FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

1393 GRAHAMS LANE

CITY OF BURLINGTON
REGION OF HALTON

PREPARED FOR:

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(2621458 ONTARIO INC.)

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Northstone Capital Partners (2621458 Ontario Inc.) to prepare a Functional Servicing & Preliminary Stormwater Management Report to support the Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) for the property located at 1393 Grahams Lane (the Site) in the City of Burlington (the City) and Halton Region (the Region).

This report will demonstrate that the proposed development can be developed in accordance with the City of Burlington and Halton Region guidelines and standards from a fire and domestic water, wastewater, and stormwater management perspective.

The reports and design standards referenced during the preparation of this report includes:

- City of Burlington Pre-consultation Package (December 22, 2023)
- Major Transit Station Area (MTSA) Phase 2 Flood Hazard Assessment (WSP, March 2023)
- Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019)
- City of Burlington Growth Analysis Study (Dillon Consulting, June 2019)
- Fire Underwriters Survey Method – Water Supply for Public Fire Protection (2020)
- City of Burlington's Stormwater Management Design Guidelines (2020)
- Ministry of the Environment, Conservation and Parks Stormwater Management Planning and Design Manual (2003)
- Conservation Halton's Guidelines for Stormwater Management Engineering Submissions (2021)
- City of Burlington's Sustainable Building and Development Guidelines (December 2021)
- Updated Area Servicing Plan (ASP) for Stormwater, Water & Wastewater – Downtown Burlington (Wood, May 2020)

2.0 Site Description

The Site encompasses an area of 1.08 ha and is currently designated as an Urban Centre – Employment (Official Plan, 2020) and zoned as a Mixed-Use Corridor – Employment (MXE). According to the City of Burlington Pre-consultation Package (December 22, 2023), the Site is located within the Burlington GO Major Transit Station Area (MTSA) which is designated as the City's Urban Growth Centre and the focal point for growth and intensification.

Currently, the Site consists of an existing storage facility, outdoor storage areas, and a parking lot. The Site is bounded by:

- A parking lot and a commercial building to the north
- Commercial buildings to the east
- Grahams Lane and commercial buildings to the south
- A Canadian National Railway (CNR) spur line to the west

A section of the Hager-Rambo Diversion Channel flows east to west approximately 50 m north of the Site and was subject of a MTSA Phase 2 Flood Hazard Assessment (WSP, March 2023). Conservation Halton advised through email correspondence that the Flood Hazard Assessment found the Site is not located within a regulated flood hazard and no spill hazard has yet to be defined, therefore, no Conservation Halton permit is required as part of the development application (Schreiner to Fletcher, October 18, 2023). Please refer to Appendix A for email correspondence.

3.0 Proposed Development

The proposed development at 1393 Grahams Lane involves demolishing the existing storage facility and re-developing the Site to include:

- Three (3) Residential Apartment Buildings (Building A – 16-Storeys, Building B – 9-Storeys, and Building C – 20-Storeys)
- Two (2) Underground Parking Levels and Above Ground Parking
- An Internal Fire Route
- Future Parkland Dedication
- Upgrades to the existing cul-de-sac (extension of sidewalk, increase in radius)

The proposed population for the development were calculated using both the design population guidelines from the Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019) and the City of Burlington Growth Analysis Study (Dillon Consulting, June 2019). The Growth Analysis Study population estimate is based on a persons per unit (PPU) forecast of 1.9 PPU for new units constructed from 2016-2041 of medium to high density type whereas the Halton Region Water and Wastewater Linear Design Manual population estimate is based on a persons per hectare method.

The estimated population for the proposed development based on the two design population guidelines are presented in Table 1.

Table 1: Population Estimates

Standard	Site Statistic[1]	Population Density	Proposed Population
Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019)	Total Site Area = 1.08 ha	285 persons/ha	308 persons
City of Burlington Growth Analysis Study (Dillon Consulting, 2019)	Proposed # of Units = 722	1.9 PPU	1372 persons

1. Site Statistics based on Site Plan prepared by Kohn Partnership Architects Inc. (March 2024).

The larger proposed population of 1372 persons based on the Growth Analysis Study (Dillon Consulting, June 2019) was used as the governing population to calculate the servicing demands for the Site.

4.0 Water Servicing

The following sections outline the existing and proposed fire and domestic water servicing for the Site. The Halton Region is responsible for the operation and maintenance of the public water supply servicing the Site.

4.1 Existing Water Servicing

According to the Sustainable Halton Water & Wastewater Master Plan (October 2011), the Site is in Pressure Zone B1 which generally includes all lands in Burlington between elevations 76.0 m and 101.4 m. Municipal water within Pressure Zone B1 is provided by an interconnected feedermain which is serviced by the Burlington, Burloak, and Oakville Water Purification Plants.

The City of Burlington as-built drawings MG-2 (Sheet 1 & 2, January 1980) and Halton Region GIS Mapping identified a municipal 350 mm diameter asbestos concrete (AC) watermain beneath Grahams Lane and a fire hydrant located in the municipal ROW adjacent to the southeast corner of the Site. The municipal watermain beneath Grahams Lane continues as a 350 mm diameter AC watermain across Brant Street and along Prospect Street as shown on as-built drawing R 90-2 (June 1988).

Relevant as-builts showing the existing water servicing surrounding the Site are provided in Appendix A.

4.2 Design Water Demand

The design fire and domestic water demand for the proposed development was estimated using the following guidelines:

- Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019)
- Fire Underwriters Survey Method – Water Supply for Public Fire Protection (2020)

Table 2 summarizes the estimated domestic design water demand results and Appendix B contains detailed calculations.

Table 2: Estimated Domestic Design Water Demand

Standard[1]	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hourly Demand (L/s)
Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019)	5	10	18

1. Domestic water demands were calculated using a 1.9 PPU based on the City of Burlington Growth Analysis Study (Dillon Consulting, 2019).

Table 3 summarizes the estimated fire flow water demand and Appendix B contains detailed calculations.

Table 3: Estimated Fire Demand Flows

Method	Building	Fire Flow Water Demand		Duration
		(L/s)	(gpm)	(hr)
Fire Underwriters Survey (2020)	A	89	1,415	1.84

Based on the Fire Underwriters Survey analysis, the characteristics of Building A produced a maximum estimated fire flow of 89 L/s for a duration of 1.84 hours. Please note that the Fire Underwriters Survey value is a conservative estimate for comparison purposes only and the design of the fire flow system will be completed by others. The mechanical/sprinkler engineer for the proposed development will complete the required analyses for fire protection and the Architect will design fire separation methods according to the determined fire flow rate to meet the Regional watermain's available flows and pressures.

