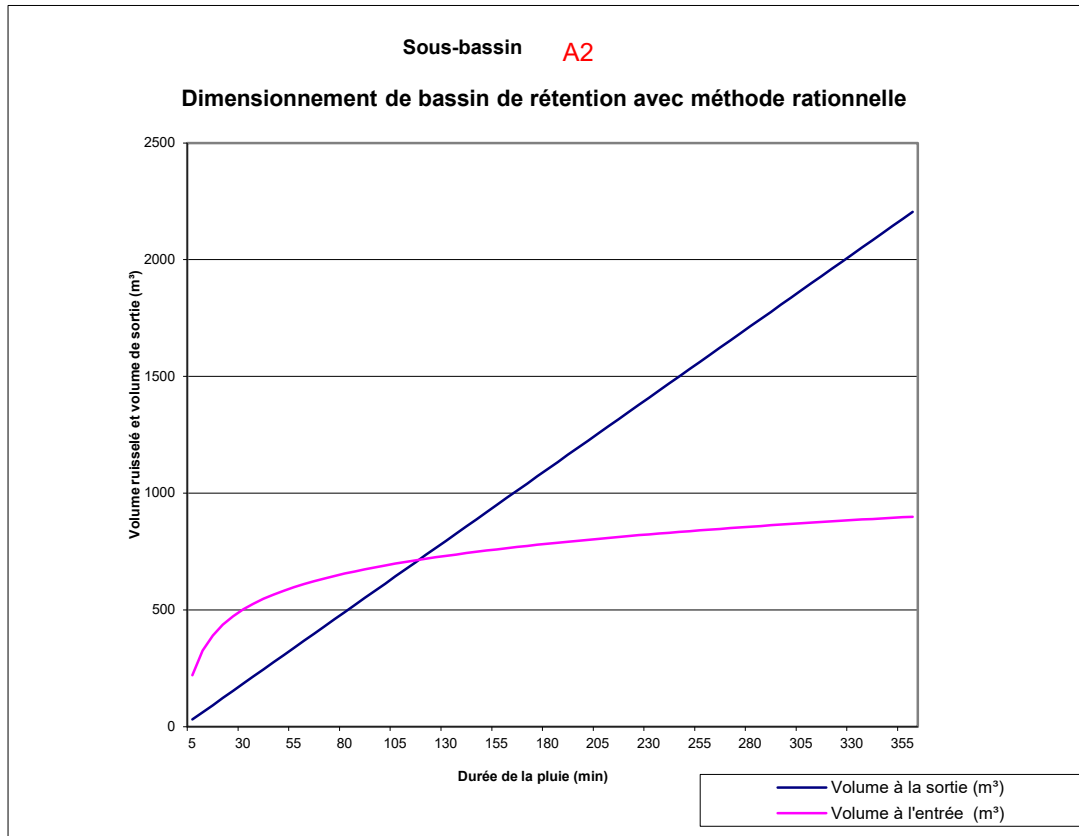
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 23, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) (4)-(5) (6)
5.0	242.70	220.95	30.6269334	190.32
10.0	178.56	325.10	61.2538667	263.85
15.0	142.89	390.25	91.8808001	298.37
20.0	119.95	436.79	122.507733	314.28
25.0	103.85	472.69	153.134667	319.55
30.0	91.87	501.79	183.7616	318.03
35.0	82.58	526.23	214.388533	311.84
40.0	75.15	547.27	245.015467	302.25
45.0	69.05	565.74	275.6424	290.10
50.0	63.95	582.21	306.269334	275.94
55.0	59.62	597.06	336.896267	260.17
60.0	55.89	610.60	367.5232	243.08
65.0	52.65	623.05	398.150134	224.90
70.0	49.79	634.56	428.777067	205.79
75.0	47.26	645.29	459.404	185.88
80.0	44.99	655.32	490.030934	165.29
85.0	42.95	664.75	520.657867	144.10
90.0	41.11	673.66	551.2848	122.37
95.0	39.43	682.09	581.911734	100.18
100.0	37.90	690.10	612.538667	77.56
105.0	36.50	697.73	643.1656	54.57
110.0	35.20	705.02	673.792534	31.23
115.0	34.01	712.00	704.419467	7.58
120.0	32.89	718.70	735.046401	-16.35
125.0	31.86	725.14	765.673334	-40.54
130.0	30.90	731.33	796.300267	-64.97
135.0	30.00	737.31	826.927201	-89.62
140.0	29.15	743.08	857.554134	-114.48
145.0	28.36	748.66	888.181067	-139.52
150.0	27.61	754.06	918.808001	-164.75
155.0	26.91	759.30	949.434934	-190.13
160.0	26.24	764.38	980.061867	-215.68
165.0	25.61	769.32	1010.6888	-241.37
170.0	25.01	774.12	1041.31573	-267.19
175.0	24.44	778.80	1071.94267	-293.15
180.0	23.90	783.35	1102.5696	-319.22
185.0	23.39	787.79	1133.19653	-345.41
190.0	22.90	792.12	1163.82347	-371.71
195.0	22.43	796.34	1194.4504	-398.11
200.0	21.98	800.47	1225.07733	-424.61
205.0	21.55	804.50	1255.70427	-451.20
210.0	21.14	808.45	1286.3312	-477.88
215.0	20.75	812.31	1316.95813	-504.64
220.0	20.37	816.10	1347.58507	-531.49
225.0	20.01	819.80	1378.212	-558.41
230.0	19.66	823.43	1408.83893	-585.40
235.0	19.33	827.00	1439.46587	-612.47
240.0	19.01	830.49	1470.0928	-639.60

245.0	18.69	833.92	1500.71973	-666.80
250.0	18.39	837.29	1531.34667	-694.06
255.0	18.11	840.59	1561.9736	-721.38
260.0	17.83	843.84	1592.60053	-748.76
265.0	17.56	847.04	1623.22747	-776.19
270.0	17.29	850.18	1653.8544	-803.68
275.0	17.04	853.27	1684.48133	-831.21
280.0	16.80	856.31	1715.10827	-858.80
285.0	16.56	859.30	1745.7352	-886.43
290.0	16.33	862.25	1776.36213	-914.11
295.0	16.11	865.15	1806.98907	-941.84
300.0	15.89	868.01	1837.616	-969.61
305.0	15.68	870.82	1868.24293	-997.42
310.0	15.48	873.60	1898.86987	-1025.27
315.0	15.28	876.34	1929.4968	-1053.16
320.0	15.09	879.04	1960.12373	-1081.09
325.0	14.90	881.70	1990.75067	-1109.05
330.0	14.72	884.32	2021.3776	-1137.05
335.0	14.54	886.91	2052.00453	-1165.09
340.0	14.37	889.47	2082.63147	-1193.16
345.0	14.20	892.00	2113.2584	-1221.26
350.0	14.04	894.49	2143.88533	-1249.40
355.0	13.88	896.95	2174.51227	-1277.56
360.0	13.72	899.38	2205.1392	-1305.76
Max Volume (V max):				319.55
Design Volume (V design) :				319.55

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:33

File \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastrate Warehouse
Location: 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
 PEO No.: 100530467

Date: July 23, 2021

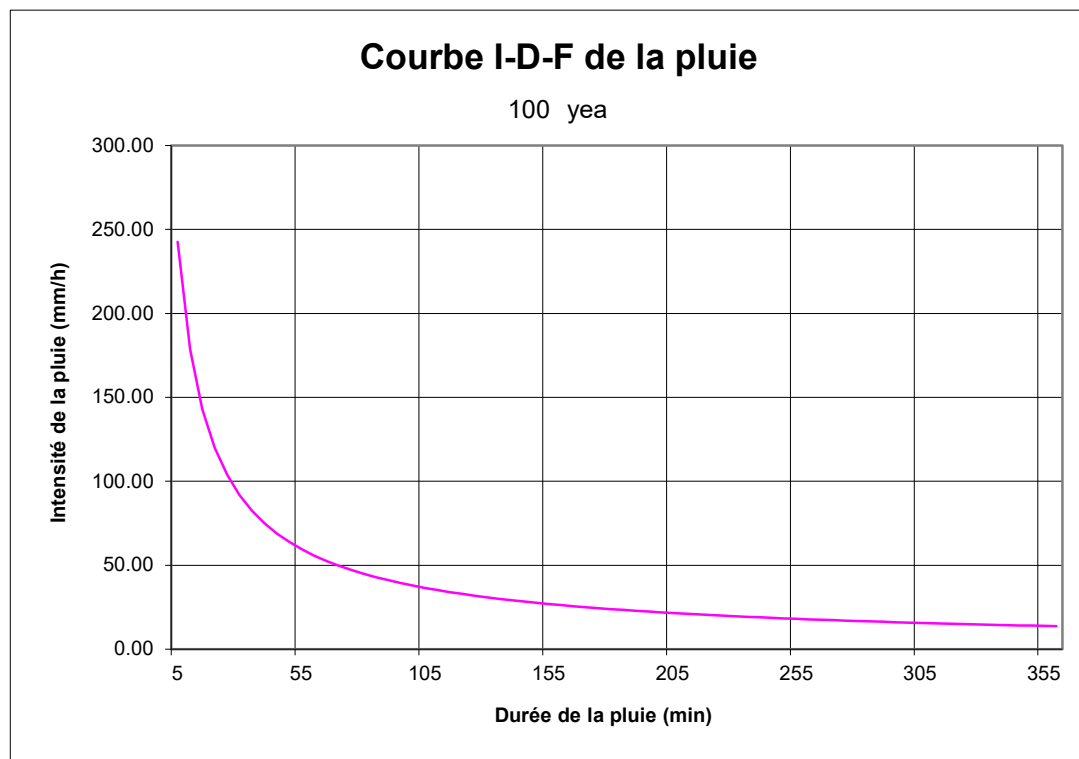
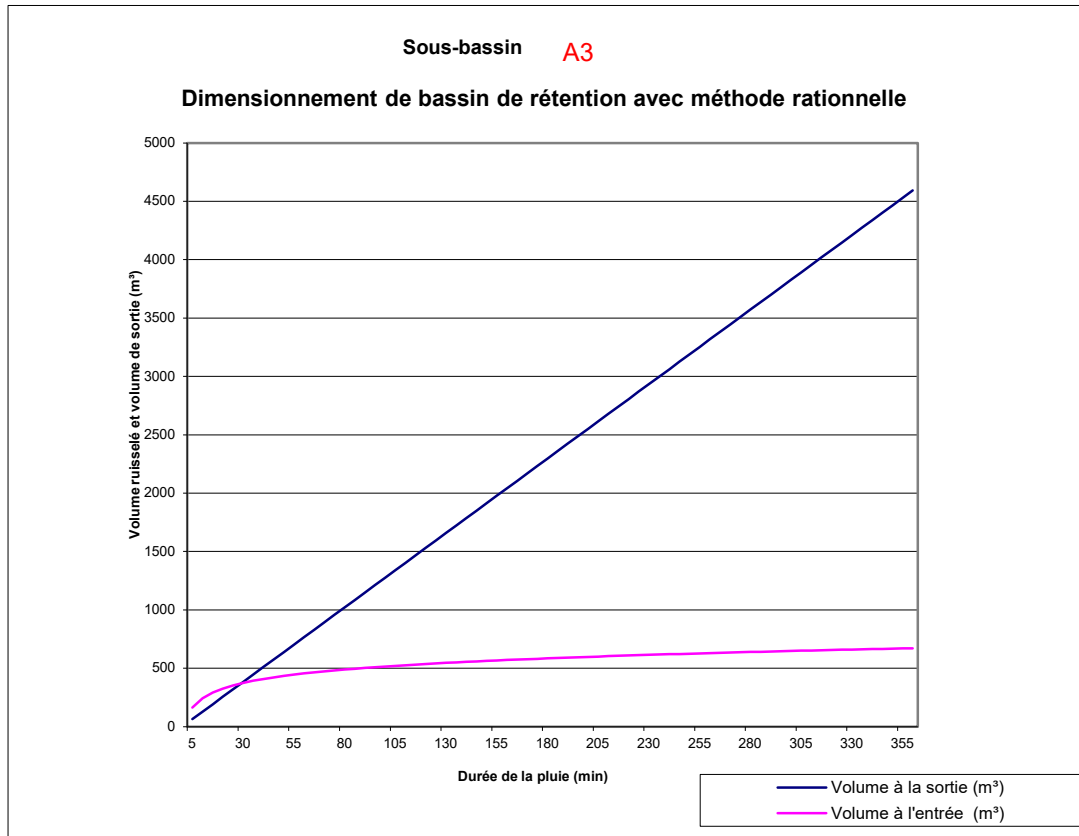
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 23, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (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 9:33

File \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse
Location: 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 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
 PEO No.: 100530467

Date: July 23, 2021

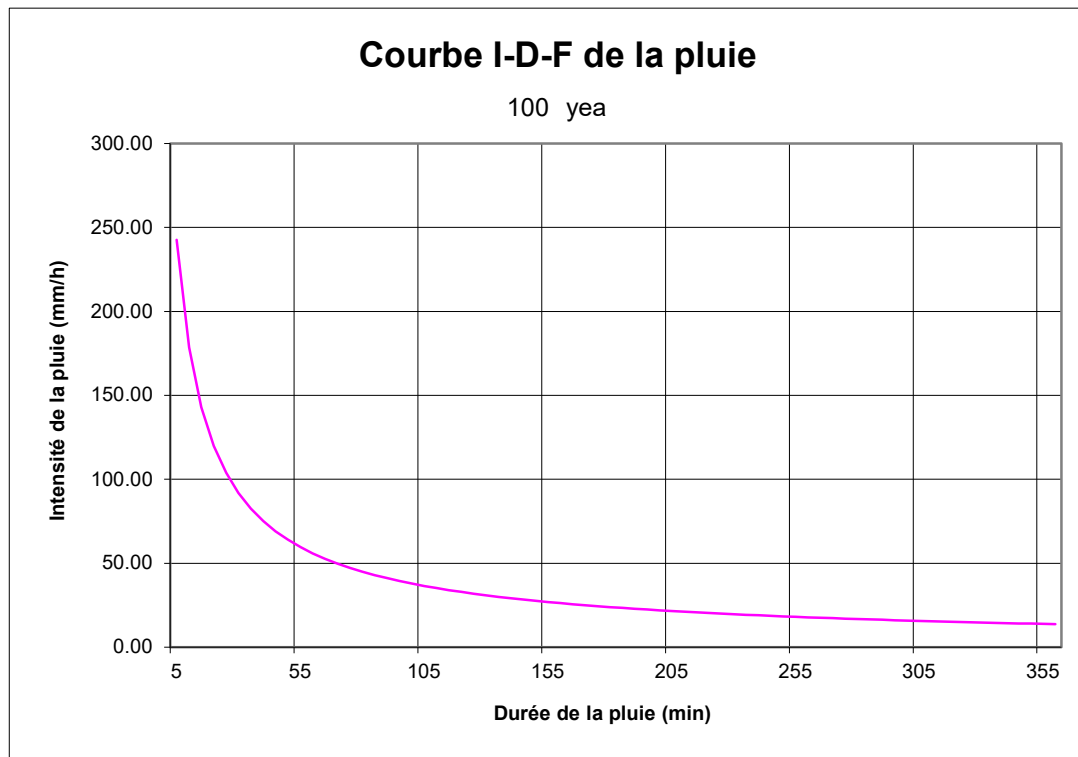
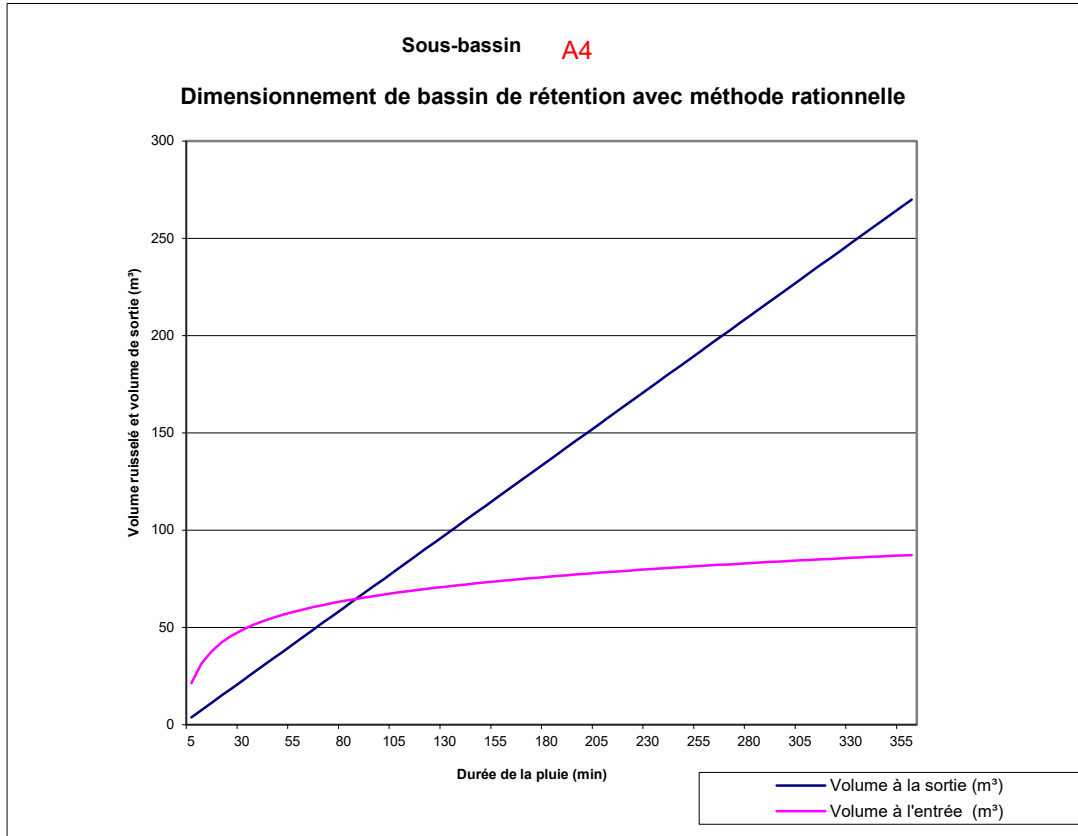
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 23, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) <i>(4)-(5)</i> (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 \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse
Location: 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 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
 PEO No.: 100530467