The total estimated design water demand for the proposed development is approximately 99 L/s – the sum of the domestic water maximum day demand and minimum fire flow (10 L/s + 89 L/s).

Watermark Solutions Ltd. conducted a hydrant flow test on October 30, 2023, to determine the available fire flows at the municipal hydrant adjacent to the southeast corner of the Site. The hydrant flow test recorded a static pressure of 61.5 psi which is within the normal operating pressure of the watermain distribution system according to Section 2.5.5. of the Halton Region Design Standards. The test projected that 297 L/s (4,703 USGPM) of water supply is available at the Site when the system is at 20 psi of residual pressure. Therefore, based on the hydrant flow test (provided in Appendix B), the available water supply from the Regional water distribution system is sufficient in meeting fire flow demands and domestic water demands for the Site. Please note, a booster pump(s) may be required to distribute water throughout the multi-storey buildings based on the internal pressure distribution requirements determined within the mechanical engineer's design scope.

4.3 Watermain Hydraulic Analysis

A watermain hydraulic analysis was completed using the Region's InfoWater model provided on October 16, 2023. The watermain analysis was completed to confirm the Region's existing water distribution system can support the proposed development.

4.3.1 Analysis Methodology

Using the InfoWater model provided by the Region, the InfoWater analysis was completed for 2021 and 2031 scenarios. The analysis began by establishing existing conditions and was successfully initialized and run as an extension to ArcMap. The existing 2021 model scenarios reflect the extent of the Region's water network currently in operation, which includes the subject property. No changes were made to the existing model.

Model inputs for the proposed 2031 conditions include adding the development's domestic demands and required fire flow to the Site location (Junction WFT14667) in the model. This junction and the two connection watermains (WMN32581 and WMN138124) were analysed. Please refer to the schematic in Appendix B for details.

The hydraulic analysis was carried out for existing 2021 and proposed 2031 scenarios under average day demand, maximum day demand, peak hour demand, and maximum day demand plus fire flow conditions.

4.3.2 Analysis Criteria

The water pressure design criteria for watermains are based on the Region's Water and Wastewater Linear Design Manual (Version 5, October 2019) and are as follows:

- Minimum and maximum regular operating pressure range from 40 to 100 psi.
- Preferred operating pressures ranging from 50 to 80 psi.
- Maximum day demand plus fire flow shall not fall below 20 psi.

4.3.3 Analysis Results

2021 Existing Conditions

The existing condition results for the Site and fronting watermains are summarized in Tables 4 and 5.

Table 4: Existing Conditions Junction Results

Year	Demand Scenario	Demand (L/s)	Pressure (psi)	Hydrant Fire Flow (L/s)
2021	ADD	0.11	56.73	NA
	MDD	0.20	59.43	NA
	PHD	0.32	57.80	NA
	MDD+FF	0.20	28.43	749.62

Table 5: Existing Conditions Pipe Results

Year	Demand Scenario	Pipe ID	Velocity (m/s)
2021	ADD	WMN32581	0.12
		WMN138124	0.12
	MDD	WMN32581	0.20
		WMN138124	0.20
	PHD	WMN32581	0.28
		WMN138124	0.28
	MDD+FF	WMN32581	0.20
		WMN138124	0.20

As shown in Tables 4 and 5, the pressure results for the analyzed junction fall within the Region's accepted range during all demand scenarios. The velocity of the two pipes connecting to the junction also fall within common operating ranges.

2031 Proposed Conditions

The proposed condition results for the Site at Junction WFT14667 and connecting watermains are summarized in Tables 6 and 7.

Table 6: Proposed Conditions Junction Results

Year	Demand Scenario	Demand (L/s)	Pressure (psi)	Hydrant Fire Flow (L/s)
2031	ADD	5.11	57.19	NA
	MDD	10.21	58.38	NA
	PHD	18.33	56.57	NA
	MDD+FF (99 L/s)	10.21	28.43	740.71

Table 7: Proposed Conditions Pipe Results

Year	Demand Scenario	Pipe ID	Velocity (m/s)
2031	ADD	WMN32581	0.09
		WMN138124	0.14
	MDD	WMN32581	0.16
		WMN138124	0.27
	PHD	WMN32581	0.18
		WMN138124	0.37
	MDD+FF (99 L/s)	WMN32581	0.16
		WMN138124	0.27

As summarized in Tables 6 and 7, the results for the analyzed junction show that pressures fall within the Region's accepted range and there is adequate available fire flow during proposed conditions.

With respect to the Region's design criteria, water pressures under normal operating conditions were maintained within the preferred pressure range of 50 to 70 psi. Watermains experienced maximum velocities that were within common operating ranges. As such, there is sufficient capacity within the Region's water distribution system to support the proposed development.

4.4 Proposed Water Servicing

The Site is proposed to be serviced by a 200 mm diameter PVC water service connected to the existing municipal 350 mm diameter AC watermain beneath Grahams Lane. The municipal connection will be facilitated within a valve chamber according to Halton Region standard RH 402.070. The proposed water service connection will be equipped with a property line valve and box.

The 200 mm diameter water service will be split into a 200 mm diameter fire line and a 100 mm diameter domestic water service as outlined in Halton Region Standard RH 409.010. The required check detector assembly, water meter, and backflow preventor will be specified in the mechanical design and is proposed to be located within the proposed development. The proposed water service connection for the development will be located along the southwest property line, as shown in the Site Servicing Plan (Drawing C103).

5.0 Sanitary Servicing

The following sections outline the existing and proposed sanitary servicing for the Site. The Halton Region is responsible for the collection and treatment of wastewater generated from the Site.

5.1 Existing Sanitary Servicing

The City of Burlington as-built drawings MG-2 (Sheet 1 & 2, January 1980) and Halton Region GIS Mapping identified a municipal 250 mm diameter concrete sanitary sewer beneath Grahams Lane installed at 0.22% to 0.36%. The Grahams Lane municipal sanitary sewer accepts wastewater from the properties fronting Grahams Lane as well as a 200 mm diameter vitrified clay sanitary sewer beneath Legion Road (City of Burlington as-built drawing ML-1, April 1980).

The Grahams Lane municipal sanitary sewer conveys wastewater to a 300 mm diameter vitrified clay trunk sanitary sewer beneath Brant Street installed at 0.65% (City of Burlington as-built drawing R 90-2, June 1988). According to the Sustainable Halton Water & Wastewater Master Plan (October 2011), the Site is within the Burlington Skyway Wastewater Treatment Plant Drainage Area.

Relevant as-built drawings showing the existing sanitary sewer infrastructure surrounding the Site are provided in Appendix A.

5.2 Wastewater Design Flow

The total peak wastewater design flow according to the Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019) is calculated using the following formula:

$$Total\ Peak\ Wastewater\ Design\ Flow = Average\ Dry\ Weather\ Flow\ \times Peaking\ Factor + Infiltration\ Flow$$

Table 8 summarizes the estimated wastewater design flow results and Appendix C contains detailed calculations.

Table 8: Estimated Wastewater Design Flow

Standard[1]	**Average Dry Weather Daily Flow** (L/s)	**Peaking Factor**	**Peak Dry Weather Flow** (L/s)	**Infiltration Flow** (L/s)	**Total Peak Wastewater Design Flow** (L/s)
Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019)	5	3.71	17	0.3	17

1 Wastewater design flows were calculated using a 1.9 PPU based on the City of Burlington Growth Analysis Study (Dillon Consulting, 2019).

The proposed sanitary service lateral for the proposed development will be sized to convey a total peak wastewater design flow of 17 L/s.

5.3 External Sanitary Sewer Hydraulic Analysis

An external sanitary sewer hydraulic analysis was completed for the municipal 250 mm diameter concrete sanitary sewer beneath Grahams Lane to model the impacts the proposed development will have on the existing sanitary sewer distribution system. As requested by the Region, the analysis included the assessment of the Grahams Lane municipal sanitary sewer to its connection at the Brant Street sanitary trunk sewer.

The drainage areas that contribute to the wastewater flow in the Grahams Lane municipal sanitary sewer were determined based on as-built drawings and GIS mapping provided by the City and Region. Wastewater design flows from each drainage area were calculated using the Halton Region Water and Wastewater Linear Design Manual (Version 5, October 2019) and populations derived from existing land use and zoning classification. The proposed population of the proposed development was based on the 1.9 PPU outlined in the City of Burlington Growth Analysis Study as presented in Table 1 (Dillon Consulting, June 2019).

Existing and proposed conditions were modelled to review the development's impact on the existing Grahams Lane municipal sanitary sewer. Results for each scenario are presented in Table 9 with supporting calculations and sanitary drainage plans provided in Appendix C.

Table 9: External Sanitary Sewer Capacity Analysis Results

Scenario	Grahams Lane Sewer Size (mm)	Critical Sewer Slope[1]	Full Flow Velocity[1] (m/s)	Critical Sewer Capacity[1] (L/s)	Total Peak Wastewater Design Flow[2] (L/s)	Maximum Operating Capacity
Existing Conditions	250	0.22%	0.57	28	10	32%
Proposed Conditions (Full-Buildout)					25	84%

1. Critical sewer section with minimum slope, velocity, and capacity is located between MH4 and MH7.
2. Total peak wastewater design flow is taken at the most downstream point of the Grahams Lane municipal sanitary sewer (i.e., at the connection with the Brant Street trunk sewer).

Under existing conditions, the Grahams Lane municipal sanitary sewer is estimated to operate at 32% of its full flow capacity of approximately 28 L/s at the most critical section between MH4 and MH7. The remainder of the Grahams Lane municipal sanitary sewer has an average operating capacity of 31%.

In proposed conditions, the total peak wastewater design flow in the Grahams Lane municipal sanitary sewer is proposed to increase by approximately 15 L/s and operate at 84% of its full flow capacity at the most critical section. The remainder of the Grahams Lane municipal sanitary sewer has an average operating capacity of 81%.

The receiving 300 mm diameter vitrified clay trunk sanitary sewer beneath Brant Street is estimated to have a full flow capacity of 78 L/s and is estimated to be operating at 33% directly downstream of its connection with the Grahams Lane municipal sanitary sewer. In detailed design stages, a construction phasing approach could be considered to reduce the immediate impacts the increased total wastewater design flows from the Site would have on the capacity of the existing sanitary sewer infrastructure.

The wastewater full flow velocity is estimated as 0.57 m/s in the critical section between MH4 and MH7 due to the shallow sewer slope of 0.22%. Ultimately, the proposed conditions will improve the scouring velocity within the Grahams Lane municipal sanitary sewer due to the increased wastewater flows directed to the sanitary sewer system from the proposed development.

5.4 Proposed Sanitary Servicing

A 200 mm diameter PVC sanitary service lateral is proposed at 2% slope, connecting to the existing 250 mm diameter concrete sanitary sewer beneath Grahams Lane in accordance with the Halton Region Linear Design Manual (Version 5, October 2019). The sanitary service lateral will be installed between a proposed property line maintenance hole and a proposed "doghouse" maintenance hole installed over the existing Grahams Lane municipal sanitary sewer. Details of the connection are shown in the Site Servicing Plan (Drawing C103). The proposed building's internal sanitary sewage collection system will be designed by the mechanical engineer to convey the wastewater to the proposed sanitary service lateral.

6.0 Drainage Conditions

The following sections outline the existing and proposed stormwater drainage conditions.

6.1 Existing Drainage

The Site is located within the Hager Creek Watershed and within Conservation Halton's jurisdiction, however, is not currently considered to be within a regulated area. The Site consists of an existing storage facility, outdoor storage areas, and an asphalt parking lot. There are some grassed areas along the south side of the property, fronting onto Grahams Lane, however the Site is largely impervious (99%).

A review of the topographic survey indicates that stormwater runoff generally drains southeast towards Grahams Lane. It is understood that an existing 600 mm diameter storm sewer bisecting the Site currently conveys stormwater to the storm sewer on Grahams Lane as shown in the City of Burlington as-built drawing MG-2 (Sheet 1, January 1980). Runoff from an external drainage area currently contributes overland runoff to the Site from the north. Based on the available topographic survey, the external area was estimated to be approximately 0.07 ha, however additional topographic information may be required at detailed design to confirm the extents of the external drainage area. Refer to the Pre-Development Drainage Plan (Figure 1) for a depiction of the existing drainage conditions.