Date: July 23, 2021

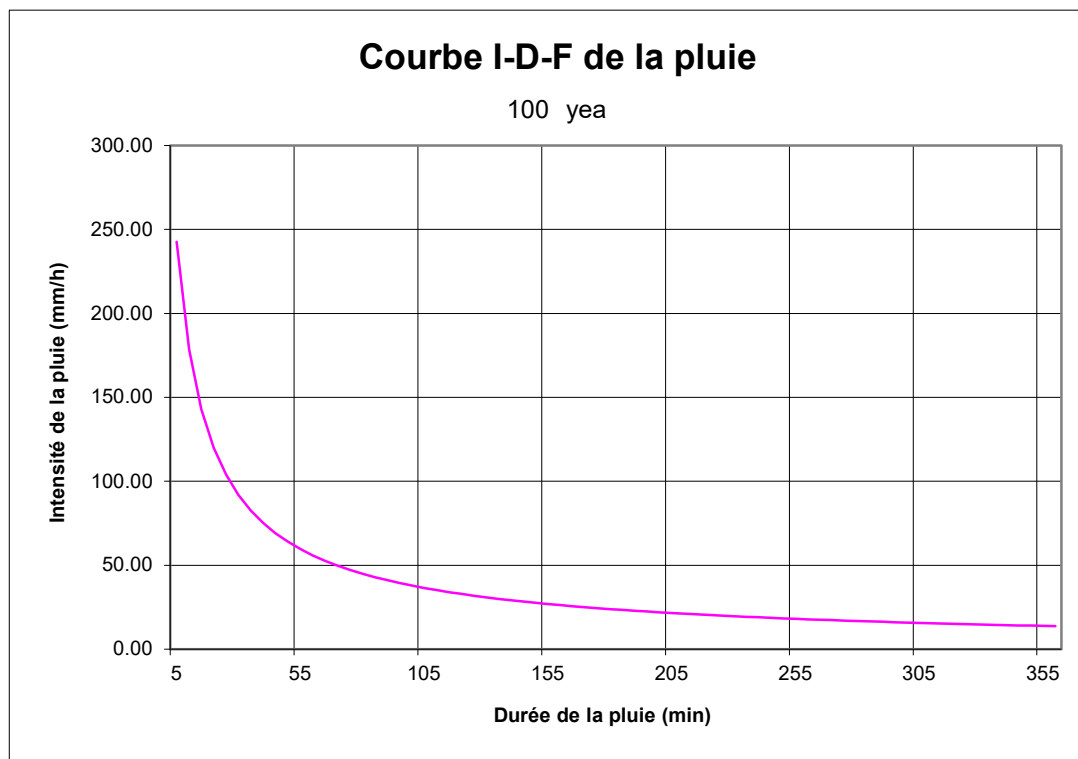
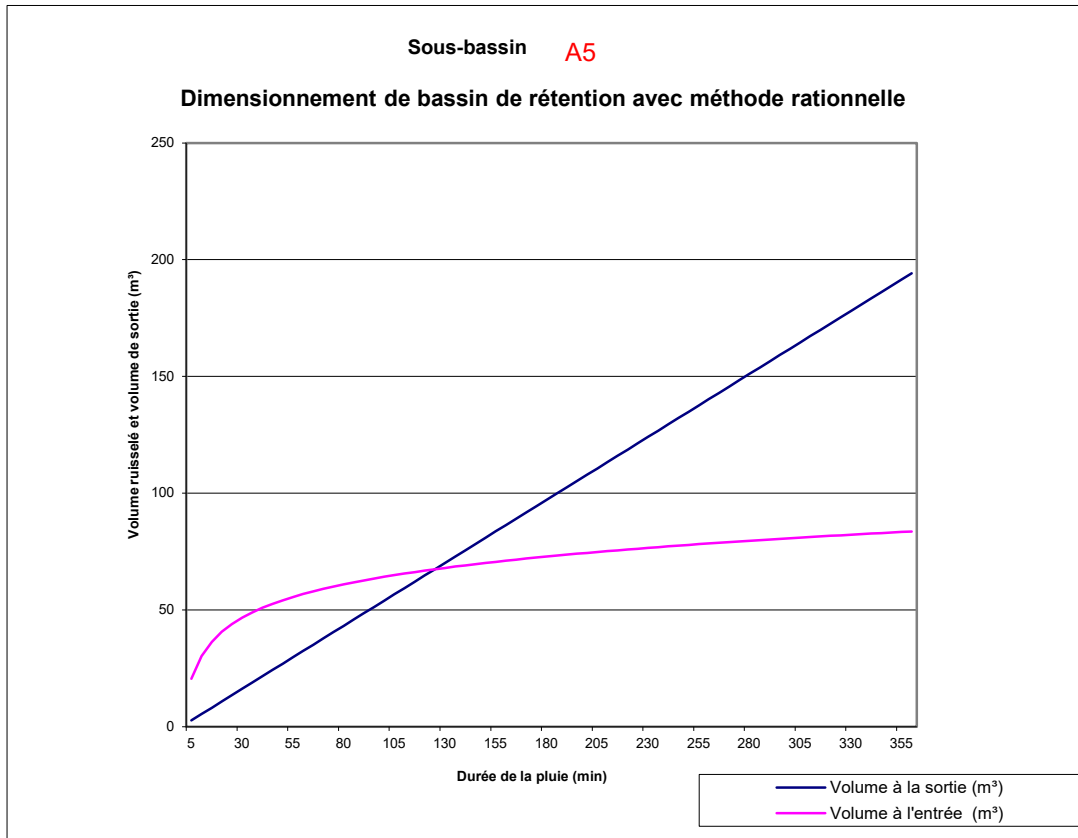
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 23, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (5)	Retention Volume (m ³) (4)-(5) (6)
5.0	242.70	20.54	2.69733002	17.84
10.0	178.56	30.22	5.39466004	24.83
15.0	142.89	36.28	8.09199005	28.19
20.0	119.95	40.61	10.7893201	29.82
25.0	103.85	43.94	13.4866501	30.46
30.0	91.87	46.65	16.1839801	30.46
35.0	82.58	48.92	18.8813101	30.04
40.0	75.15	50.88	21.5786401	29.30
45.0	69.05	52.59	24.2759702	28.32
50.0	63.95	54.12	26.9733002	27.15
55.0	59.62	55.51	29.6706302	25.83
60.0	55.89	56.76	32.3679602	24.40
65.0	52.65	57.92	35.0652902	22.86
70.0	49.79	58.99	37.7626202	21.23
75.0	47.26	59.99	40.4599503	19.53
80.0	44.99	60.92	43.1572803	17.76
85.0	42.95	61.80	45.8546103	15.94
90.0	41.11	62.63	48.5519403	14.07
95.0	39.43	63.41	51.2492703	12.16
100.0	37.90	64.15	53.9466004	10.21
105.0	36.50	64.86	56.6439304	8.22
110.0	35.20	65.54	59.3412604	6.20
115.0	34.01	66.19	62.0385904	4.15
120.0	32.89	66.81	64.7359204	2.08
125.0	31.86	67.41	67.4332504	-0.02
130.0	30.90	67.99	70.1305805	-2.14
135.0	30.00	68.54	72.8279105	-4.29
140.0	29.15	69.08	75.5252405	-6.45
145.0	28.36	69.60	78.2225705	-8.62
150.0	27.61	70.10	80.9199005	-10.82
155.0	26.91	70.59	83.6172306	-13.03
160.0	26.24	71.06	86.3145606	-15.25
165.0	25.61	71.52	89.0118906	-17.49
170.0	25.01	71.97	91.7092206	-19.74
175.0	24.44	72.40	94.4065506	-22.01
180.0	23.90	72.82	97.1038806	-24.28
185.0	23.39	73.24	99.8012107	-26.57
190.0	22.90	73.64	102.498541	-28.86
195.0	22.43	74.03	105.195871	-31.17
200.0	21.98	74.41	107.893201	-33.48
205.0	21.55	74.79	110.590531	-35.80
210.0	21.14	75.16	113.287861	-38.13
215.0	20.75	75.52	115.985191	-40.47
220.0	20.37	75.87	118.682521	-42.82
225.0	20.01	76.21	121.379851	-45.17
230.0	19.66	76.55	124.077181	-47.53
235.0	19.33	76.88	126.774511	-49.89
240.0	19.01	77.21	129.471841	-52.27

245.0	18.69	77.52	132.169171	-54.65
250.0	18.39	77.84	134.866501	-57.03
255.0	18.11	78.14	137.563831	-59.42
260.0	17.83	78.45	140.261161	-61.81
265.0	17.56	78.74	142.958491	-64.22
270.0	17.29	79.04	145.655821	-66.62
275.0	17.04	79.32	148.353151	-69.03
280.0	16.80	79.61	151.050481	-71.45
285.0	16.56	79.88	153.747811	-73.86
290.0	16.33	80.16	156.445141	-76.29
295.0	16.11	80.43	159.142471	-78.72
300.0	15.89	80.69	161.839801	-81.15
305.0	15.68	80.95	164.537131	-83.58
310.0	15.48	81.21	167.234461	-86.02
315.0	15.28	81.47	169.931791	-88.46
320.0	15.09	81.72	172.629121	-90.91
325.0	14.90	81.97	175.326451	-93.36
330.0	14.72	82.21	178.023781	-95.81
335.0	14.54	82.45	180.721111	-98.27
340.0	14.37	82.69	183.418441	-100.73
345.0	14.20	82.92	186.115771	-103.19
350.0	14.04	83.15	188.813101	-105.66
355.0	13.88	83.38	191.510431	-108.13
360.0	13.72	83.61	194.207761	-110.60
Max Volume (V max):				30.46
Design Volume (V design) :				30.46

Fastfrate Warehouse Development
Industrial/Commercial Development





STORAGE VOLUME CALCULATIONS

Project: Fastrate Warehouse Development
 Industrial/Commercial Development
Project #: A001083 (360)
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 2021-08-06 9:33

File \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastrate Warehouse
Location: 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
 PEO No.: 100530467

Date: July 23, 2021

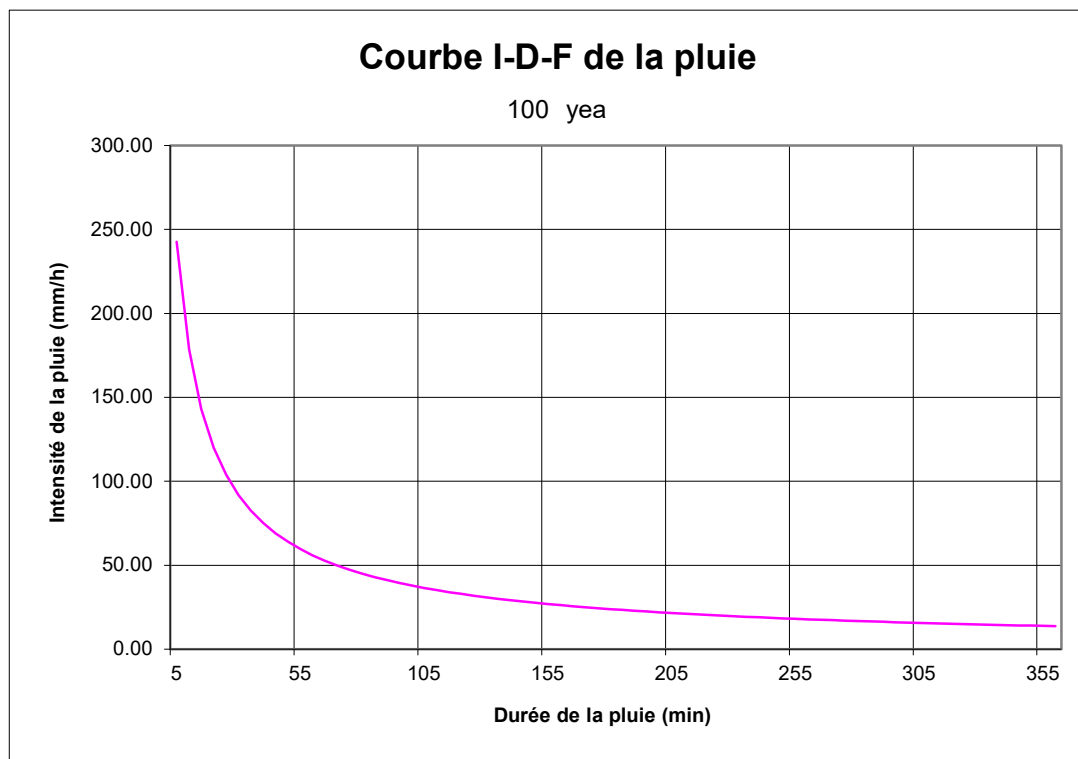
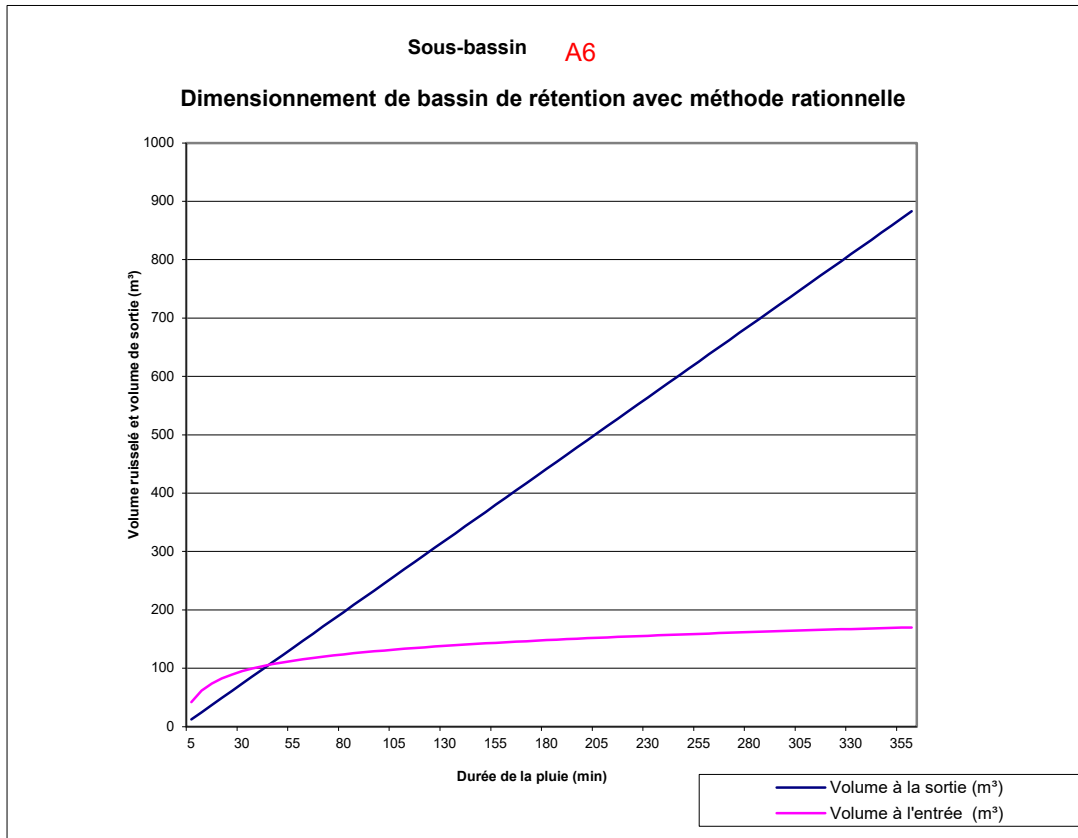
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 23, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (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 \\cima.plus\cima\Cima-C10\Ott_Projects\A\A001000-A001499\A001083_Fastfrate Warehouse
Location: 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 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
 PEO No.: 100530467

Date: July 23, 2021

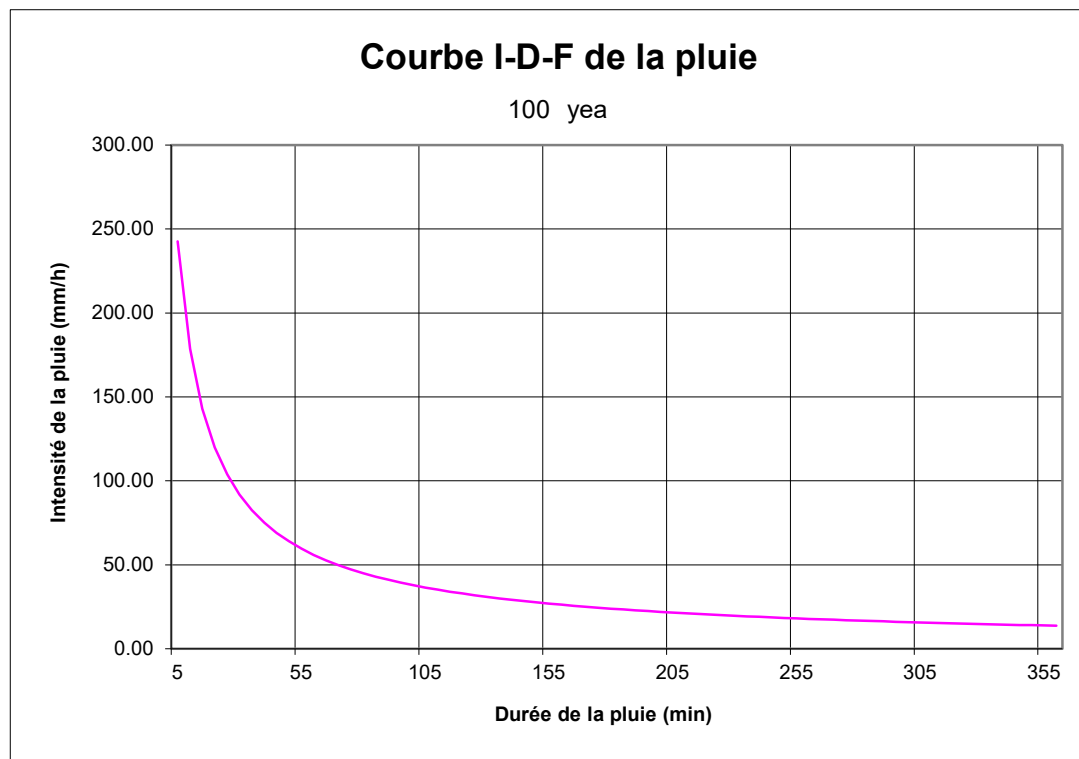
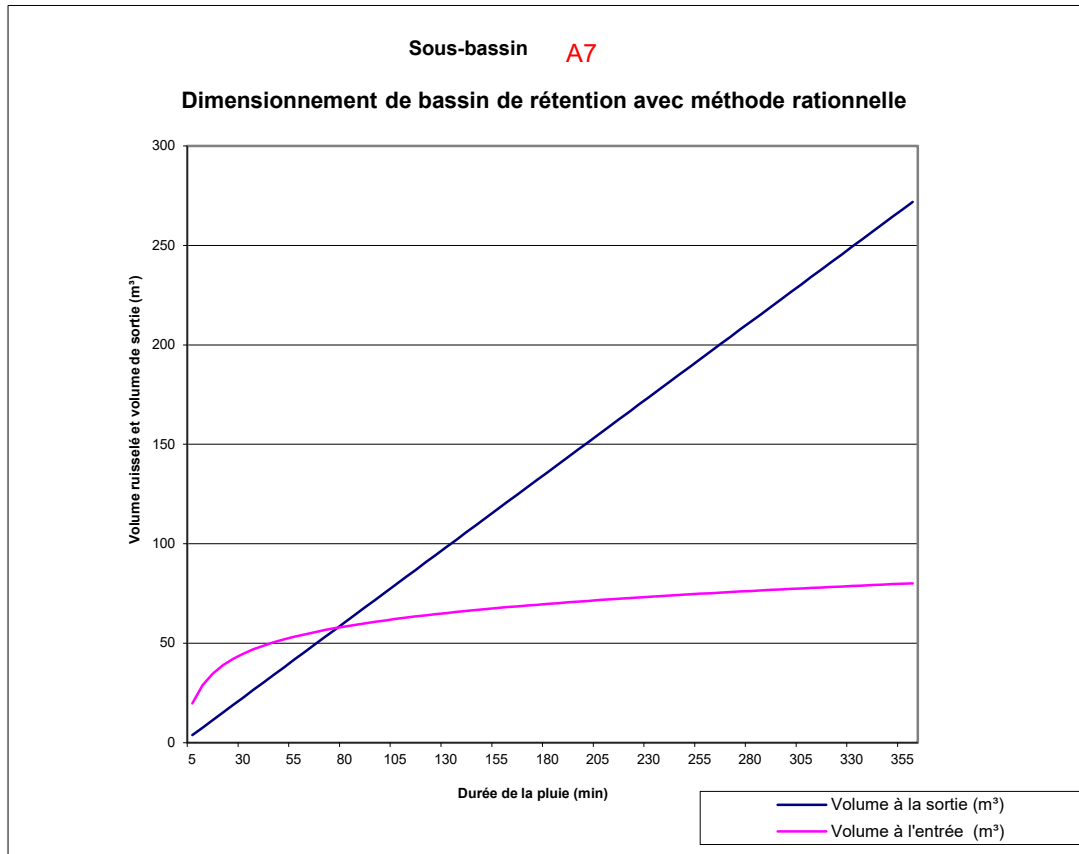
Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 23, 2021

Rainfall Duration (min) <i>T</i> (1)	Rainfall Intensity (mm/h) <i>I</i> (2)	Runoff Volume (m ³) <i>CIAT</i> (4)	Output Volume (m ³) <i>kQT</i> (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

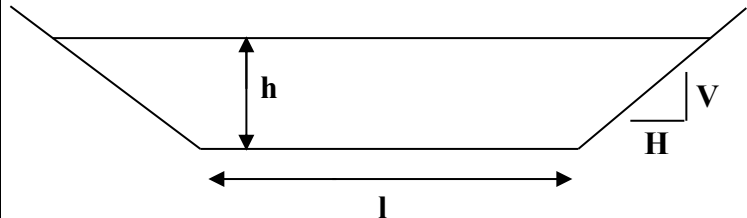


FASTFRATE

A001083 (360)

CHANNEL CHECK AT DITCH ON SOMME STREET (100-YEAR)

Bed Length (l)	m	0.000		
Side Slopes (H:V)	H/V	3.0000	1.0000	
Slope (S)	m/m	0.0050	%	0.50
Roughness Coefficient	n	0.0300		
Flow (Q)	m ³ /s	3.857	l/s	3,857
Velocity (V)	m/s	1.395	cm/s	140
Hydraulic Radius (R_h)	m	0.455		
Wetted Area	m ²	2.765		
Wetted Perimeter	m	6.072		
Height of water (h)	m	0.960		



Notes:

The ditch on Somme street at which our site is connecting will have a headwater height of 0.96m during the 100-year storm event. The bottom of the ditch at that location is 89.110 which means the hydraulic grade line within the ditch will be at 90.07.