6.2 Proposed Drainage

The proposed development will consist of three (3) residential apartment buildings, two underground parking levels, above ground (surface) parking, and landscaping. Underground parking spans the majority of the Site area, therefore, although surface landscaping is proposed, the Site will remain largely impervious. External drainage will continue to enter the Site similar to existing conditions and will be considered in the stormwater management approach for the Site. Refer to the Post-Development Drainage Plan (Figure 2) for a depiction of the proposed drainage conditions.

Area drains are proposed across the Site to capture runoff, which will be conveyed through the mechanical system to an underground stormwater management vault located within the underground parking. The stormwater management vault will span the full height of the P1 and P2 levels with captured flows being pumped out of the tank at a controlled rate and discharged to the existing storm sewer on Grahams Lane. An emergency overflow will be proposed during detailed design from the underground storage vault allowing excess flows to outlet to the surface in the event of a blockage or pump failure.

Emergency overland (major system) flow routes are provided through the Site to direct runoff towards Grahams Lane in the event of a large storm event or blockage. Refer to the Site Grading Plan (Drawing C102) depicting the overland flow paths.

There is proposed parkland dedication along the western side of the Site, overtop of the proposed underground parking garage. Drainage within this parkland area will be captured by area drains and conveyed internally to the building for both quality and quantity control. This results in municipal drainage being conveyed into the future private development and is due to site grading and servicing constraints. A drainage agreement or similar is recommended to manage future maintenance considerations of the parkland drainage system. Additional details will be provided during detailed design.

The Site Grading and Site Servicing Plans (Drawings C102 and C103) illustrate the proposed drainage of the Site, the location and design of the storm sewer, and all connections.

7.0 Stormwater Management

Stormwater management for the proposed development has been designed to achieve the City of Burlington's Stormwater Management Design Guidelines (2020), Ministry of the Environment, Conservation and Parks Stormwater Management Planning and Design Manual (2003), with consideration given to Conservation Halton's Guidelines for Stormwater Management Engineering Submissions (2021) and City of Burlington's Sustainable Building and Development Guidelines (December 2021).

A pre-consultation for the Site was held with City of Burlington staff and a subsequent Pre-Consultation Package issued December 22, 2023.

The stormwater management criteria for the proposed development include:

<u>Quantity Control</u>

- Discharge to a storm sewer shall control the greater of the 100-year or Regional (Hurricane Hazel) storm event to the 5-Year pre-development peak flow.
- For re-development sites, a maximum pre-development imperviousness of 36.0% is to be applied.

<u>Quality Control</u>

- Provide Enhanced (Level 1) quality treatment (80% TSS Removal) for 90% of average annual rainfall volume.

Water Balance

- Best efforts to retain the first 5mm of rainfall via infiltration or re-use on-site.

7.1 Existing Storm Servicing

A review of City of Burlington as-constructed drawing MG-2 (dated 01, 1980) and ML-1 (dated 04, 1980) identify the following storm sewers near the Site:

- A growing diameter (E to W) storm sewer from 350 mm to 675 mm beneath Grahams Lane.
- A growing diameter (N to S) storm sewer from 375 mm to 525 mm beneath Legion Road.

7.2 Stormwater Quantity Control

City of Burlington criteria requires post-development peak flows (greater of the 100-year or Regional storm event) to be controlled to the 5-Year pre-development peak flow because the proposed development will discharge to the existing storm sewer on Grahams Lane.

The entire Site (1.08 ha), including the external drainage area (0.07 ha), currently drains towards Grahams Lane under existing conditions. Therefore, the pre-development target flow was calculated based on the entire 1.15 ha drainage area contributing to the Site's outlet. Since the existing drainage areas are mostly impervious (approximately 99% impervious) a maximum 36.0% imperviousness has been applied for pre-development conditions per City of Burlington criteria.

A Visual Otthymo (VO) model was prepared to model the target pre-development and post-development peak flows using the City of Burlington's Intensity-Duration-Frequency (IDF) data. In the absence of a subwatershed study, the following storm events were analyzed per City of Burlington criteria: 6, 12, and 24 hour Chicago storm events, 6, 12, and 24 hour SCS Type II storm events, and the Regional (Hurricane Hazel) storm event.

The required amount of on-site storage was determined by comparing the post-development peak flow rates to the allowable 5-year pre-development release rate of 125 L/s.

The proposed stormwater quantity controls consist of rooftop ponding on each of the proposed apartment buildings, and a stormwater vault located in the underground parking garages. Rooftop ponding calculations assumed 80% of each building rooftop area is available for storage up to a maximum ponding depth of 0.15 m. Flow control roof drains will be specified at detailed design to restrict flows discharging from each rooftop and scuppers are to be installed such that the maximum depth of water does not exceed 0.15 m per the Ontario Building Code. A combined 149.4 m^3 of volume is available on the Site via rooftop ponding.

A SWM vault located in the underground parking garage will provide a total storage volume of approximately 215.6 m^3, based on a 38.5 m^2 footprint and 5.6 m height (spanning the full height of the P1 and P2 levels), as provided by Kohn Partnership Architects Ltd. Detained stormwater will be pumped out of the tank at the controlled rate of 125 L/s and discharged to the existing storm sewer on Grahams Lane. The mechanical consultant shall specify an appropriate pump to meet the required discharge rate at the detailed design stage. The Site Servicing Plan (Drawing C103) illustrates the location of the underground storage tank.

A summary of the Site flows and required storage volumes have been provided in Table 10**.** Refer to Appendix D for complete stormwater calculations and VO model outputs.

Table 10: Pre- and Post-Development Flow Rates and Required Storage Volumes

Storm Distribution	5-Year Pre-Development Peak Flow (L/s)	Post-Development Uncontrolled Flow Rate (L/s)	Post-Development Controlled Flow Rate (L/s)	Total Rooftop Ponding Volume Used (m^3)	SWM Vault Volume Required (m^3)	SWM Vault Volume Provided (m^3)
6-hour Chicago	127	516	125	127	188	215.6
12-hour Chicago	134	516	125	128	189	
24-hour Chicago	138	516	125	128	189	
6-hour SCS Type II	125	427	125	146	201	
12-hour SCS Type II	131	429	125	146	200	
24-hour SCS Type II	147	470	125	148	209	
Regional (Hurricane Hazel)	-	169	125	118	92	

A maximum 209 m^3 of SWM vault storage is required to attenuate peak flows to the target release rate as shown in Table 10. Since the SWM vault provides 215.6 m^3 of storage volume, sufficient quantity control is provided to attenuate differences in peak flows.

A 400 mm diameter PVC storm sewer lateral is proposed at 0.75%, to convey stormwater from the SWM vault to the existing storm sewer beneath Grahams Lane. The storm sewer lateral will be installed between a property line maintenance hole to a "doghouse" maintenance hole installed over the existing storm sewer. Details of the connection are shown in the Site Servicing Plan (Drawing C103).

Based on the Updated Area Servicing Plan for Stormwater, Water & Wastewater (Wood, May 2020), the existing storm sewer on Grahams Lane is shown as surcharging during the 5-year storm event on Drawing No. 13 (provided in Appendix D). The Site is part of a larger catchment within the Wood study which assumes on-site stormwater management controls the post-development flows to pre-development flows.

It is anticipated that the surcharging condition will be reduced as part of the proposed development since the proposed stormwater management controls for the Site will over-control post-development runoff to the 5-year pre-development peak flow rate (set at a 36.0% imperviousness, less than the existing Site's imperviousness). Therefore resulting in an overall net-benefit on the area from a stormwater management perspective.

Further investigation into the hydraulic conditions of the downstream storm sewer capacity and surcharging conditions could be completed at the detailed design stage to confirm the proposed development will maintain or lessen the impact on the downstream storm sewers. Additionally, the need for a backflow preventer at the Site's outlet will be investigated to reduce the risk of stormwater backing up into the underground parking structure if surcharging occurs in the municipal storm sewer system.

7.3 Stormwater Quality Control

The Site's existing conditions are largely impervious, consisting of an existing storage facility, outdoor storage areas, and an asphalt parking lot. The proposed development will also be largely impervious due to the underground parking, however the increased landscaped areas at grade will inherently improve the quality of stormwater runoff.

Enhanced (Level 1) quality treatment is required, as defined by the MECP requires 80% removal of Total Suspended Solids (TSS) from 90% of the average annual runoff volume. Per City of Burlington guidelines and pre-consultation comments, a treatment train approach is proposed to be applied.

Landscaped areas of the Site are considered inherently clean since the grass will help filter suspended solids from runoff. Purple-Roof Systems (or equivalent) will be investigated at the detailed design stage for each of the building rooftops. These rooftop systems include a green-roof component which will provide quality treatment of runoff via a landscaped surface, resulting in approximately 80% TSS removal. Runoff from rooftops and at-grade areas will be directed to the southeast corner of the Site to an oil/grit separator, achieving a treatment train approach.

An ETV certified oil/grit separator will be installed at the southeast corner of the Site to treat flows prior to discharging to the Grahams Lane storm sewer. Per City of Burlington guidelines, hydrodynamic flow separators have been credited with a maximum 50% TSS removal rate. A Stormceptor EFO8 (or approved equivalent) has been preliminarily sized to provide 60% TSS removal for 90% of average annual runoff and is shown on the Site Servicing Plan (Drawing C103). The sizing report and ETV certification for the Stormceptor unit is provided in Appendix D.

It is understood that there is no oil/grit separator or similar water quality treatment provided on the Site in existing conditions. Further, the proposed development plan significantly increases the amount of landscaped area on the Site which inherently improves water quality compared to the existing conditions. The proposed water quality measures promote further quality treatment on the Site, achieving an overall 77% TSS removal rating. Therefore, the proposed development offers a new improvement in overall stormwater runoff quality, compared to existing conditions.

7.4 Water Balance

Best efforts to retain a 5 mm depth of rainfall via infiltration and/or re-use on the Site is provided. A 5 mm rainfall volume equates to 54.0 m^3 of volume for the 1.08 ha Site.

As noted above, a Purple-Roof (or equivalent) system will be investigated at the detailed design stage for each of the three apartment building rooftops. These rooftop systems include a green-roof component which will retain rainfall on the Site for evapotranspiration. Detailed calculations will be completed at the detailed design stage, however it is anticipated that each Purple-roof system will retain a 5 mm depth of rainfall. Assuming Purple-roofs will occupy approximately 80% of the total roof area on-site, a total 14.9 m^3 retention volume will be achieved on the Site for evapotranspiration.

While infiltration-based measures are not feasible due to the underground parking spanning most of the Site, rainfall landing on landscaped areas of the Site will be retained within the available topsoil layer and will re-enter the environment via evapotranspiration. An approximate total 2,869 m^2 of landscaped area is proposed for the development which will retain approximately 14.3 m^3 of rainfall on the Site (based on a 5 mm initial abstraction typically applied to pervious areas).

Based on the above preliminary calculations, a total retention volume of 29.2 m^3 is provided on-site. It is anticipated that approximately 24.8 m^3 water balance volume remains to be accommodated on the Site to meet the City's 5 mm retention target. A concrete vault within the underground parking lot could feasibly be provided to retain this additional volume and be re-used on the Site for greywater re-use (i.e., irrigation of landscaped areas, toilet flushing, car wash, etc.) to be determined at the detailed design stage. An option for cash-in-lieu may be applicable to mitigate any remaining portion of the 54.0 m^3 retention volume not achieved on the Site.

7.5 Sustainable Building and Development Guidelines

The City of Burlington's Sustainable Building and Development Guidelines (December 2021) were considered throughout the functional servicing and stormwater management design. Table 11 presents the relevant sustainable guidelines and systems proposed for the development. The design of the sustainable systems and compliance with the guidelines will be further investigated in detailed design stages.

Table 11: Sustainable Building and Development Guidelines Checklist

Guideline	Description and Proposed Implementation
Green Roofs (3.11)	Green roofs could be implemented on each or some of the proposed residential towers. Green roofs can be incorporated into rooftop amenity areas or similar.
Enhanced Water Quality (4.1)	An oil/grit separator (OGS) is proposed for the development. This system will provide treatment on the Site that does not currently exist. Filtration systems could also be explored during detailed design, if required.
Water Conservation Systems (4.2)	Water conservation systems, such as low volume fixtures, could be included within the new buildings design, as specified by the mechanical engineer during detailed design.
Pervious Surfaces (4.3)	The proposed development results in an overall increase of pervious/landscaped surfaces from 118 m^2 to approximately 2,869 m^2.