Prepared by: Julien Sauvé, P.Eng
100200100

Date: July 20, 2021

Verified by: Julien Sauvé, P.Eng
 PEO No.: 100200100

Date: July 20, 2021

CALCUL DE LA LIGNE PIÉZOMÉTRIQUE
Feuille de calcul



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): 90.07
Vitesse initiale (m/s): 1.4
n de Manning: 0.013

Effacer

Graphique

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 _r (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



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

Effacer

Graphique

LGE_s initiale (m):
LGH initiale (m):

No. de regard (1)	D (mm) (2)	Q (m ³ /s) (3)	S (m/m) (4)	L (m) (5)	V (m/s) (6)	y (m) (7)	A (m ²) (8)	y _c (m) (9)	V ² /2g (m) (10)	S _f (m/m) (11)	h _f (m) (12)	LGE _s (m) (13)	K (14)	K(V ² /2g) (m) (15)	LGE _e (m) (16)	LGH _e (m) (17)	Él. cour. (amont) (m) (18)	Él. Surface (m) (19)	Type d'écoulement (20)	Él. Surface - LGH (m) (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)

Prepared by: Guillaume LeBlond, M.A.Sc., EIT
 PEO No.: 100530467

Date: August 9, 2021

Numerical Analysis; Orifice sizing

Extended Detention Control

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: August 9, 2021

Extended Detention Orifice

Control Type: Circular Orifice plate
 Elevation Range (m): 89.3 to 89.5
 Base elevation (m): 89.3
 Initial head over Orifice: 0
 Orifice Diameter (mm): 80
 No. of orifices: 1
 Gravitational Acceleration, g (m/s²): 9.81
 Discharge Coefficient, C_d: 0.63

Weir Equation Comparison	Values	Notes
Weir Elevation (m)	89.3	
Head over weir, H _w (m)	0.20	
Weir Discharge Coeff., C _w	0.61	
Weir Length, L _w (m)	0.1	
Weir Flow, q _w (m ³ /s) – Peak Flow	0.02 (2/3*C _w *L _w *sqrt(2*g)*H _w ^(3/2))	
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" (m ²)	Orifice Area "a" (m ²)	Q _{ea} *C*sqrt(2*g*hf) (m ³ /s)	Time differential, dt (s)	Q _e =2/3*C _w *L _w *sqrt(2*g)*h _w ^(3/2) (m ³ /s)	Time differential, dt (s)
89.30	0.00	0.00	0	846.29	5.03E-03	1.00E-06	0	0.00E+00
89.31	0.01	0.01	0.01	849.30	5.03E-03	1.40E-03	6055	1.80E-04
89.32	0.02	0.02	0.01	852.32	5.03E-03	1.98E-03	4297	5.09E-04
89.33	0.03	0.03	0.01	855.34	5.03E-03	2.43E-03	3521	9.36E-04
89.34	0.04	0.04	0.01	858.37	5.03E-03	2.81E-03	3060	1.44E-03
89.35	0.05	0.05	0.01	861.40	5.03E-03	3.14E-03	2746	2.01E-03
89.36	0.06	0.06	0.01	864.44	5.03E-03	3.44E-03	2516	2.65E-03
89.37	0.07	0.07	0.01	867.48	5.03E-03	3.71E-03	2338	3.34E-03
89.38	0.08	0.08	0.01	870.53	5.03E-03	3.97E-03	2194	4.08E-03
89.39	0.09	0.09	0.01	873.59	5.03E-03	4.21E-03	2076	4.86E-03
89.40	0.10	0.10	0.01	876.65	5.03E-03	4.44E-03	1976	5.70E-03
89.41	0.11	0.11	0.01	879.71	5.03E-03	4.65E-03	1891	6.57E-03
89.42	0.12	0.12	0.01	882.78	5.03E-03	4.86E-03	1817	7.49E-03
89.43	0.13	0.13	0.01	885.86	5.03E-03	5.06E-03	1752	8.44E-03
89.44	0.14	0.14	0.01	888.94	5.03E-03	5.25E-03	1694	9.44E-03
89.45	0.15	0.15	0.01	892.03	5.03E-03	5.43E-03	1642	1.05E-02
89.46	0.16	0.16	0.01	895.12	5.03E-03	5.61E-03	1595	1.15E-02
89.47	0.17	0.17	0.01	898.22	5.03E-03	5.78E-03	1553	1.26E-02
89.48	0.18	0.18	0.01	901.32	5.03E-03	5.95E-03	1515	1.38E-02
89.49	0.19	0.19	0.01	904.43	5.03E-03	6.11E-03	1479	1.49E-02
89.50	0.20	0.20	0.01	907.55	5.03E-03	6.27E-03	1447	1.61E-02

Numerical Results:

Parameter	Value	Units
Peak Flowrate (L/s)	6.27	L/s
Average Flowrate (L/s)	4.12	L/s
Water Quality Volume (m ³)	175.65	m ³
Drawdown Time (h)	13.1	h
90% Drawdown Time (h)	11.4	h

MOE Equation 4.10 Results:

Parameter	Value	Units
Area of Pond	878.2696766	m ²
Orifice Discharge Coeff. C	0.63	unls.
Orifice Area, A _o	5.03E-03	m ²
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
 PEO No.: 100530467

Date: August 9, 2021

Retention Control - Freeflow condition

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: August 9, 2021

Retention Control Orifice

Control Type	Rectangular Orifice	Weir Equation Comparison	Values	Notes
Elevation Range (m)	89.5- 89.85	Weir Elevation (m)	89.5	
Base elevation (m)		Head over weir, H_w (m)	0.60	
Initial head over Orifice		Weir Discharge Coeff., C_w	0.61	
Orifice Depth (mm)				
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" (m ²)	Orifice Area "a" (m ²)	Q=ac d*sqrt(2*g*hf) (m ³ /s)	Time differential, dt (s)
89.50	0.00	0	907.55	6.24E-01	1.00E+06
89.51	0.01	0.01	910.67	6.24E-01	1.74E-01
89.52	0.02	0.01	913.79	6.24E-01	2.46E-01
89.53	0.03	0.01	916.93	6.24E-01	3.02E-01
89.54	0.04	0.01	920.06	6.24E-01	3.48E-01
89.55	0.05	0.01	923.21	6.24E-01	3.89E-01
89.56	0.06	0.01	926.35	6.24E-01	4.27E-01
89.57	0.07	0.01	929.51	6.24E-01	4.61E-01
89.58	0.08	0.01	932.67	6.24E-01	4.93E-01
89.59	0.09	0.01	935.83	6.24E-01	5.22E-01
89.60	0.10	0.01	939.00	6.24E-01	5.51E-01
89.61	0.11	0.01	942.18	6.24E-01	5.78E-01
89.62	0.12	0.01	945.36	6.24E-01	6.03E-01
89.63	0.13	0.01	948.54	6.24E-01	6.28E-01
89.64	0.14	0.01	951.73	6.24E-01	6.52E-01
89.65	0.15	0.01	954.93	6.24E-01	6.74E-01
89.66	0.16	0.01	958.13	6.24E-01	6.97E-01
89.67	0.17	0.01	961.34	6.24E-01	7.18E-01
89.68	0.18	0.01	964.56	6.24E-01	7.39E-01
89.69	0.19	0.01	967.78	6.24E-01	7.59E-01
89.70	0.20	0.01	971.00	6.24E-01	7.79E-01
89.71	0.21	0.01	974.23	6.24E-01	7.98E-01
89.72	0.22	0.01	977.47	6.24E-01	8.17E-01
89.73	0.23	0.01	980.71	6.24E-01	8.35E-01
89.74	0.24	0.01	983.95	6.24E-01	8.53E-01
89.75	0.25	0.01	987.21	6.24E-01	8.71E-01
89.76	0.26	0.01	990.46	6.24E-01	8.88E-01
89.77	0.27	0.01	993.73	6.24E-01	9.05E-01
89.78	0.28	0.01	997.00	6.24E-01	9.21E-01
89.79	0.29	0.01	1000.27	6.24E-01	9.38E-01
89.80	0.30	0.01	1003.55	6.24E-01	9.54E-01
89.81	0.31	0.01	1006.84	6.24E-01	9.70E-01
89.82	0.32	0.01	1010.13	6.24E-01	9.85E-01
89.83	0.33	0.01	1013.42	6.24E-01	1.00E+00
89.84	0.34	0.01	1016.72	6.24E-01	1.02E+00
89.85	0.35	0.01	1020.03	6.24E-01	1.03E+00
89.86	0.36	0.01	1023.34	6.24E-01	1.04E+00
89.87	0.37	0.01	1026.66	6.24E-01	1.06E+00
89.88	0.38	0.01	1029.99	6.24E-01	1.07E+00
89.89	0.39	0.01	1033.32	6.24E-01	1.09E+00
89.90	0.40	0.01	1036.65	6.24E-01	1.10E+00
89.91	0.41	0.01	1039.99	6.24E-01	1.11E+00
89.92	0.42	0.01	1043.34	6.24E-01	1.13E+00
89.93	0.43	0.01	1046.69	6.24E-01	1.14E+00
89.94	0.44	0.01	1050.04	6.24E-01	1.16E+00
89.95	0.45	0.01	1053.41	6.24E-01	1.17E+00
89.96	0.46	0.01	1056.77	6.24E-01	1.18E+00
89.97	0.47	0.01	1060.15	6.24E-01	1.19E+00
89.98	0.48	0.01	1063.53	6.24E-01	1.21E+00
89.99	0.49	0.01	1066.91	6.24E-01	1.22E+00
90.00	0.50	0.01	1070.30	6.24E-01	1.23E+00
90.01	0.51	0.01	1073.70	6.24E-01	1.24E+00
90.02	0.52	0.01	1077.10	6.24E-01	1.26E+00
90.03	0.53	0.01	1080.50	6.24E-01	1.27E+00
90.04	0.54	0.01	1083.91	6.24E-01	1.28E+00
90.05	0.55	0.01	1087.33	6.24E-01	1.29E+00
90.06	0.56	0.01	1090.75	6.24E-01	1.30E+00
90.07	0.57	0.01	1094.18	6.24E-01	1.31E+00
90.08	0.58	0.01	1097.62	6.24E-01	1.33E+00
90.09	0.59	0.01	1101.05	6.24E-01	1.34E+00
90.10	0.60	0.01	1104.50	6.24E-01	1.35E+00

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" (m ²)	Orifice Area "a" (m ²)	Qea*C*sqrt(2*g*hf) (m ³ /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
 PEO No.: 100530467

Date: August 9, 2021

Retention Control - Surcharged condition

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: August 9, 2021

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" (m ²)	Orifice Area "a" (m ²)	$Q=a \cdot C_d \cdot \sqrt{2 \cdot g \cdot hf}$ (m ³ /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
<u>Allowable Flowrate</u>	<u>906.9 L/s</u>

Prepared by: Guillaume LeBlond, M.A.Sc., EIT
 PEO No.: 100530467

Date: August 9, 2021

Retention Control - Surcharged condition

Verified by: Christian Lavoie-Label, P.Eng.
 PEO No.: 100067842

Date: August 9, 2021

Extended Detention Orifice

Control Type Circular Orifice plate
 Elevation Range (m) 90.07-90.15
 Base elevation (m) 90.07
 Initial net head over Orifice 0
 Orifice Diameter (mm) 80
 No. of orifices 1
 Gravitational Acceleration, g (m/s²) 9.81
 Discharge Coefficient, C_d 0.63

Water Elevation (m)	Head over Orifice, hf (m)	Head differential, dh (m)	Pond Area "A" (m ²)	Orifice Area "a" (m ²)	$Q = a \cdot C_d \cdot \sqrt{2 \cdot g \cdot h_f}$ (m ³ /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

Total Rating Curve

Crossing: West Entrance

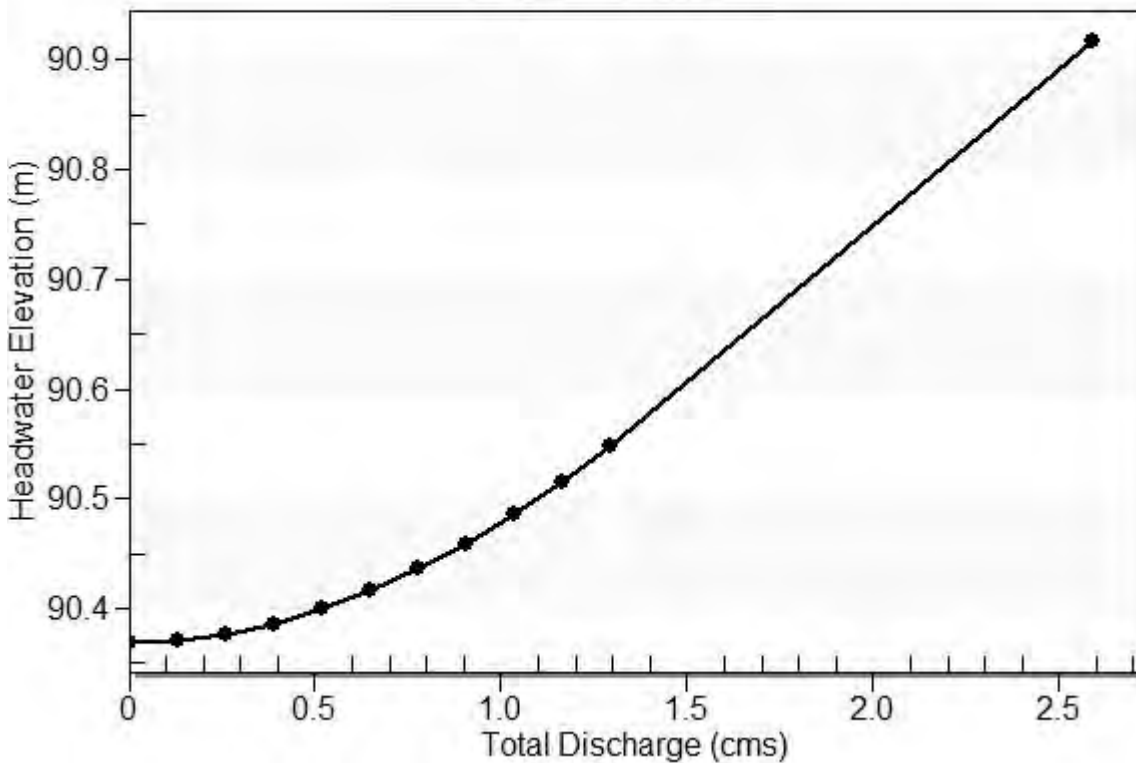


Table 2 - Culvert Summary Table: West Entrance Road Culvert

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

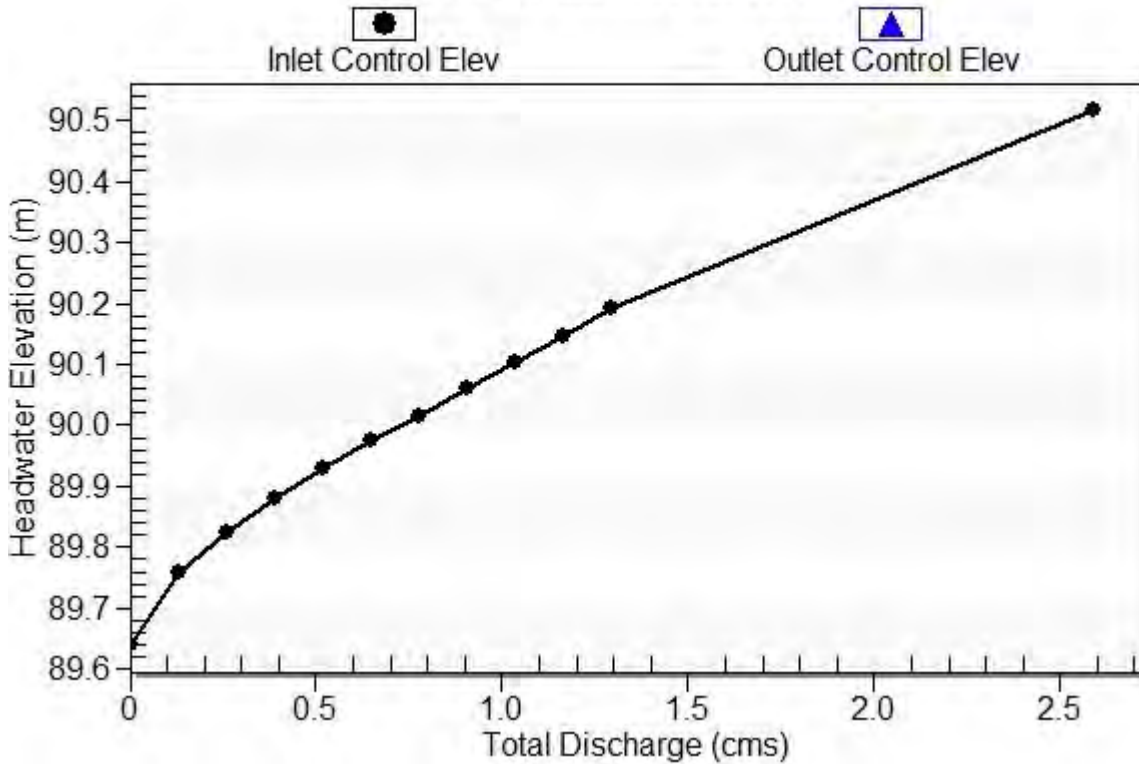
Inlet Elevation (invert): 89.64 m, Outlet Elevation (invert): 89.63 m

Culvert Length: 18.90 m, Culvert Slope: 0.0005

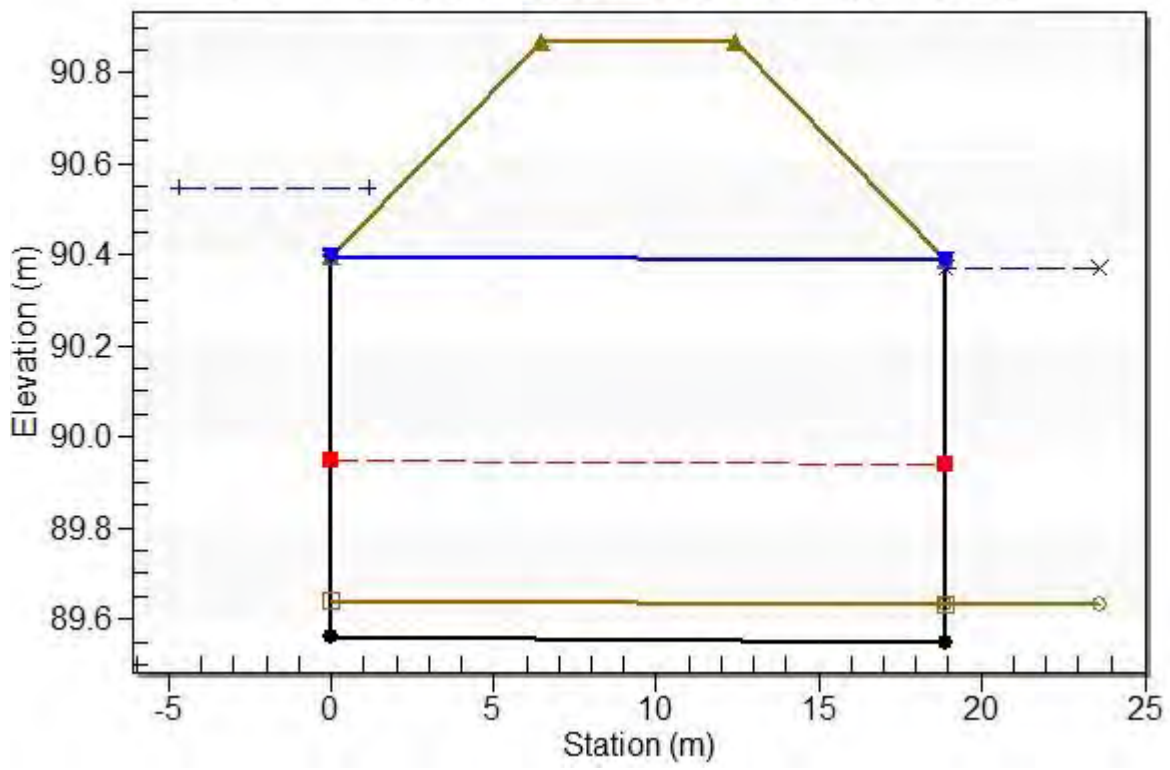
Culvert Performance Curve Plot: West Entrance Road Culvert

Performance Curve

Culvert: West Entrance Road Culvert



Water Surface Profile Plot for Culvert: West Entrance Road Culvert
Crossing - West Entrance, Design Discharge - 1.30 cms
Culvert - West Entrance Road Culvert, Culvert Discharge - 1.30 cms



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

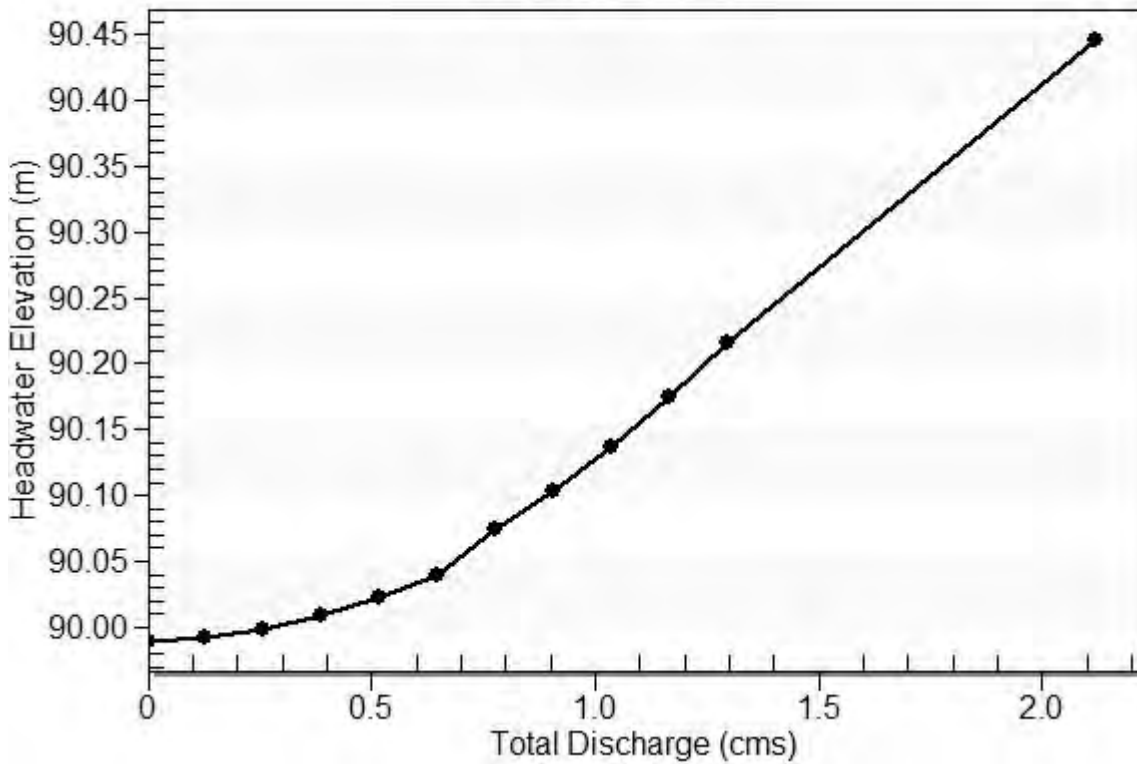
Maximum Flow: 45.7325 cfs

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 Rating Curve
Crossing: East Entrance

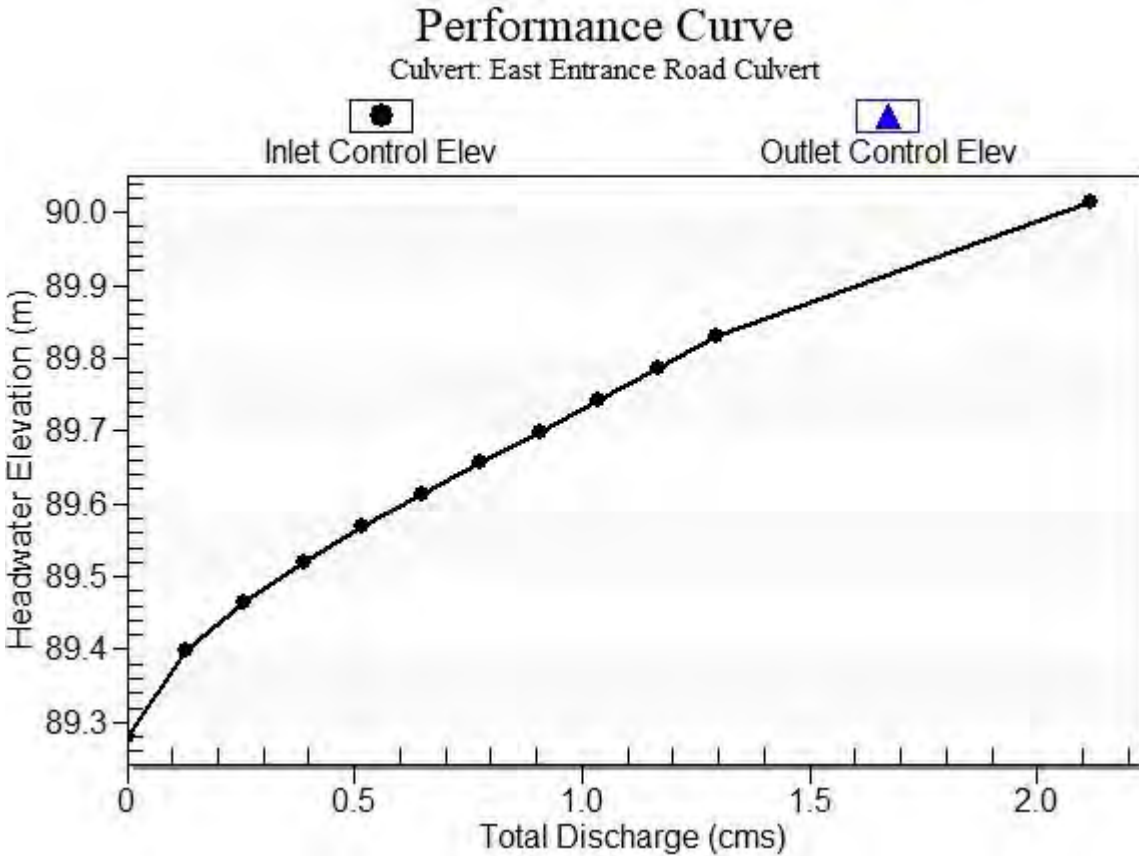


Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.99	0.000	0.710	0-NF	0.000	0.000	0.740	0.740	0.000	0.000
0.13	0.13	89.99	0.118	0.712	6-FFt	0.199	0.070	0.740	0.740	0.084	0.000
0.26	0.26	90.00	0.185	0.719	6-FFt	0.308	0.110	0.740	0.740	0.169	0.000
0.39	0.39	90.01	0.240	0.730	6-FFt	0.406	0.143	0.740	0.740	0.253	0.000
0.52	0.52	90.02	0.289	0.743	6-FFt	0.507	0.173	0.740	0.740	0.337	0.000
0.65	0.65	90.04	0.334	0.760	6-FFt	0.636	0.200	0.740	0.740	0.422	0.000
0.78	0.78	90.07	0.376	0.795	6-FFt	0.758	0.224	0.740	0.740	0.506	0.000
0.91	0.91	90.10	0.419	0.824	6-FFt	0.758	0.247	0.740	0.740	0.590	0.000
1.04	1.04	90.14	0.463	0.858	6-FFt	0.758	0.269	0.740	0.740	0.674	0.000
1.17	1.17	90.17	0.507	0.895	6-FFt	0.758	0.290	0.740	0.740	0.759	0.000
1.29	1.29	90.22	0.550	0.936	6-FFt	0.758	0.310	0.740	0.740	0.843	0.000

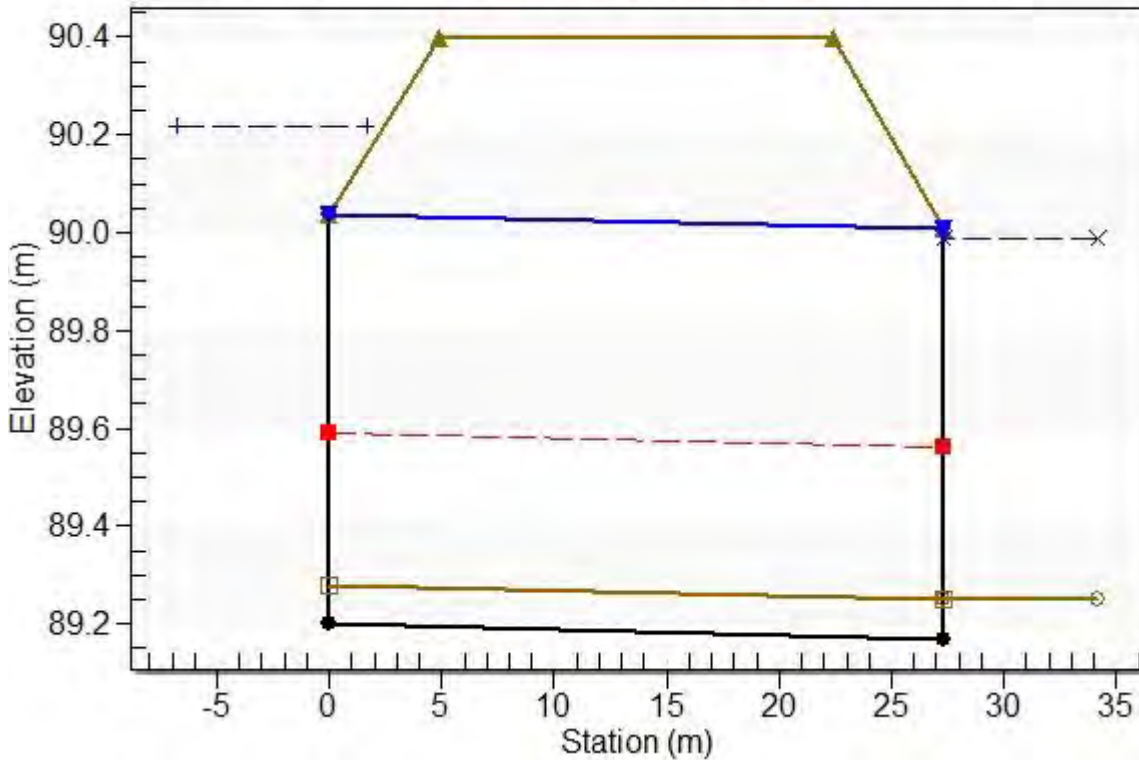
Table 5 - Culvert Summary Table: East Entrance Road Culvert

 Straight Culvert
 Inlet Elevation (invert): 89.28 m, Outlet Elevation (invert): 89.25 m
 Culvert Length: 27.30 m, Culvert Slope: 0.0011

Culvert Performance Curve Plot: East Entrance Road Culvert



Water Surface Profile Plot for Culvert: East Entrance Road Culvert
Crossing - East Entrance, Design Discharge - 1.29 cms
 Culvert - East Entrance Road Culvert, Culvert Discharge - 1.29 cms



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

Total Rating Curve

Crossing: West Ditch Site Culvert 10y

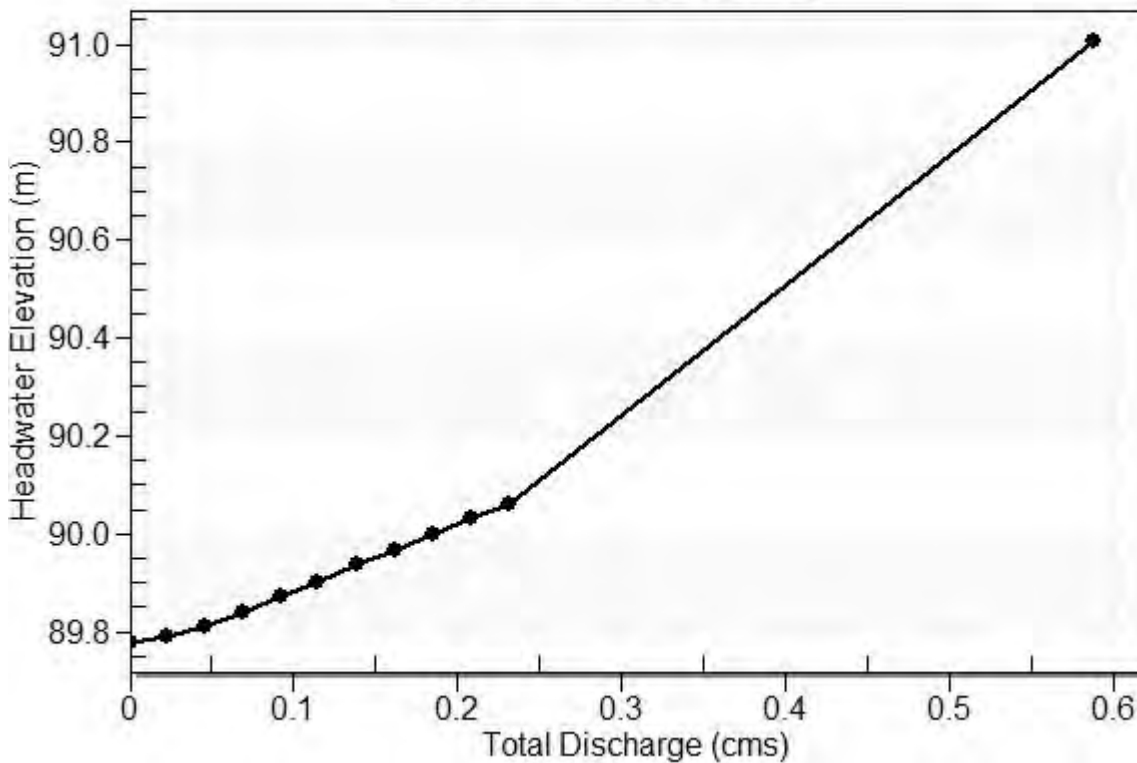


Table 2 - Culvert Summary Table: West Ditch Site Culvert 10y

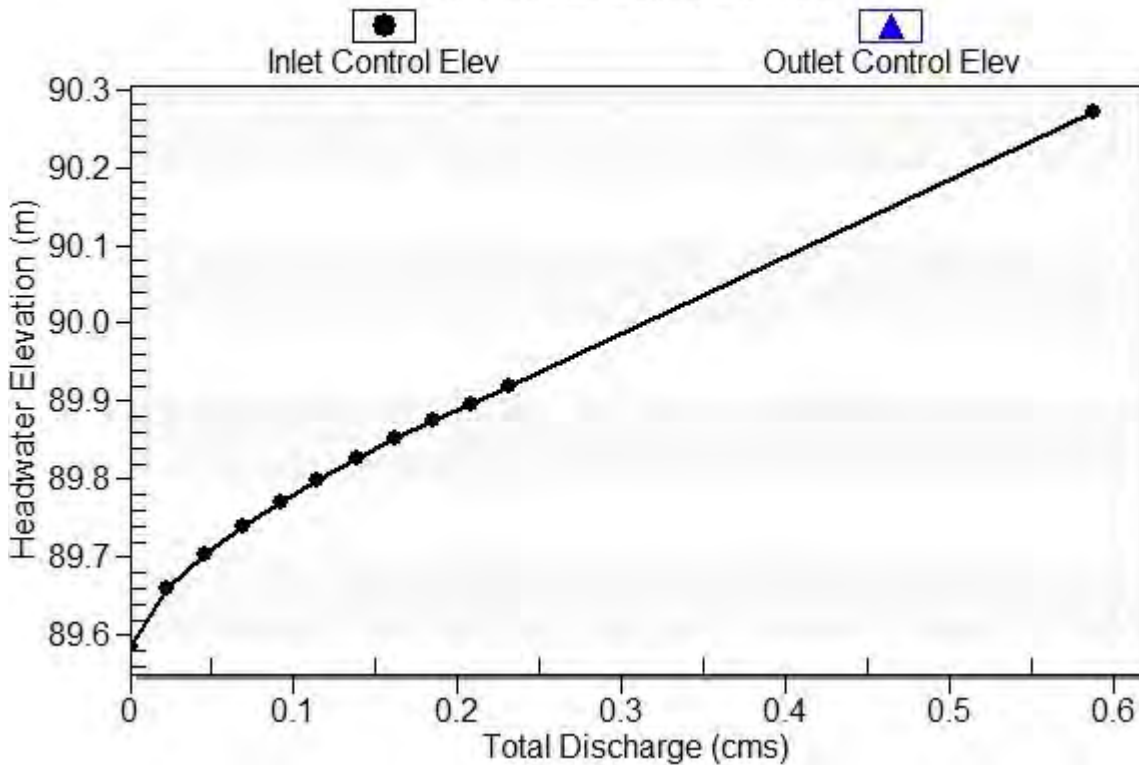
Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.78	0.000	0.195	0-NF	0.000	0.000	0.236	0.240	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