8.0 Preliminary Utility Study

A preliminary utility study has been initiated by Crozier to identify the location of existing utilities on Grahams Lane from Legion Road to the CN Railway including hydro, communications, and gas. The following utilities have been with supporting markups provided in Appendix E:

- **Burlington Hydro** – 4.16 kV 3 phase overhead conductors on Burlington Hydro owned poles fronting the Site on the north side of the road. An existing 3 phase pole mounted transformer currently existing fronting the Site which feeds power to 1393 Grahams Lane as well as another property south of the road (BHI-240201-01LC, February 1, 2024).

- **Enbridge** – An active high pressure 2" gas main runs along half of the north boulevard fronting the Site and another active high pressure 2" gas main runs along the south boulevard fronting the entirety of the Site on Grahams Lane (G-tel Engineering Inc. Markups, February 3, 2024).

- **Bell** – Buried copper cables and pedestals exist on both north and south boulevards fronting the Site on Grahams Lane (MMP Survey 23-182-PS, December 21, 2023).

- **Cogeco** – Overhead fibre optic cable and copper cables are attached to Burlington Hydro owned poles fronting the Site (burlokf.dbg, February 1, 2024).

- **Hydro One** – Confirmed within email response transmission lines are not buried in this area.

Enbridge has advised that their system is anticipated to have capacity to service the proposed development (Bresolin to Mazza, March 4, 2024). Coordination with each utility provider will be continued throughout the design process to further understand the existing utility capacity, design loading, and integration of the utility services with the proposed development.

9.0 Conclusions and Recommendations

The proposed development located at 1393 Grahams Lane in the City of Burlington involves constructing three (3) residential apartment buildings with a shared underground parking structure. The proposed development can be developed in accordance with the City of Burlington and Halton Region guidelines and standards from a fire and domestic water, wastewater, and stormwater management perspective based on the information contained in this report and the following conclusions:

- A flood hazard assessment and Conservation Halton permit is not required as part of the development application. The Site is not located within a regulated flood hazard and no spill hazard has yet to be defined.

- Fire and domestic water supply for the Site is proposed to be provided using a 200 mm diameter fire line and 100 mm diameter domestic line extending from the 350 mm diameter municipal watermain beneath Grahams Lane. The total estimated design water demand for the proposed development is approximately 99 L/s.

- There is sufficient capacity within the Region's water distribution system to support the proposed development based on a watermain hydraulic analysis using the Region's InfoWater model. The system is proposed to operate within the Halton Region's preferred pressure range of 50 to 70 psi and velocities within common operating ranges.

- Sanitary servicing for the Site is proposed to be provided with a 200 mm diameter sanitary sewer lateral installed at a slope of 2% extending from a proposed property line maintenance hole to a proposed "doghouse" maintenance hole installed over the existing 250 mm municipal sanitary sewer beneath Grahams Lane. The total peak wastewater design flow for the proposed development is estimated to be 17 L/s.

- The municipal 250 mm diameter concrete sanitary sewer beneath Grahams Lane is estimated to operate at a maximum 84% of its full flow capacity at its most critical section in proposed full-buildout conditions. The increased wastewater flow from the proposed development will improve the scouring velocity in the sewer.

- In detailed design stages, a construction phasing approach could be considered to reduce the immediate impacts the increased wastewater design flow has on the capacity of the existing sanitary sewer infrastructure.

- Post-development (100-year and Regional) flows will be controlled to the 5-year pre-development peak flow rates since the Site will discharge to the existing storm sewer on Grahams Lane. Quantity controls will be provided by rooftop ponding and an underground SWM vault located within the underground parking, with detained flows pumped at a controlled rate discharging to the storm sewer on Grahams Lane.

- A 400 mm diameter PVC storm sewer lateral is proposed at 0.75%, to convey stormwater from the SWM vault to the existing municipal storm sewer beneath Grahams Lane.

- Quality treatment of runoff from the Site will be provided via a treatment train consisting of treatment by at-grade landscaped areas, green roofs, and a downstream oil/grit separator at the Site outlet. The existing Site is mostly impervious with no quality treatment provided; therefore, the proposed quality treatment strategy will significantly improve quality of stormwater runoff leaving the subject Site compared to existing conditions.

- Best efforts to retain a 5 mm rainfall event are proposed for the Site. It is anticipated that green roofs and landscaped areas will retain a total 24.8 m^3 on the Site. Additional measures to retain rainfall to meet the 5 mm objective will be explored at the detailed design stage.

- Further investigation into the hydraulic conditions of the downstream storm sewer capacity and surcharging conditions could be completed at the detailed design stage to confirm the proposed development will maintain or lessen the impact on the downstream storm sewers.

- The need for a backflow preventer at the Site's outlet will be investigated to reduce the risk of stormwater backing up into the underground parking structure if surcharging occurs in the municipal storm sewer system.

Based on the above conclusions, we support the proposed development application from the perspective of fire and domestic water supply, sanitary servicing, and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

James Fletcher, Engineering Intern
Land Development

C.F. CROZIER & ASSOCIATES INC.

Brendan Walton, P. Eng.
Project Manager

JKF/rl

\\Crozier-Files\Projects\2500\2548 - Northstone Capital Partners (2621458 Ontario Inc.)\6852 - 1393 Grahams Lane, Burlington\Reports\2024.03.11_(2548-6852)_1393 Grahams Lane_FSRSWM.docx

APPENDIX A

Agency Correspondence & As-built Drawings

James Fletcher

From: Laura Schreiner <lschreiner@hrca.on.ca>
Sent: October 18, 2023 4:39 PM
To: James Fletcher; Wang, Faye; Malik, Umar
Cc: Brendan Walton
Subject: RE: Floodplain Assessment Terms of Reference - 1393 Grahams Lane, Burlington ON
Attachments: CH comments RE_ _EXTERNAL_Development Preconsultation - 1393 Graham s Lane OPA_ZBA (1).msg

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Filed to Sharepoint

Hi James,

I've been looking into this file further. Conservation Halton's (CH's) preconsultation comments from March (attached) indicated that more information was needed regarding flood hazard on the property, either from a flood hazard assessment or by waiting for the City to complete the City of Burlington's Major Transit Station Area (MTSA) Phase 2 Flood Hazard Assessment. The Phase 2 study has since been completed. The inundation limit as shown in the City's Phase 2 study was screened, and regulated spill flood hazard was not ultimately mapped on 1393 Graham's Lane. As such, the property is not currently considered to be within an area regulated by CH.

The City's Phase 2 study included requirements for verification of a development's stormwater management (SWM) strategy using the watershed modelling developed by the study. Analysis requirements are deferred to City of Burlington staff; however, CH should be re-engaged if verification identifies regulatory SWM controls are required.

Please be advised that the subject property may, however, be affected by a potential flood hazard (spill) that is unmapped. No CH permit is required until such time as that spill is defined, spill policy is updated, or further direction is provided from the Province.

Based on the above, CH no longer requires a flood hazard assessment for this application. I was recently circulated a preconsultation extension request for this property, and I will send updated comments reflecting the above to City staff so they are aware.

As such, I'm not sure if tomorrow's meeting is required? We are ready and willing to meet if there is anything you would like to discuss or clarify, just don't want to use your time unnecessarily. Please let me know your thoughts.

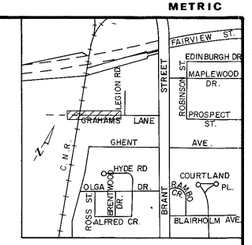
Best,
Laura

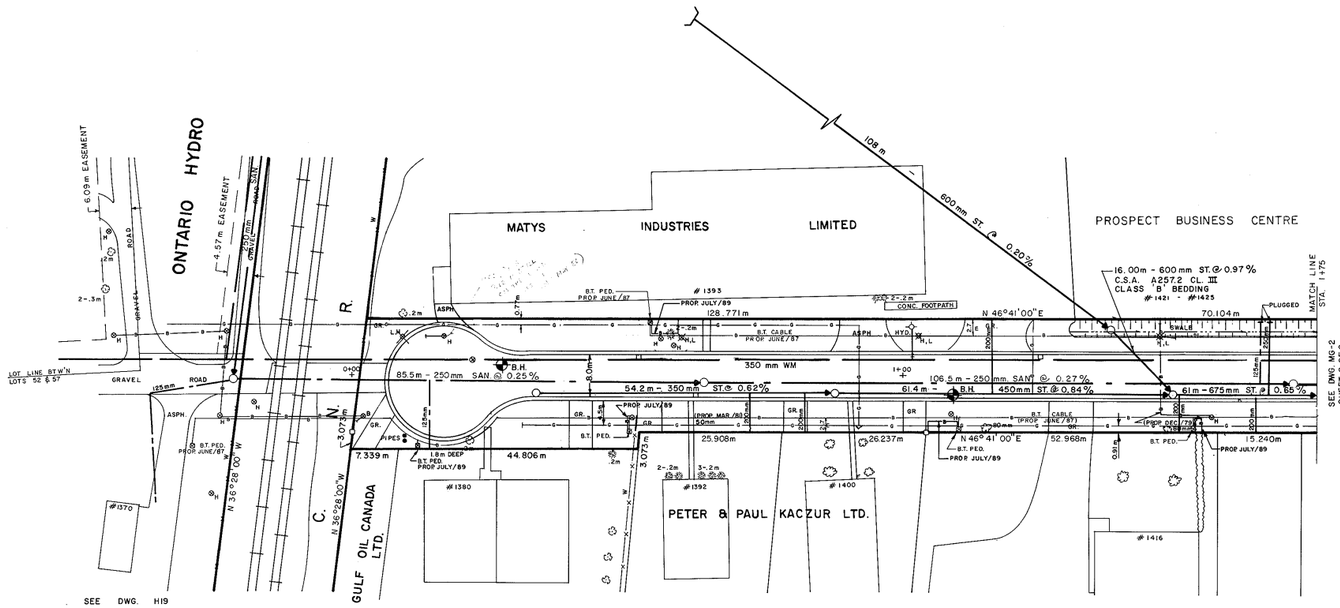
Laura Schreiner
Environmental Planner

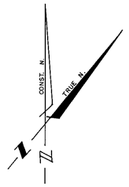
2596 Britannia Road West, Burlington, ON L7P 0G3
905.336.1158 ext.2230 | lschreiner@hrca.on.ca
conservationhalton.ca