Performance Curve

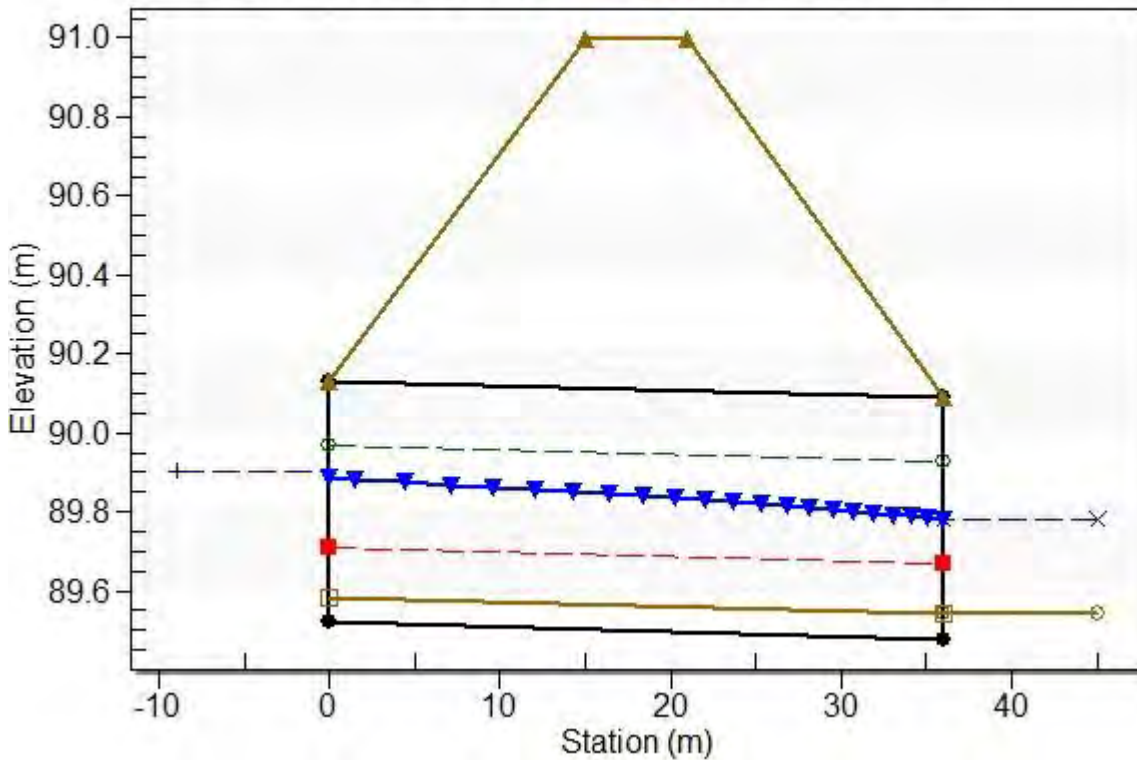
Culvert: West Ditch Site Culvert 10y



Water Surface Profile Plot for Culvert: West Ditch Site Culvert 10y

Crossing - West Ditch Site Culvert 10y, Design Discharge - 0.11 cms

Culvert - West Ditch Site Culvert 10y, Culvert Discharge - 0.11 cms



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

Total Rating Curve

Crossing: East Ditch Site Culvert 10y

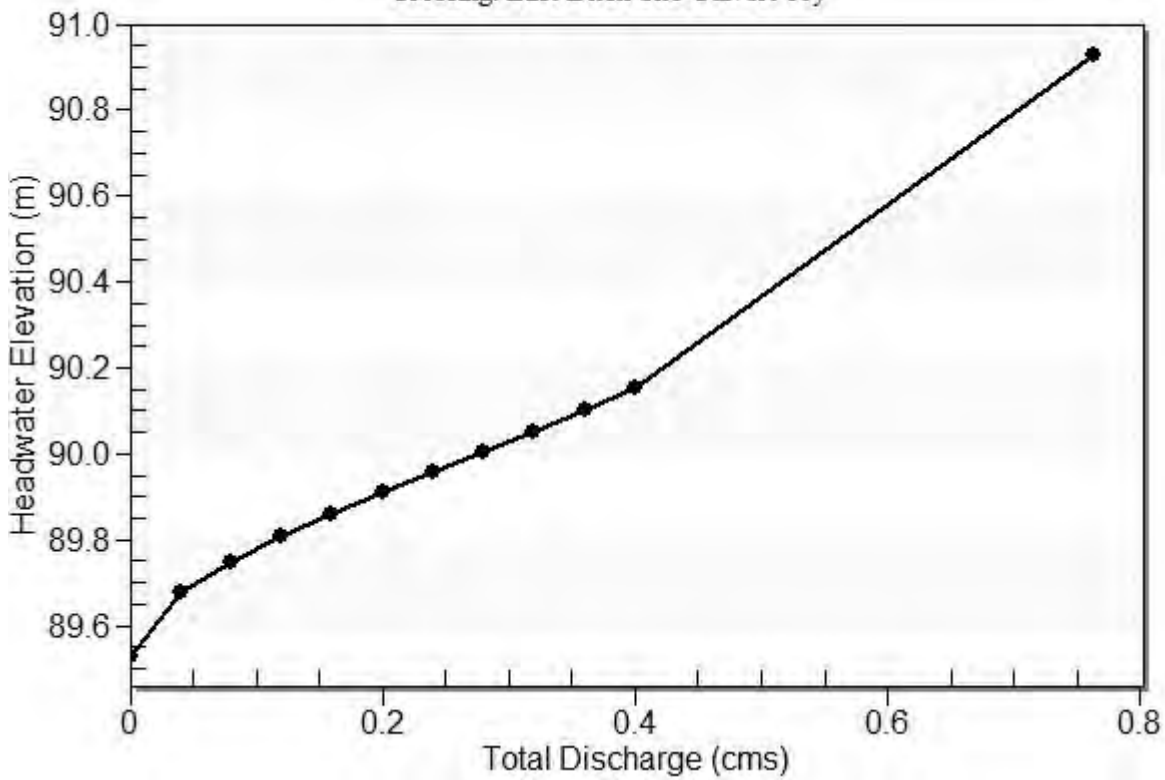


Table 5 - Culvert Summary Table: East Ditch Site Culvert 10y

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

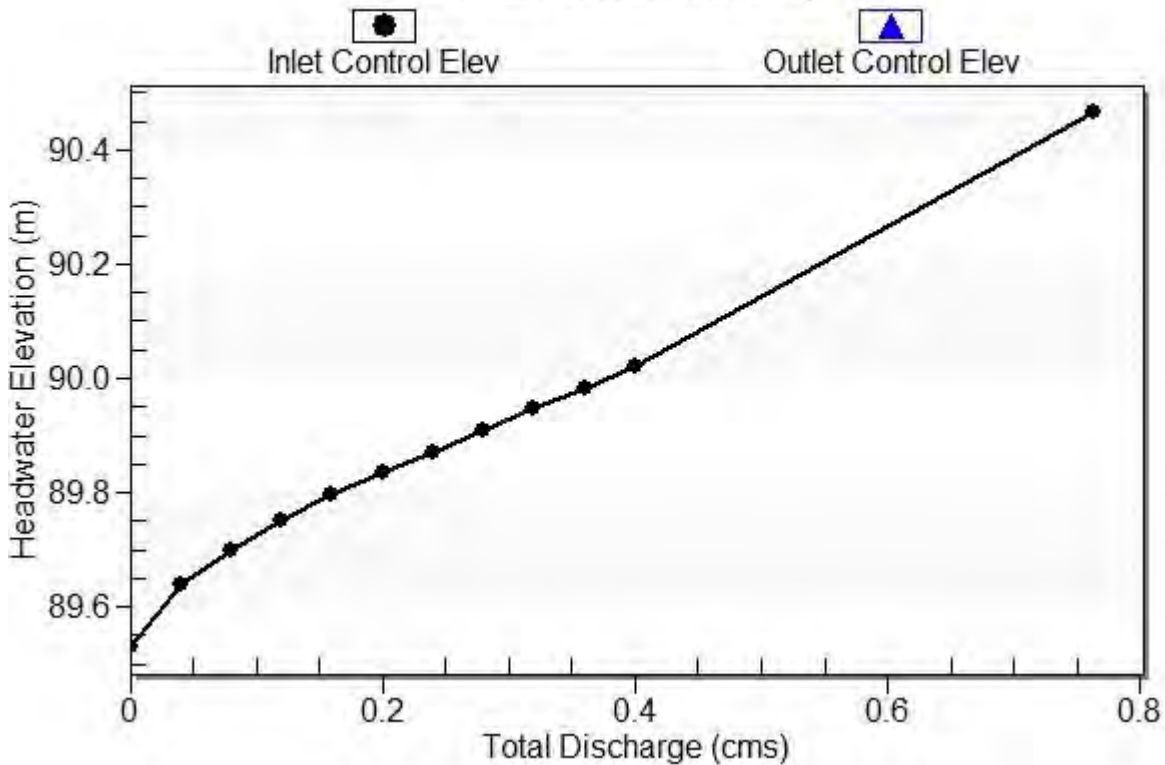
Inlet Elevation (invert): 89.53 m, Outlet Elevation (invert): 89.50 m

Culvert Length: 21.55 m, Culvert Slope: 0.0014

Culvert Performance Curve Plot: East Ditch Site Culvert 10y

Performance Curve

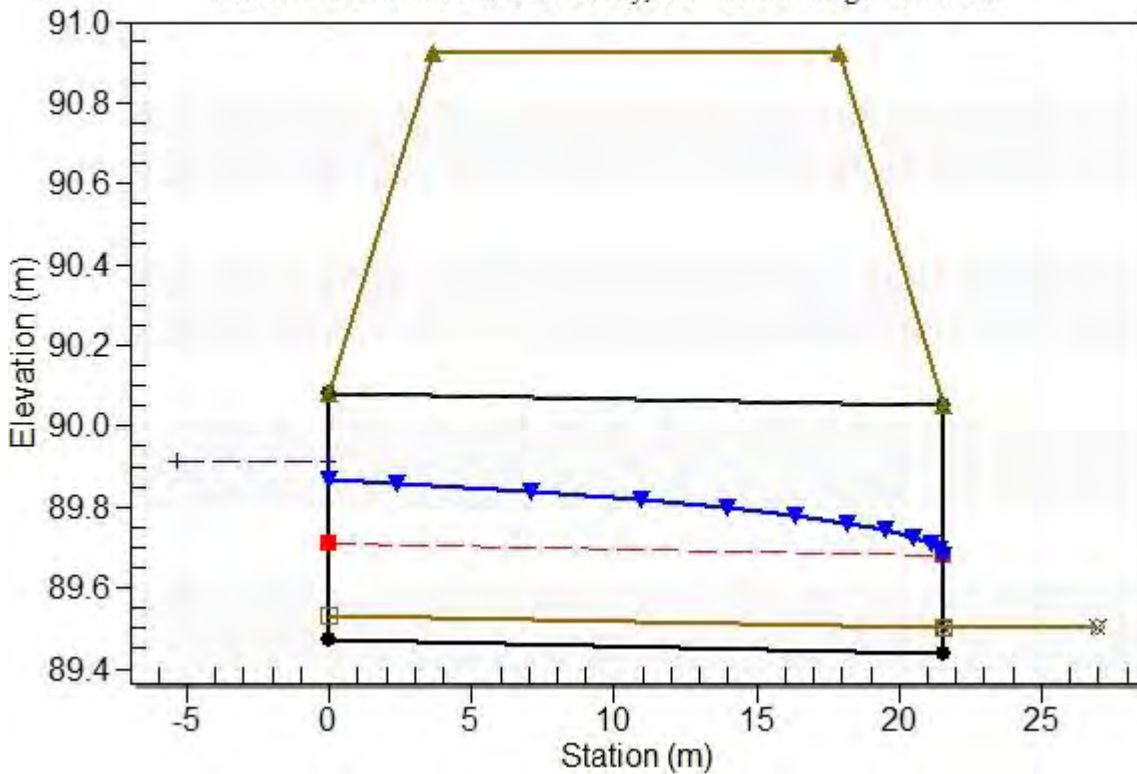
Culvert: East Ditch Site Culvert 10y



Water Surface Profile Plot for Culvert: East Ditch Site Culvert 10y

Crossing - East Ditch Site Culvert 10y, Design Discharge - 0.20 cms

Culvert - East Ditch Site Culvert 10y, Culvert Discharge - 0.20 cms



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

Total Rating Curve

Crossing: West Ditch Site Culvert 100y

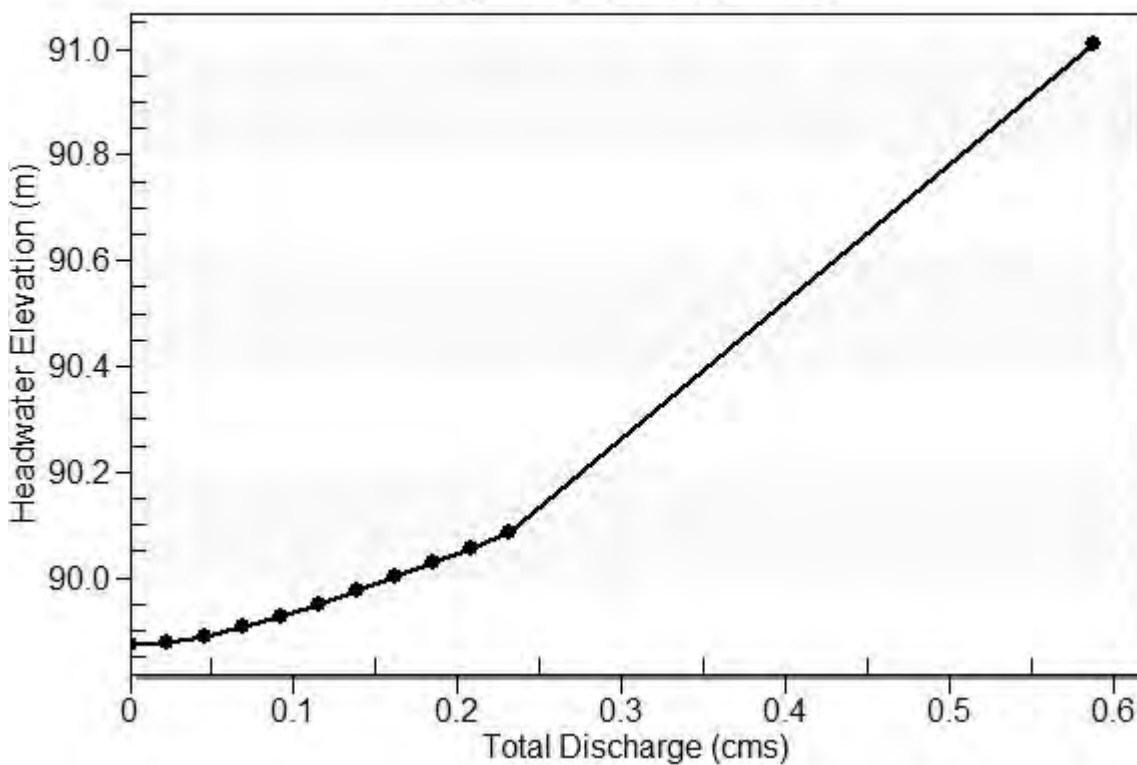


Table 8 - Culvert Summary Table: West Ditch Site Culvert 100y

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

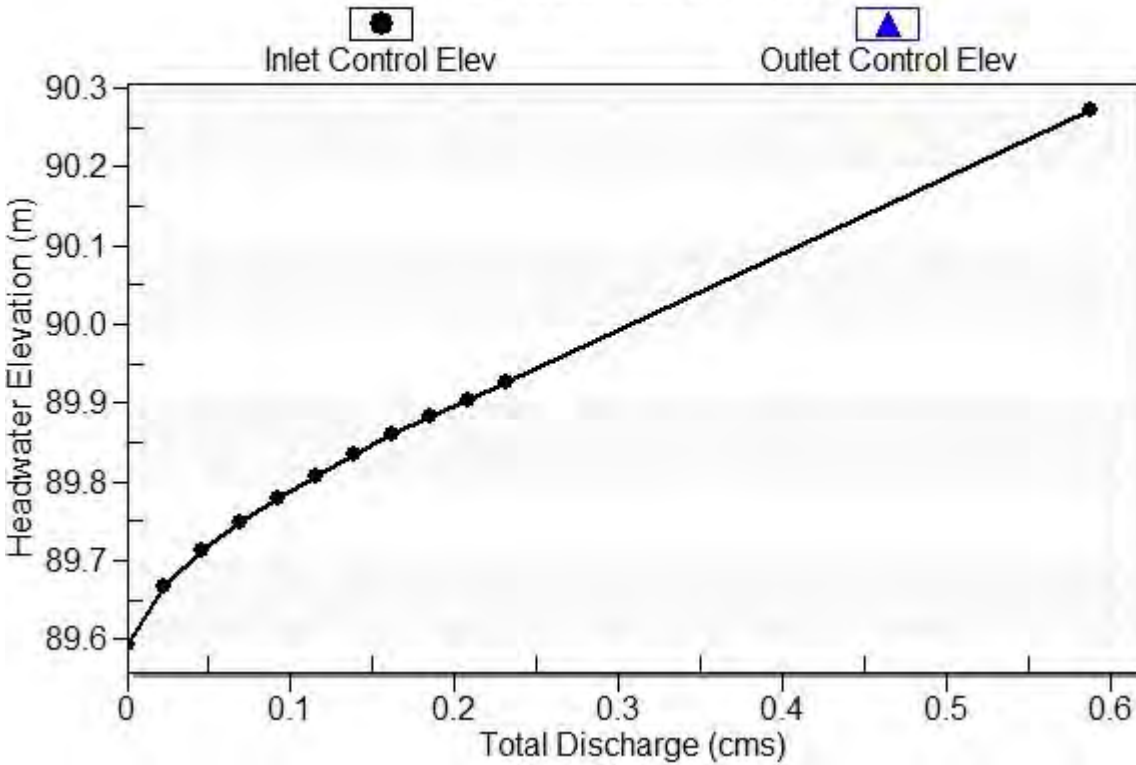
Inlet Elevation (invert): 89.59 m, Outlet Elevation (invert): 89.55 m

Culvert Length: 36.00 m, Culvert Slope: 0.0011

Culvert Performance Curve Plot: West Ditch Site Culvert 100y

Performance Curve

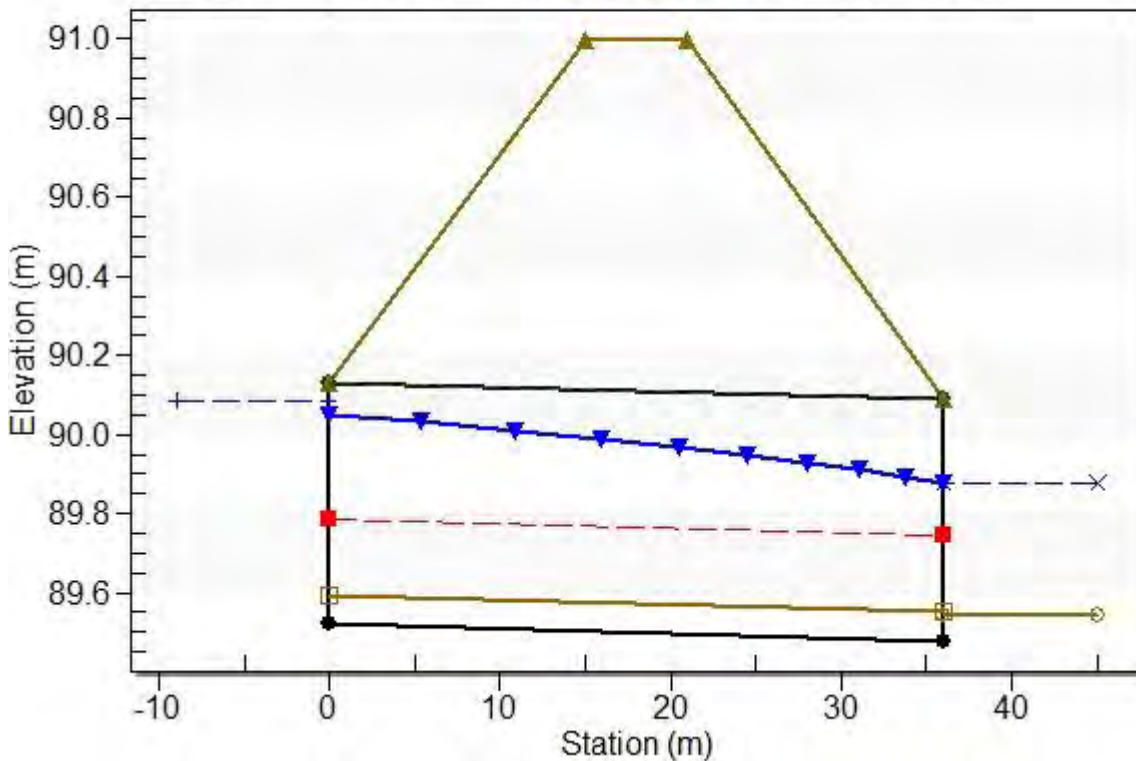
Culvert: West Ditch Site Culvert 100y



Water Surface Profile Plot for Culvert: West Ditch Site Culvert 100y

Crossing - West Ditch Site Culvert 100y, Design Discharge - 0.23 cms

Culvert - West Ditch Site Culvert 100y, Culvert Discharge - 0.23 cms



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

Total Rating Curve

Crossing: East Ditch Site Culvert 100y

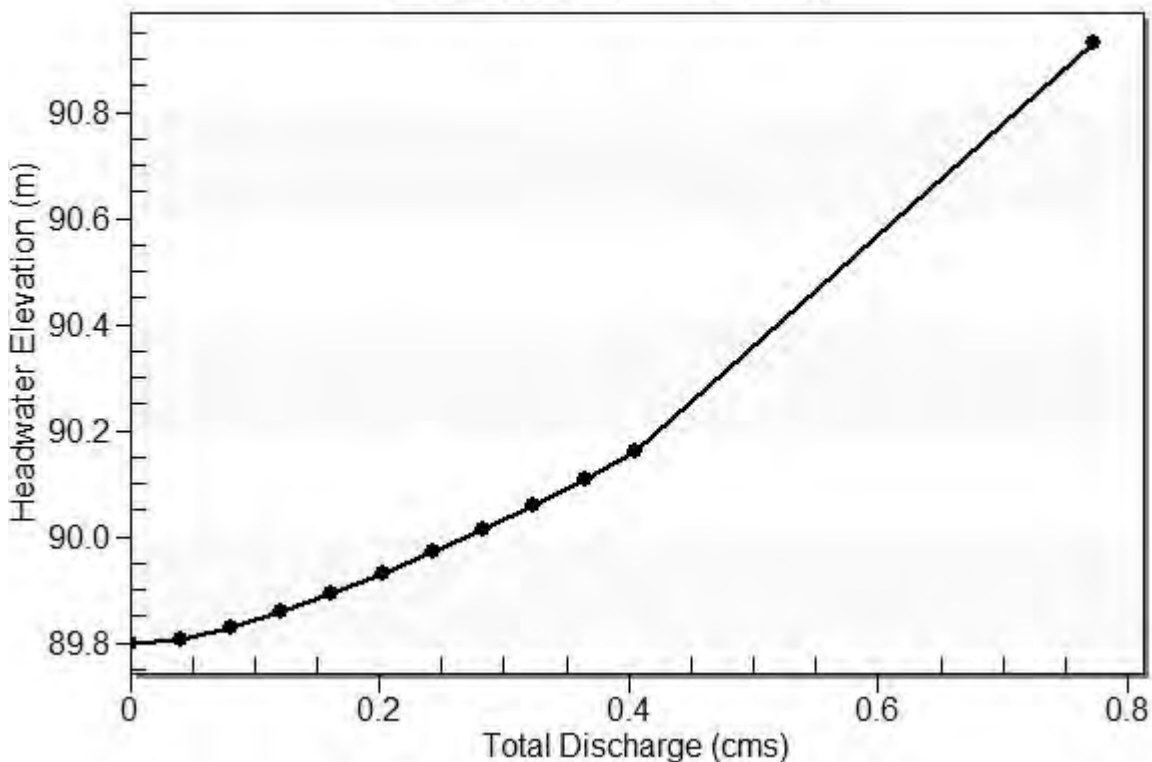


Table 11 - Culvert Summary Table: East Ditch Site Culvert 100y

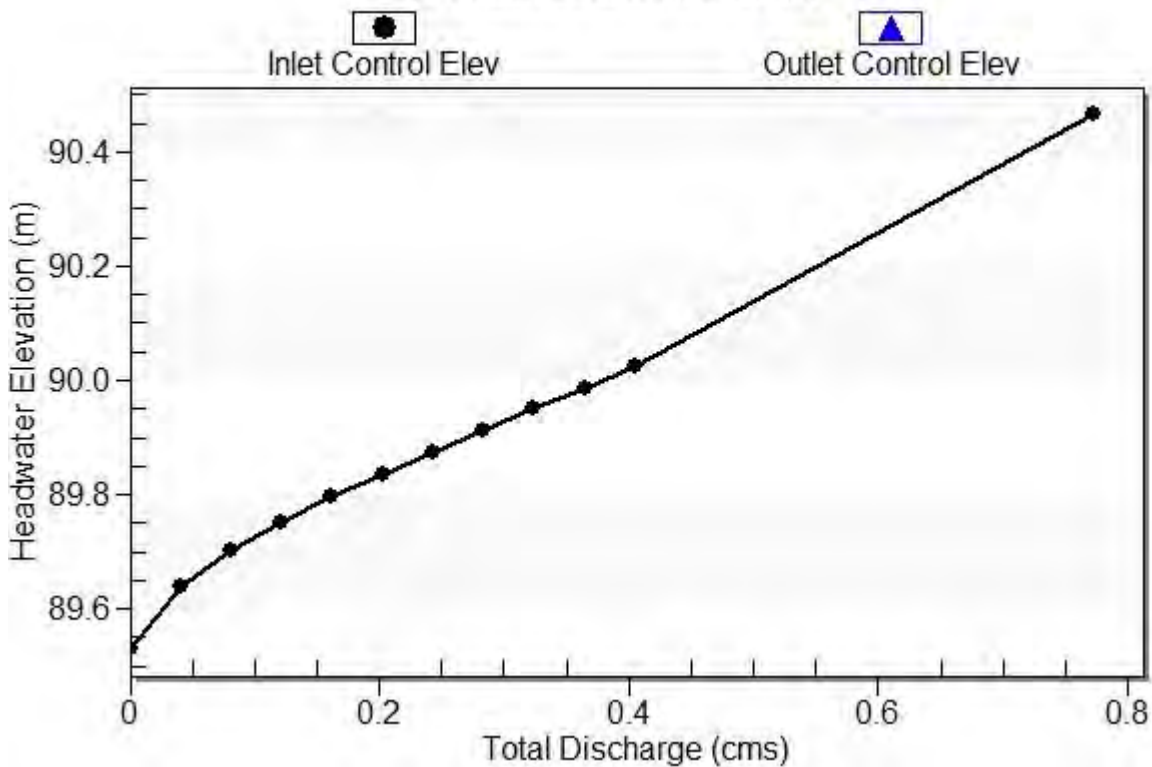
Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.80	0.000	0.270	0-NF	0.000	0.000	0.300	0.300	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

Performance Curve

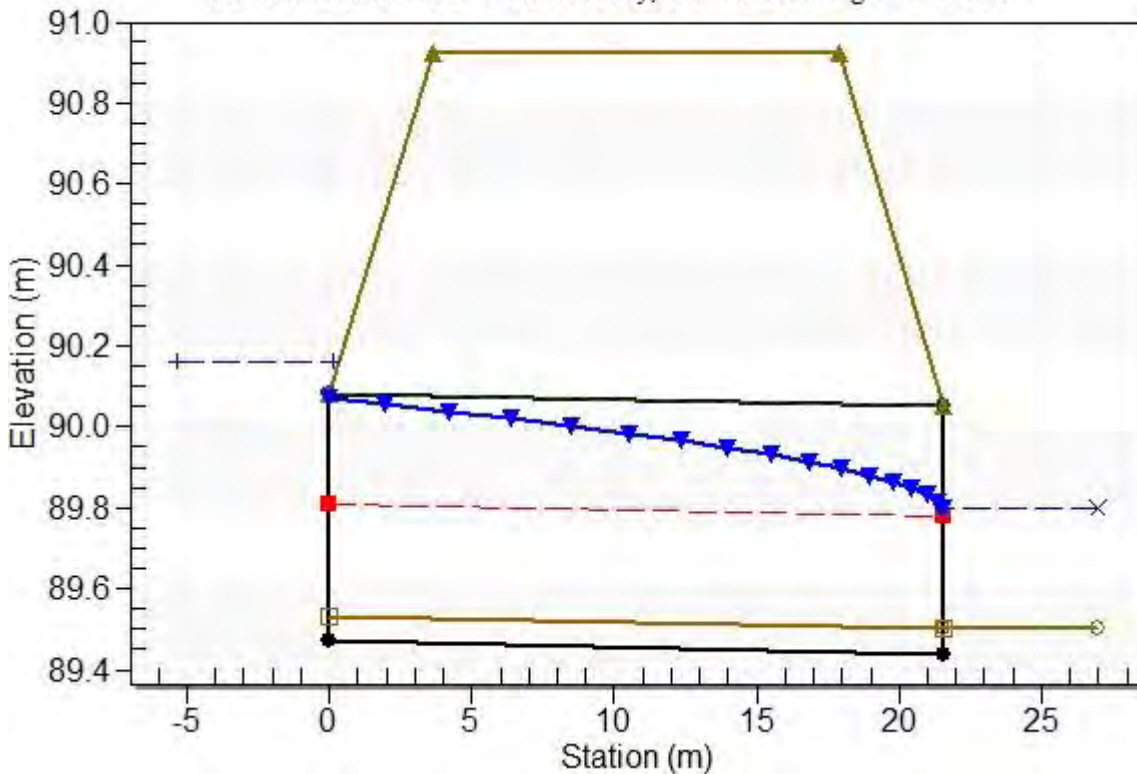
Culvert: East Ditch Site Culvert 100y



Water Surface Profile Plot for Culvert: East Ditch Site Culvert 100y

Crossing - East Ditch Site Culvert 100y, Design Discharge - 0.40 cms

Culvert - East Ditch Site Culvert 100y, Culvert Discharge - 0.40 cms



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

Total Rating Curve

Crossing: Transfer Culvert 100y

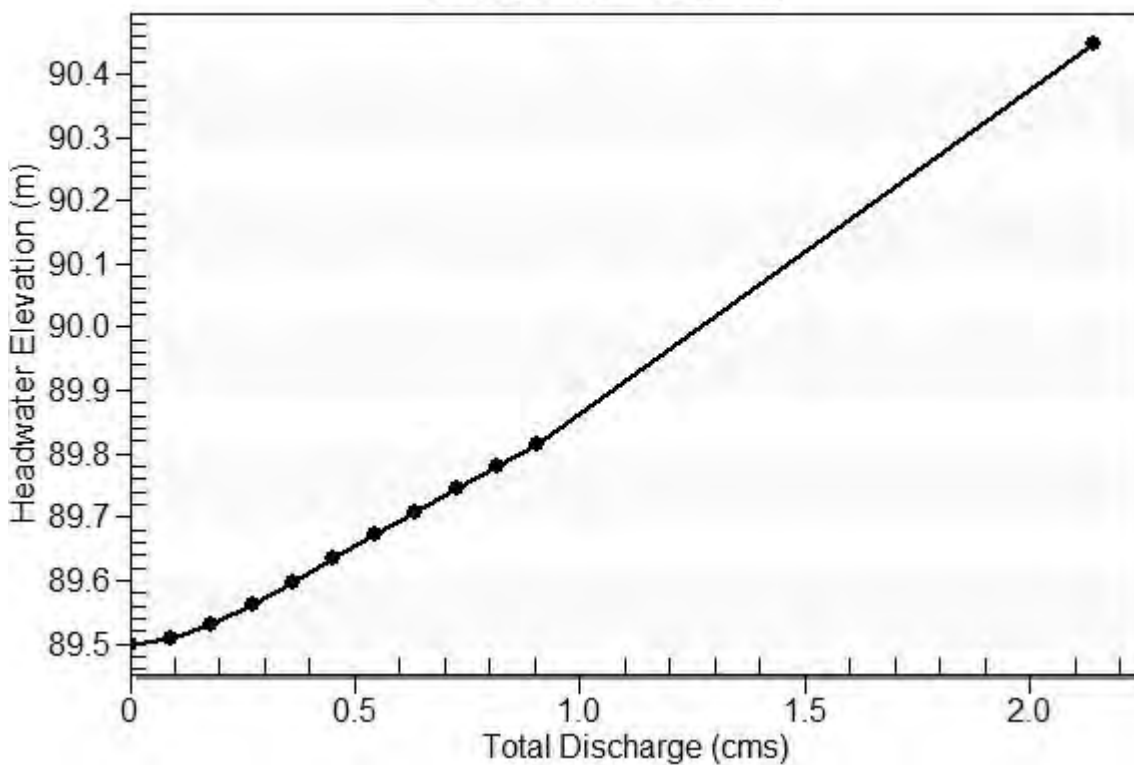


Table 14 - Culvert Summary Table: Transfer Culvert 100y

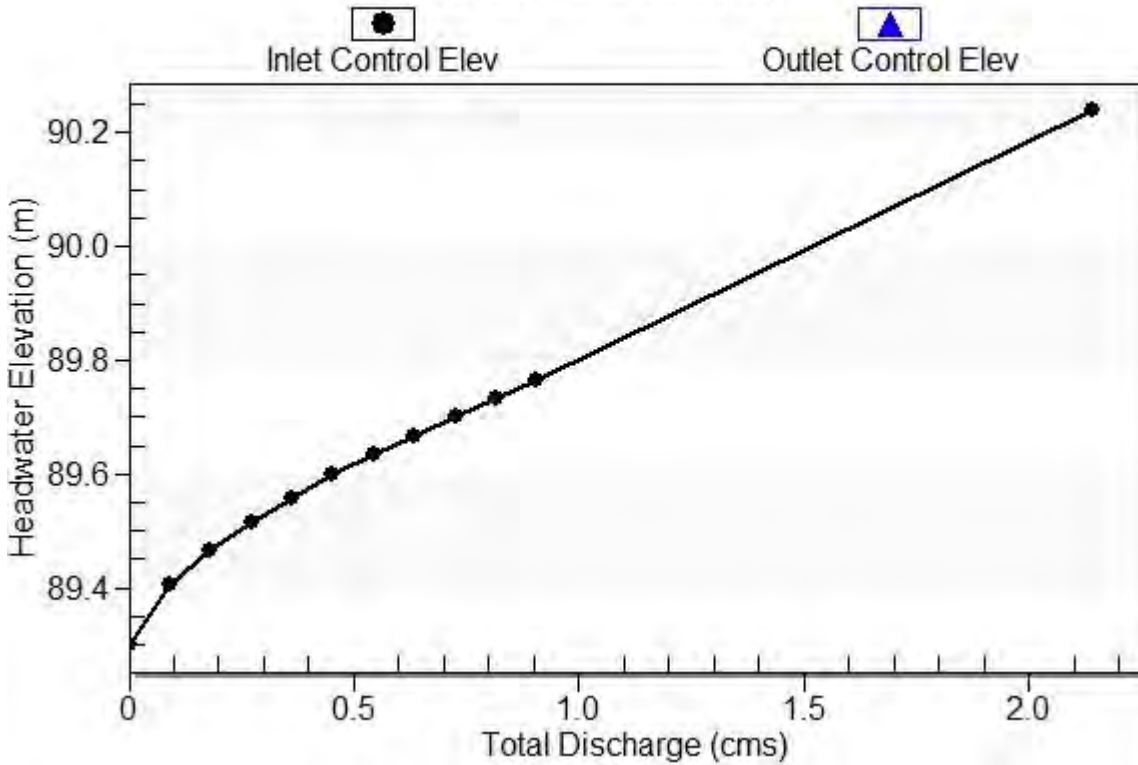
Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	89.50	0.000	0.200	0-NF	0.000	0.000	0.325	0.325	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

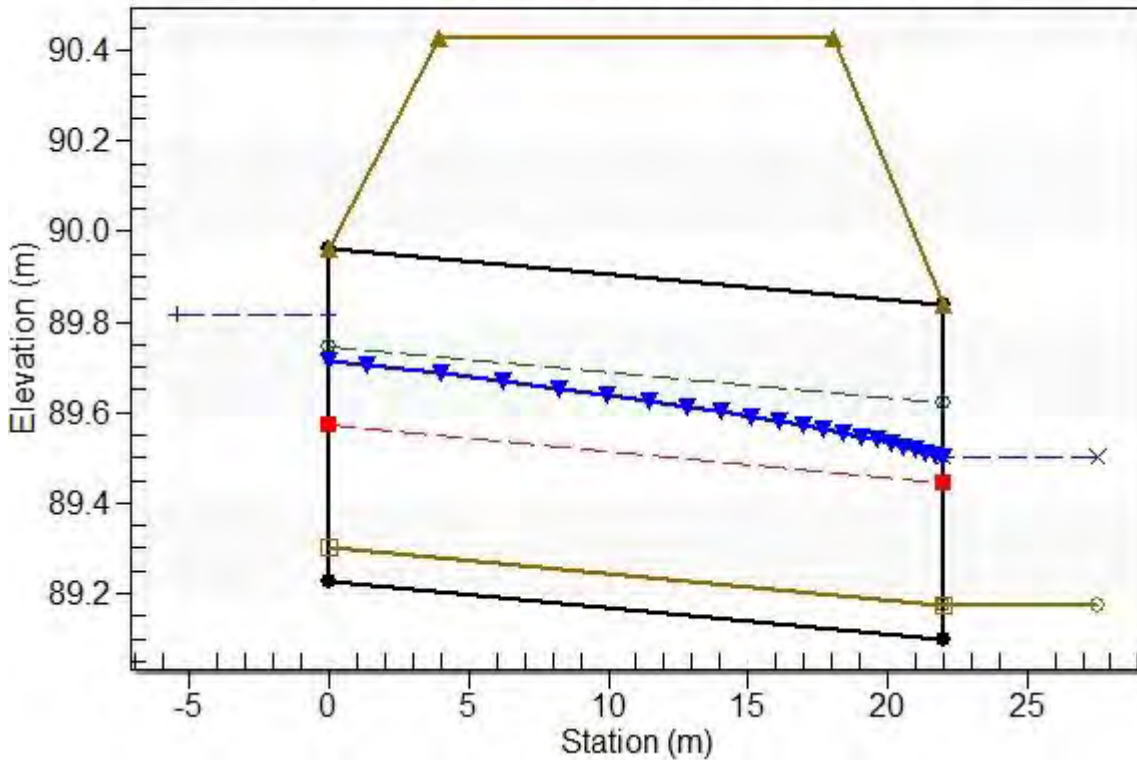
Culvert Performance Curve Plot: Transfer Culvert 100y
Performance Curve
 Culvert: Transfer Culvert 100y



Water Surface Profile Plot for Culvert: Transfer Culvert 100y

Crossing - Transfer Culvert 100y, Design Discharge - 0.91 cms

Culvert - Transfer Culvert 100y, Culvert Discharge - 0.91 cms



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 m²

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/m²

Calculated Avg Shear Stress: 1.9013 N/m²

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 m²
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/m²
Calculated Avg Shear Stress: 1.4294 N/m²

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 m²
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/m²
Calculated Avg Shear Stress: 2.5269 N/m²

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 m²
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/m²
Calculated Avg Shear Stress: 1.9201 N/m²

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 m²
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/m²
Calculated Avg Shear Stress: 2.0376 N/m²

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 m²
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/m²
Calculated Avg Shear Stress: 1.5506 N/m²



PROJECT NAME: Warehouse Development
 CIMA+ PROJECT NUMBER: A001083
 CLIENT: Fastfrate (Ottawa) Holdings Inc.
 PROJECT STATUS: 90 % Design (Site Plan Approval)

July 25, 2021

HYDRAULIC CALCULATIONS FOR STORM SEWERS

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012
2. City of Ottawa Technical Bulletins up to and including ISTB-2018-01

DESIGN BASIS:

Manning Coefficient : 0.013
 Maximum permitted velocity : 3.00 m/s
 Minimum permitted velocity : 0.80 m/s

Section	Dia. mm	Length m	Slope %	Invert upstream m	Invert downstream m	Capacity (full) m³/s	Velocity (full) m/s	Flow m³/s	Velocity (actual) m/s	% Full
Building Service Connection / STM 1	600	29.3	1.00%	89.750	89.460	0.614	2.17	0.213	1.96	35%
STM 2	600	21.9	0.50%	89.430	89.320	0.435	1.54	0.283	1.64	65%
STM 3	600	13.2	0.50%	87.765	87.700	0.435	1.54	0.283	1.64	65%
Outlet				87.700						

Remarks

The data in green has been calculated or modified by the designer
 The data in blue has been calculated using formulas inserted by the designer

Notes :

1. Storm Sewer Peak Flow Determined per Roof Restricted flow of 213 L/s; and uncontrolled flow from Catchments A4 of 35.792 L/s and from Catchment A5 of 34.458 L/s.

Prepared by: Guillaume LeBlond, M.A.Sc., EIT
 PEO No.: 100530467

Date: 2021-07-25

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 1E+08

Date: 2021-07-25



Appendix I - Potable Water & Fire Protection Calculations.





PROJECT NAME: Fastrate Warehouse Development
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastrate (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:

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., EIT Date: 2021-07-26
 PEO# 100530467

Verified by: Christian Lavoie-Lebel, P.Eng. Date: 2021-07-26
 PEO# 100173201



PROJECT NAME: Fastrate Warehouse Development
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastrate (Ottawa) Holdings Inc.
PROJECT STATUS: 90 % Design (Site Plan Approval)

FIRE FLOW ASSESSMENT

APPLICABLE DESIGN GUIDELINES:

1. Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999
2. Ottawa Design Guidelines - Water Distribution (2010) including Appendix H per ISTB-2018-02
3. City of Ottawa Technical Bulletin ISTB-2018-02
4. MOE Design Guidelines for Drinking-Water Systems

STEP A - DETERMINE THE TYPE OF CONSTRUCTION

Type of Construction	Coefficient (C)	Value Selected (C)
Fire-resistive Construction (> 3 hours)	0.6	0.6
Non-combustible Construction	0.8	
Ordinary Construction	1	
Wood Frame Construction	1.5	

STEP B - DETERMINE THE FLOOR AREA

Floor/Level	Floor Area Per Level (sq. ft.)	Floor Area Per Level (m2)	Fire Resistive Building	Protected Openings (one hour rating)	Area of Structure Considered (m2)
Gross Floor Area (GFA) Ground Level:	92,376	8,582	YES	YES	8,582
TOTAL FLOOR AREA (A):	92,376	8,582			8,582

STEP C - DETERMINE THE HEIGHT IN STOREYS

Floor/Level	Number of Storeys	Percent of Floor Area Considered
Ground Level:	1	100%
HEIGHT IN STOREYS:	1	

STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

$$F = 220C\sqrt{A}$$

Where:

- F is the required fire flow in L/min
- C is the coefficient related to the type of construction, and;
- A is the total floor area of the building in m²

Coefficient Related to Type of Construction (C) = 0.6
 Floor Area Considered (A) = 8,582 m²

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	1.00
Limited combustible	0.85	
Combustible	1.00	
Free burning	1.15	
Rapid burning	1.25	

REQUIRED (BASE) FIRE FLOW (F) = 12000 L/min (Not rounded)



PROJECT NAME: Fastfrate Warehouse Development
CIMA+ PROJECT NUMBER: A001083
CLIENT: Fastfrate (Ottawa) Holdings Inc.
PROJECT STATUS: 90 % Design (Site Plan Approval)

FIRE FLOW ASSESSMENT

STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Sprinkler System Design	Sprinkler Design Charge	Value Selected (C)	Total Charge
Automatic sprinkler system conforming to NFPA standards	-30%	Yes	-30%
Standard water supply	-10%	No	0%
Fully supervised system	-10%	No	0%
TOTAL CHARGE FOR SPRINKLER SYSTEM			-30%

DECREASE FOR SPRINKLER PROTECTION = **-3600** L/min (Not rounded)

STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Façade	Separation Distance (m)	Length-height Factor of Exposed Wall (m-storeys)	Assumed Construction of Exposed Wall of Adjacent	Total Charge
North Façade	>45	N/A	N/A	0%
East Façade (fire/party wall)	>45	N/A	N/A	0%
South Façade	>45	N/A	N/A	0%
West Façade	>45	N/A	N/A	0%
TOTAL CHARGE FOR EXPOSURES				0%

INCREASE FOR EXPOSURES = **0** L/min (Not rounded)

STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP F + STEP G, ROUND TO NEAREST 1,000 L/min)

TOTAL REQUIRED FIRE FLOW (RFF) = **8000** L/min (Rounded to Nearest 1,000 L/min)
133.3333333 L/s
2113 USGPM



PROJECT NAME: Fastfrate Warehouse Development

CIMA+ PROJECT NUMBER: A001083

CLIENT: Fastfrate (Ottawa) Holdings Inc.

PROJECT STATUS: 90 % Design (Site Plan Approval)

FIRE FLOW ASSESSMENT

NOTES/COMMENTS:

STEP A - DETERMINE THE TYPE OF CONSTRUCTION

1. No notes or comments

STEP B - DETERMINE THE FLOOR AREA

1. Assumed vertical openings and exterior vertical communications are properly protected (one hour rating), thus only the area of the largest floor plus 25% of each of the two immediately adjoining floors accounted for per Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999

2. Per the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999, Note E: Fire Walls - In determining floor areas, a fire wall that meets or exceeds the requirements of the current edition of the National Building Code of Canada (provided this necessitates a fire resistance rating of 2 or more hours) may be deemed to subdivide the building into more than one area or may, as a party wall, separate the building from an adjoining building. It is assumed that the party wall to the east will have a fire-resistance rating of at least two hours.

STEP C - DETERMINE THE HEIGHT IN STOREYS

1. Two levels of underground parking not considered as they are at least 50% below grade (note F of Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999)

STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

1. No notes or comments.

STEP E - DETERMINE THE INCREASE OR DECREASE FOR OCCUPANCY AND APPLY TO STEP D (STEP D x STEP E, DO NOT ROUND)

1. Occupancy selected assuming commercial establishment will fall under C-3 occupancy type.

STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

1. Assumes sprinkler system will not be fully supervised.

STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

1. Assumes adjoining wall to east is an unpierced party wall considered to form a boundary when determining floor areas warranting a 10% exposure charge per Note E of the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999

STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP F + STEP G, ROUND TO NEAREST 1,000 L/min)

1. No notes or comments.

Prepared by: Julien Sauvé, P.Eng.
PEO# 100200100

Date: 2020-07-26

Verified by: Christian Lavoie-Lebel, P.Eng.
PEO# 100067842

Date: 2020-07-26



PROJECT NAME: Warehouse Development
 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 :

- Slope of 3.00% has been assumed for all building connections.

Prepared by: Guillaume LeBlond, M.A.Sc., EIT
 PEO No.: 100530467

Date: 2021-07-25

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: 2021-07-25



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"

Only temperatures from winter (Dec 21 – March 21) are used for calculation.

Freezing Degree Days (FDD) are computed with this simple formula:

$$FDD = 0^{\circ}\text{C} - T_{(daily\ mean)}$$

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

Prepared by 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 Distribution Pipe	25	m	
Number of Distribution Pipes	7		
Total Length	175	m	
Diameter	0.025	m	
Cross Sectional Area	0.000490874	m ²	
Total Volume of Distribution Pipe	0.085902924	m ³	
Total Volume of Distribution Pipe	85.90	L	
75% of Volume of Distribution 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)

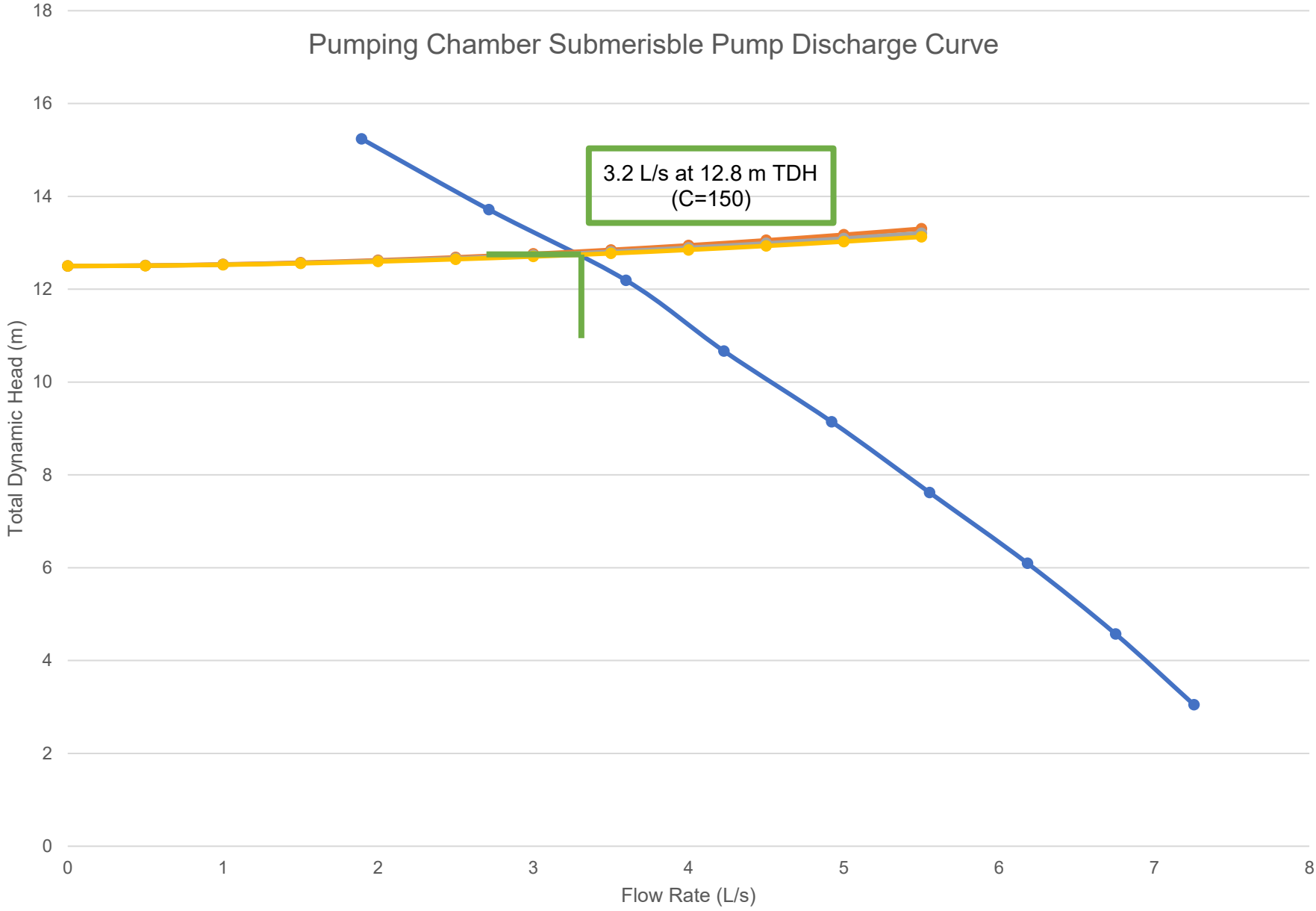
Parameter	Value	Unit	Notes	Flow		Velocity m/s	Fitting Loss (K*V^2/2*g) m	Pipe Friction Losses Friction Coefficient (C) in m			Static Head m	Pressure to be dosed m	Total Dynamic Head Loss (m)		
				L/s	m3/s			140	150	160			140	150	160
Low Water Level	86.712	mASL		0	0.0000	0.0E+00	0.0E+00	0.00	0.00	0.00	2.5	10	12.50	12.50	12.50
Top of Pipe	89.212	mASL		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
Static Head	2.5	m		1	0.0010	2.0E-06	1.0E-12	0.03	0.03	0.03	2.5	10	12.53	12.53	12.53
Pipe Diameter	0.05	m		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
Pipe Area	0.001963495	m2		2	0.0020	3.9E-06	4.1E-12	0.12	0.11	0.10	2.5	10	12.62	12.61	12.60
Pipe Length	5	m		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
Pressure at end	10	m		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
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												

Level IV Treatment Unit Discharge Pumps (to SBT Leaching Bed)

Parameter	Value	Unit	Notes	Flow		Velocity m/s	Fitting Loss (K*V^2/2*g) m	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 m	Pressure to be dosed m	Total Dynamic Head Loss (m)		
				L/s	m3/s			140	150	160	140	150	160			140	150	160
Low Water Level	86.712	mASL		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
Top of Pipe	89.212	mASL		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
Static Head	2.5	m		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
Pipe Diameter	0.05	m		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
Pipe Area	0.001963495	m2		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
Pipe Length	18	m		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
Pipe Diameter	0.025	m		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
Pipe Area	0.000490874	m2		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
Pipe Length	26	m		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
Pressure at end	0.6	m	per OOWA best practices	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
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															

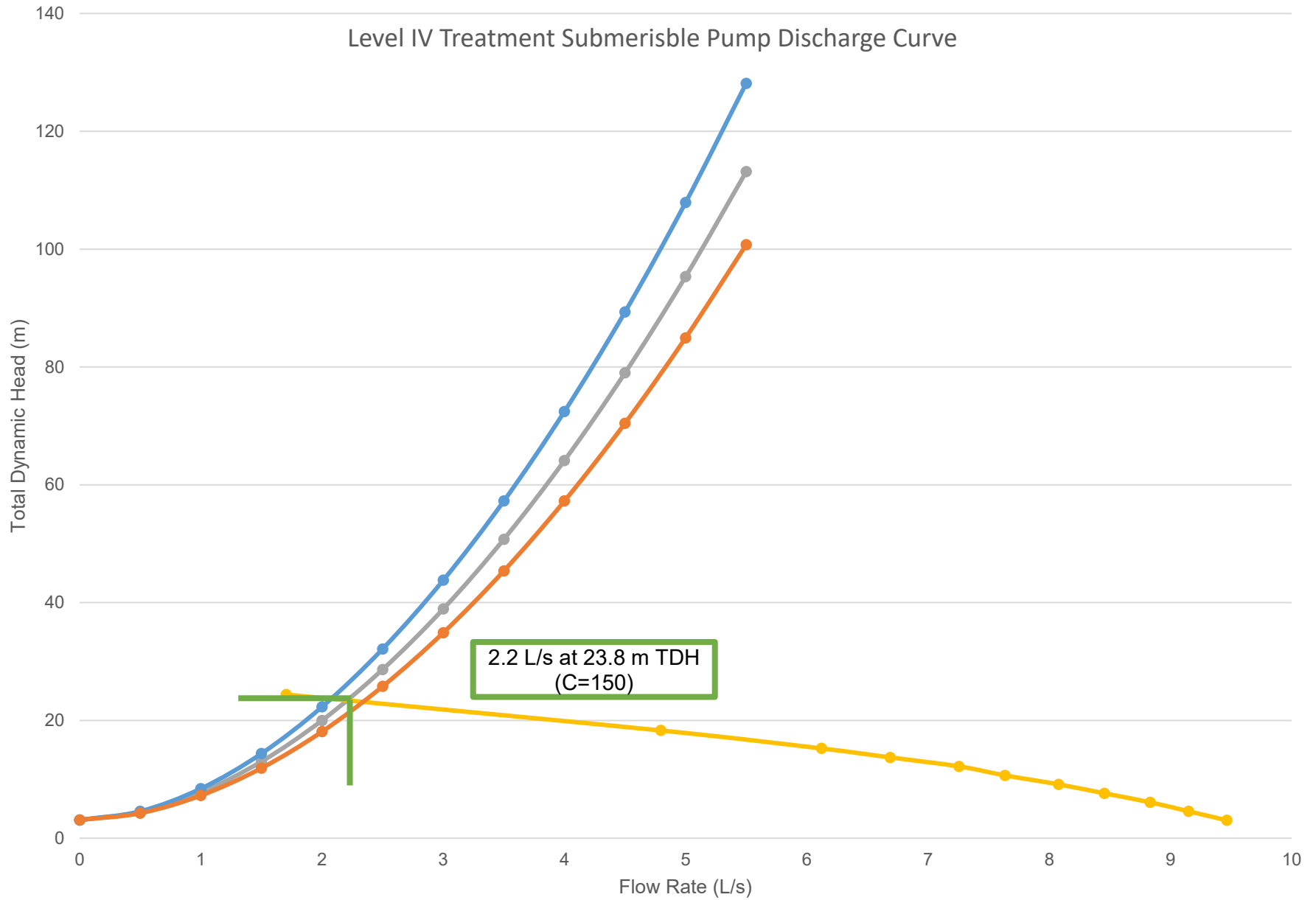
Recycle Line Pump (from Level IV Treatment to Upstream of the Septic System)															
Parameter	Value	Unit	Notes	Flow		Velocity m/s	Fitting Loss (K*V ² /2*g) m	Pipe Friction Losses Friction Coefficient (C) in m			Static Head m	Pressure to be dosed m	Total Dynamic Head Loss (m)		
				L/s	m ³ /s			140	150	160			140	150	160
Low Water Level	86.712	mASL													
Top of Pipe	89.212	mASL		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
Static Head	2.5	m		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
Pipe Diameter	0.05	m		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
Pipe Area	0.001963495	m ²		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
Pipe Length	18	m		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
Pressure at end	0.6	m		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
Fittings	K Value	Qty	Total	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
90 degree elbows	0.81	3	2.43	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
Check Valve	10.8	1	10.8	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
Ball Valve	0.08	1	0.08	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
		Subtotal	13.31	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
		Safety Factor	1.2	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
		Total	14.51	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 Submersible Pump Discharge Curve



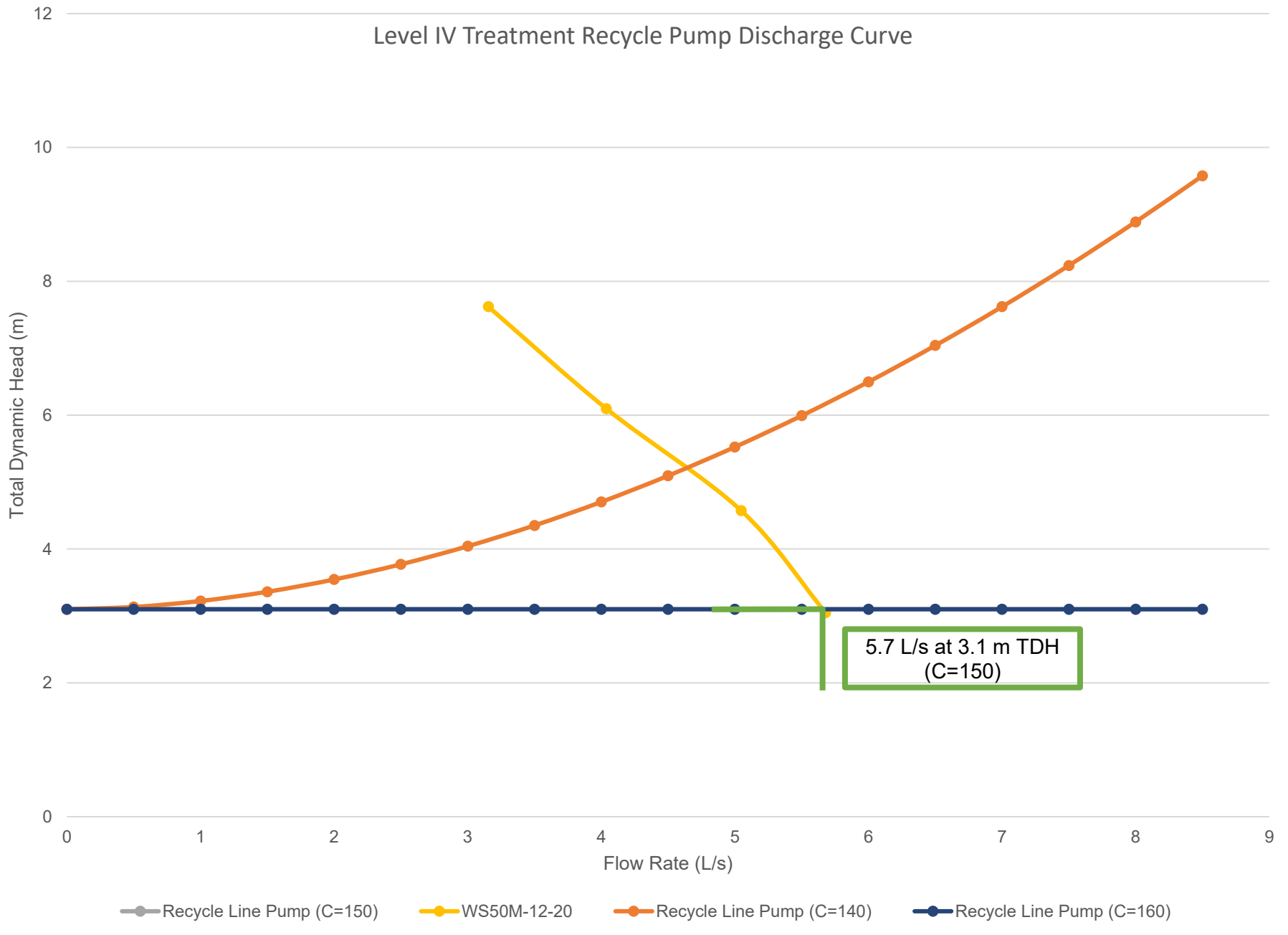
WS50HAM-12-20 Pump Chamber Discharge (C=140) Pump Chamber Discharge (C=150) Pump Chamber Discharge (C=160)

Level IV Treatment Submersible Pump Discharge Curve



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



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/m²/d
 Peaking factor: 1.5 unitless
 Extraneous 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%, otherwise use 1.0
 Institutional Peak factor: 1.5 if institutional contribution >20%, 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 Design 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

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)

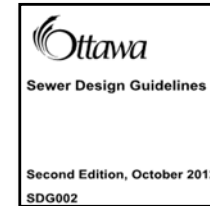
EXTRANEANEOUS FLOWS (Typical values for Partially Separated Sewers):
 Local Street Level Analysis (less than or equal to 10 ha):
 Wet Weather Extraneous Flow: 5.0 L/s/gross ha (rare event)
 Annual event to be determined at design
 Neighborhood Level Analysis (between 10 ha and 100 ha):
 Wet Weather Extraneous 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

Prepared by: Guillaume LeBlond, M.A.Sc., EIT.
 PEO No.: 100530467

Date: July 20 2021

Verified by: Christian Lavoie-Lebel, P.Eng.
 PEO No.: 100067842

Date: July 20 2021



\\cma.plus\cimal\Cima-C10\Ott_P\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



Appendix L - Correspondence



APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.

A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer to:

<http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans>

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	5	1. Site Servicing Plan	2. Assessment of Adequacy of Servicing	S	5
S	5	3. Grade Control and Drainage Plan	4. Geotechnical Study	S	5
■		5. Composite Utility Plan	6. Groundwater Impact Study	■	
■		7. Servicing Options Report	8. Wellhead Protection Study	■	
S	5	9. Transportation Impact Study	10. Erosion and Sediment Control Plan	S	5
S	5	11. Storm water Management Plan	12. Hydrogeological and Terrain Analysis	S	5
■		13. Hydraulic Water main Analysis	14. Noise / Vibration Study	S	5
■		15. Roadway Modification Design Plan	16. Confederation Line Proximity Study	■	

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
■		17. Draft Plan of Subdivision	18. Plan Showing Layout of Parking Garage	■	
■		19. Draft Plan of Condominium	20. Planning Rationale	S	3
S	5	21. Site Plan (<i>can be combined with Landscape Plan</i>)	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 (<i>can be combined with Site Plan</i>)	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 (<i>Include in EIS</i>)	41. Environmental Impact Statement (<i>please contact the SNC</i>)	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 proposed 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 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.

Engineering Comments (Provided by Harry Alvey, Infrastructure Project Manager)

- 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 met jointly from these ponds.
- Information will need to be provided for fire siamese connections to the building for the sprinklers. These will need to be accessible from fire lanes for fire trucks.
- Provide fire flow computations based on FSU method and information on interior fire sprinkler system.
- This site has been filled with uncontrolled fill. The geotechnical report will should provide an analysis of these soils and their ability to provide adequate bearing capacity for the traffic and proposed structures on site.
- The geotechnical report will need to include a section on slope stability for the slopes along Rideau Road and Somme Street.
- Percolations tests should be provided to indicate that an appropriate infiltration rate can be achieved for the needed septic discharge. This should be provided in the hydrogeological report.
- Truck traffic maneuvers for the proposed trucks, fire trucks and garbage trucks should be modeled in AutoTurn for onsite to show there is adequate access/space for these vehicles to maneuver safely. This analysis should also show proposed location of proposed well if it is in or adjacent to the pavement.
- For onsite design of pavement provide the ESAL's expected for the site, the CBR or Mr of the subgrade soils, frost heave potential and proposed pavement design.
- The stormwater management will require a direct submission of the ECA to the MECP. The current turnaround times for these ECA applications are approximately 11 to 12 months.

Feel free to contact Harry Alvey at Harry.Alvey@ottawa.ca, for follow-up questions.

Transportation Comments (Provided by Mike Giampa, Transportation Project Manager)

- A Transportation Impact Assessment (TIA) is warranted, please proceed to scoping.
- The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (*if applicable*) and/or monitoring report (*if applicable*).
- Although a full review of the TIA Strategy report (*Step 4*) is not required prior to an application, it is strongly recommended.

- Right-of-way protection on Rideau is 26 metres and the sight triangle at Somme/Rideau: 5 metre x 5 metres
 - A Road Noise Impact Study is required for the proposed office use.
- Feel free to contact Mike Giampa at Mike.Giampa@ottawa.ca, for follow-up questions.

Environmental Comments (Provided by Matthew Hayley, Environmental Planner)

- The lot was created as part of a subdivision (15-94-0505) and in 2008 a “Tree Preservation and Protection Plan, Proposed Industrial Subdivision (Excluding Orgaworld site)...” was prepared by Golder Associates; dated October 15, 2008 as part of the final approval of the subdivision. This document will need to be followed.
- The site plan will need to have a Tree Conservation Report (TCR) to implement the previously approved tree preservation and protection plan. The TCR will also need to reflect current requirements regarding butternuts and other Official Plan policies. The proposal to add parking within the wooded area will not be supported if this area is identified from preservation in the approved tree preservation and protection plan.
- Please note that a watercourse is mapped along Rideau Road and the South Nation Conservation Authority should be consulted as the proposed parking lot may be within 30 m of this mapped feature. You will need to support this location for the parking lot as per the Official Plan and the Shields Creek Subwatershed study.

Feel free to contact Matthew Hayley at Matthew.Hayley@ottawa.ca, for follow-up questions.

Hydrogeological Comments (Provided by Michel Kearney, Hydrogeologist)

- A Hydrogeological and Terrain Analysis report is required, in accordance with Procedures D-5-4 and D-5-5 of the Ministry of the Environment, Conservation and Parks. This will include the siting, drilling and testing of the production well (*i.e. not just a test well*).
- It appears that there are thin soils (*defined as 2 m or less*) on the subject site. Enough test pits and boreholes are to be put down in the area of the leaching bed and in the surrounding area to assess the risk to the onsite well and any existing or future offsite wells. The report is to document the fieldwork and provide an opinion on the level of risk.
- Depending on the findings of the fieldwork, mitigation measures may be required in order to reduce the risk to the water supply. These may include a longer casing length for the well, a deeper aquifer source, an advanced (*Level 4 or beyond*) sewage treatment system and ensuring the well is upgradient from the sewage system. Discussion with the City’s technical reviewers is encouraged, as the study progresses.
- The well must be located in a landscaped area, away from traffic and potential sources of contamination, a minimum distance of 3 m from property lines and buildings, as well as the minimum distance to the sewage system as prescribed in the Ontario Building Code. Grades are to be provided on the Grading Plan for the top of casing, the ground at the well and 3 m away from the well, to demonstrate drainage away from the well in accordance with the Regulation (O.Reg. 903).

Feel free to contact Michel Kearney at Michel.Kearney@ottawa.ca, for follow-up questions.

Conservation Authority Comments (Provided by James Holland, Watershed Planner, SNC)

Natural Heritage

- A watercourse flows along Rideau Road towards the Findlay Creek Municipal Drain, approximately 70m downstream. Findlay Creek is a permanent feature watercourse known to contain sensitive aquatic species.
- To prevent soil erosion and impacts to surface water, development and site alteration should be set back 30 metres from the high water mark of the watercourse, or 15 metres from the existing top of bank, whichever is greater. This is consistent with Section 4.7.3 of the City of Ottawa's Official Plan and Section 69 of the Zoning By-law.
- For any development within the setback area, an EIS should be completed demonstrating that the development will have no negative impacts on the feature or its functions.

Stormwater Management

- Stormwater management must conform to the design for the Hawthorn Industrial Park and meet the current standards.
- Water quality should be managed so that post-runoff equals pre runoff volumes for the 1 or 5 and the 100 year event.
- Water quality should achieve 80% TSS removal.
- The stormwater design should include, at a minimum, a grading and drainage plan, sediment and erosion control plan and a supporting report with calculations demonstrating how the standards have been met.

Conservation Authority Regulations

- Any interference with a watercourse, including a roadside ditch, may require a permit under O. Regulation 170/06, and restrictions may apply.

Private Servicing

- The applicant should contact the Ottawa Septic Service Office for input on the design of private servicing.

Feel free to contact Planner, James Holland, at jholland@nation.on.ca, for follow-up questions.

Application Submission Information

Applications Type: **Site Plan Control, Complex.**

Application processing timeline generally depends on the quality of the submission. For more information on standard processing timelines, please visit: <https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/development-application-forms#site-plan-control>

Prior to submitting a formal application, it is recommended that you pre-consult with the Ward Councillor.

For information on application fees, please visit: <https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/fees-and-funding-programs/development-application-fees>

To request City of Ottawa plan(s) or report information please contact the City of Ottawa Information Centre: InformationCentre@ottawa.ca or (613) 580-2424 ext. 44455

Application Submission Requirements

For information on the preparation of Studies and Plans and the City's requirements, please visit: <https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans>

Please provide hard copies and electronic copy (PDF) of all plans and studies required.

All plans and drawings must be produced on A1-sized paper and folded to 21.6 cm x 27.9 cm (8½" x 11").

Note that many of the plans and studies collected with this application must be signed, sealed and dated by a qualified engineer, architect, surveyor, planner or designated specialist.

Julien Sauvé

From: Julien Sauvé
Sent: Wednesday, May 19, 2021 9:19 AM
To: Alvey, Harry; Brown, Adam
Cc: Christian Lavoie-Lebel; Tim Kennedy
Subject: 301 Somme Street. Fastfrate Meeting Minutes

Hi Harry,

Thanks a lot again for meeting with us. The following is a brief summary of our discussion.

Date of Meeting: May 18, 2021
Attendees: Harry Alvey – City of Ottawa
Adam Brown – City of Ottawa
Julien Sauvé – 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 not 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



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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
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From: Uzochina 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 **total** 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: Uzochina Ukeje <uukeje@gwal.com>
Cc: Christian Lavoie-Lebel <Christian.Lavoie-Lebel@cima.ca>; Peter Chan <pchan@gwal.com>; Tim Kennedy <Tim.Kennedy@cima.ca>; Julien Sauvé <Julien.Sauve@cima.ca>
Subject: [EXTERNAL]RE: A001083 - CBRE Fastfrate - Building Stormwater Management

Hi Uzo,

Just to clarify what I need from my last email:

I need the number of roof drains as well as the flowrate per drain .

Hope this clears up any confusion.

Thanks,

GUILLAUME LEBLOND, M.A.Sc., EIT
EIT / Infrastructures
EIT / Infrastructure



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de l'ingénierie



From: Guillaume LeBlond

Sent: July 8, 2021 10:44 AM

To: Uzochina 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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Employeur
CANADA 2019

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Servicing Study Guidelines for Development Applications

4. Development Servicing Study Checklist

4.1 General Content

Required Content	Reference Location
<input type="checkbox"/> Executive Summary (for larger reports only).	N/A
<input checked="" type="checkbox"/> Date and revision number of the report.	Cover Sheet
<input checked="" type="checkbox"/> Location map and plan showing municipal address, boundary, and layout of proposed development.	Report Figures, Appendix
<input checked="" type="checkbox"/> Plan showing the site and location of all existing services.	Appendix B
<input checked="" type="checkbox"/> 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
<input checked="" type="checkbox"/> Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.4, Appendix L
<input checked="" type="checkbox"/> 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 defensible design criteria.	Section 1.3 & 4.3.2
<input checked="" type="checkbox"/> Statement of objectives and servicing criteria.	Section 1 , 2.2.1, 3.2 & 4.2
<input checked="" type="checkbox"/> Identification of existing and proposed infrastructure available in the immediate area.	Section 1.2 & Appendix B
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Proposed phasing of the development, if applicable.	N/A
<input type="checkbox"/> Reference to geotechnical studies and recommendations concerning servicing.	Appendices B, C, D & E
<input type="checkbox"/> 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
<input type="checkbox"/> Confirm consistency with Master Servicing Study, if available	N/A
<input checked="" type="checkbox"/> Availability of public infrastructure to service proposed development	Section 1.2 & 3.1
<input checked="" type="checkbox"/> Identification of system constraints	Appendix C
<input checked="" type="checkbox"/> Identify boundary conditions	Appendix C
<input checked="" type="checkbox"/> Confirmation of adequate domestic supply and pressure	Section 3.2 & 3.3
<input checked="" type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
<input checked="" type="checkbox"/> Address reliability requirements such as appropriate location of shut-off valves	Appendix F
<input type="checkbox"/> Check on the necessity of a pressure zone boundary modification.	N/A
<input checked="" type="checkbox"/> 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
<input type="checkbox"/> 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

<input type="checkbox"/>	Description of off-site required feeder mains, 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
<input checked="" type="checkbox"/>	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2, Appendix I
<input type="checkbox"/>	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
<input checked="" type="checkbox"/> 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
<input type="checkbox"/> Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
<input type="checkbox"/> 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
<input checked="" type="checkbox"/> Description of existing sanitary sewer available for discharge of wastewater from proposed development	N/A
<input checked="" type="checkbox"/> 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
<input checked="" type="checkbox"/> 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
<input checked="" type="checkbox"/> Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 2.2
<input type="checkbox"/> 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
<input type="checkbox"/> Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
<input type="checkbox"/> Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Required Content	Reference Location
<input checked="" type="checkbox"/> 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
<input checked="" type="checkbox"/> Analysis of available capacity in existing public infrastructure.	Section 4.1, 4.3
<input checked="" type="checkbox"/> A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Appendix B, G
<input checked="" type="checkbox"/> 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
<input checked="" type="checkbox"/> 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
<input checked="" type="checkbox"/> Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 4.3, 4.4 & Appendix H
<input type="checkbox"/> Set-back from private sewage disposal systems.	Appendix F
<input type="checkbox"/> Watercourse and hazard lands setbacks.	Appendix F
<input checked="" type="checkbox"/> 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
<input type="checkbox"/> Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Section 4
<input checked="" type="checkbox"/> 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
<input type="checkbox"/> 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
<input checked="" type="checkbox"/> 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

<input type="checkbox"/>	Any proposed diversion of drainage catchment areas from one outlet to another.	Section 4.2, Appendix G
<input type="checkbox"/>	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Appendix F
<input type="checkbox"/>	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
<input type="checkbox"/>	Identification of potential impacts to receiving watercourses	Section 1.3.4
<input type="checkbox"/>	Identification of municipal drains and related approval requirements.	N/A
<input checked="" type="checkbox"/>	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 4.3 and 4.4
<input type="checkbox"/>	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
<input type="checkbox"/>	Inclusion of hydraulic analysis including hydraulic grade line elevations.	Appendix H
<input type="checkbox"/>	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 5
<input type="checkbox"/>	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
<input type="checkbox"/>	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

Required Content	Reference Location	
<input type="checkbox"/>	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
<input type="checkbox"/>	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
<input type="checkbox"/>	Changes to Municipal Drains.	N/A
<input type="checkbox"/>	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	
<input checked="" type="checkbox"/>	Clearly stated conclusions and recommendations	Section 6
<input type="checkbox"/>	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.	
<input type="checkbox"/>	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	