MG-2
SH-1

METRIC



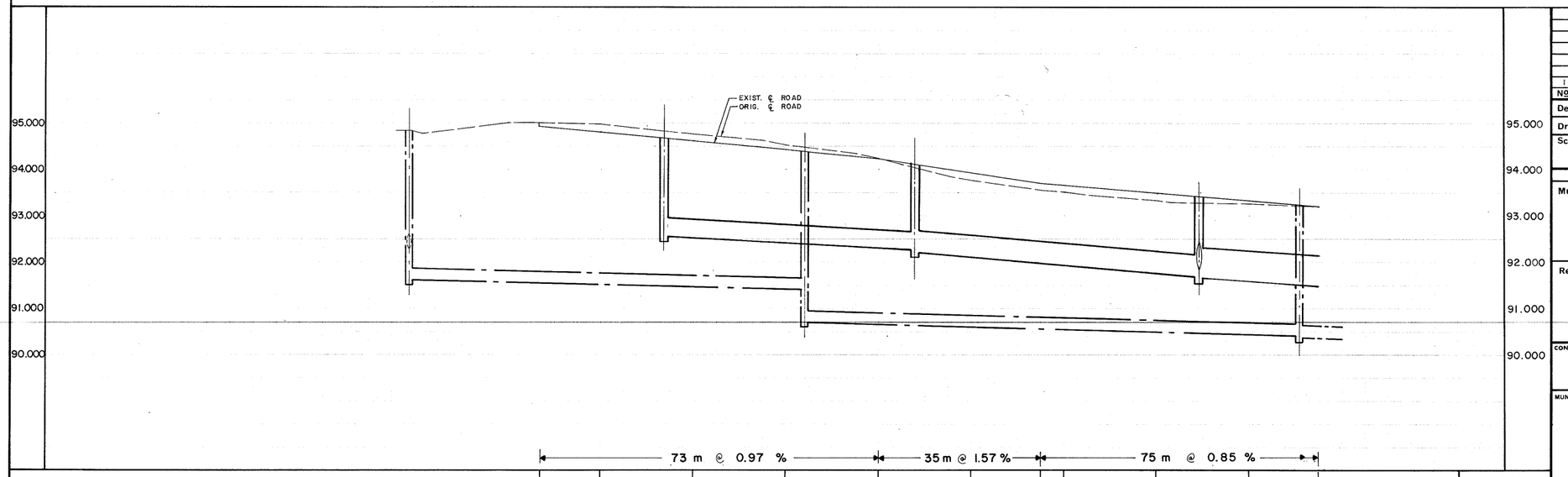




FOR TYPICAL X-SECTION
SEE DWG. MG-2 SHEET 2

GRAHAMS LANE

GEOD. B.M.
CONC. WALL AT EAST SIDE OF A SMALL BRIDGE AT S/E CORNER OF BRANT ST. & PROSPECT ST., 1.0 MILE N/W OF LAKESHORE RD.; TABLET IN TOP OF WALL 18 INCHES EAST OF GUARD RAIL, 13 INCHES ABOVE GROUND. No. 65-U-125 ELEV. 304.243



No	Date	By	REVISIONS
1	JAN./80	L.S.	"AS CONSTRUCTED" CONTR. Nº 79-23 (NOTES G-174)

Design		Checked		Date SEPT. 25 1978
Drawn	J.A.C.	Checked		
Scale	HORZ. 1:500 (10 0 10 20) VERT. 1:50 (1 0 1 2)			REFERENCES 208-3460, 208-3821, S-03-27-E, S-03-29-L, S-03-30-A, S-03-100-D, S-03-103-E.

APPROVALS

Municipal

DIRECTOR OF PUBLIC WORKS

DATE

Regional

FIELD NOTES G-165, G-166, G-166A

STAMP

CONSULTANT

MUNICIPALITY

CITY OF BURLINGTON

DEPARTMENT OF PUBLIC WORKS

TITLE

GRAHAMS LANE

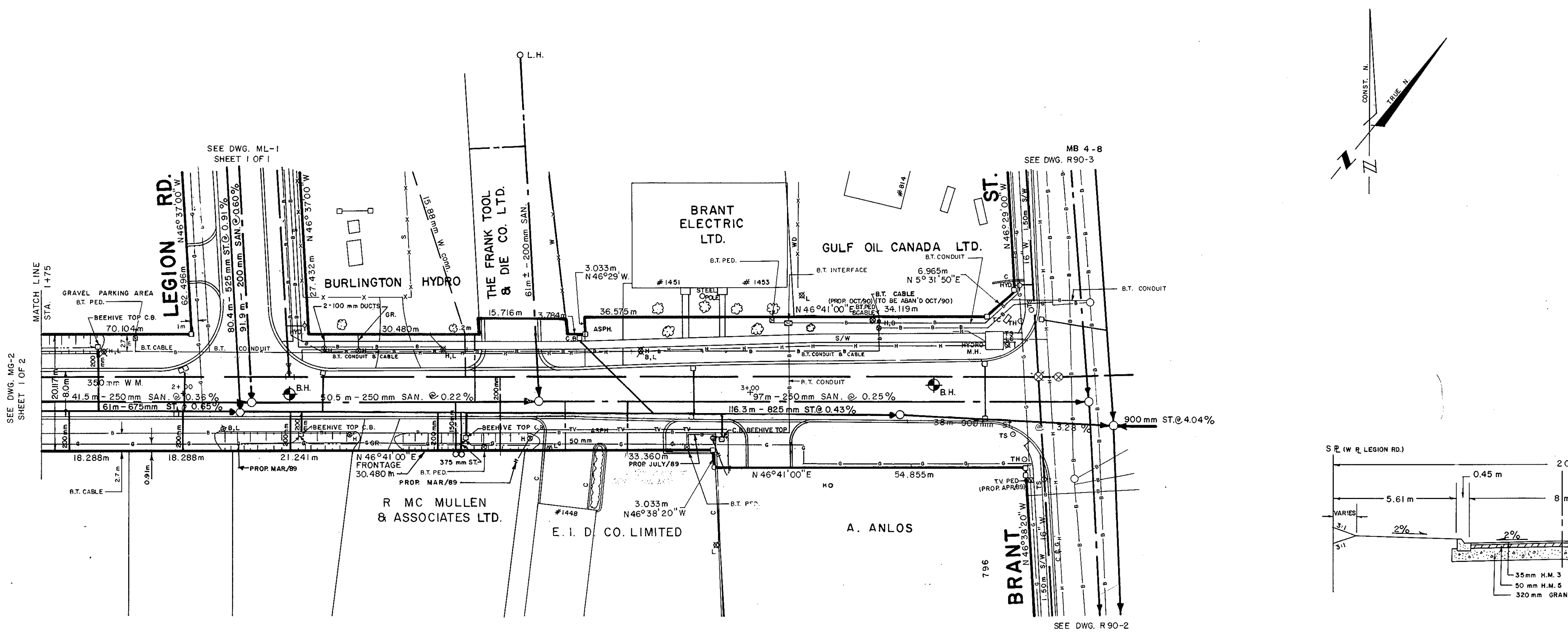
C.N.R. - 175m E'LY.

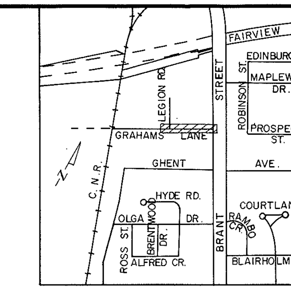
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MG-2	
CONTRACT Nº	SHEET 1 OF 2

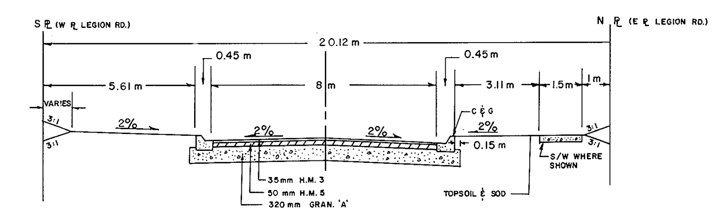
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MG-2
SH-2

METRIC







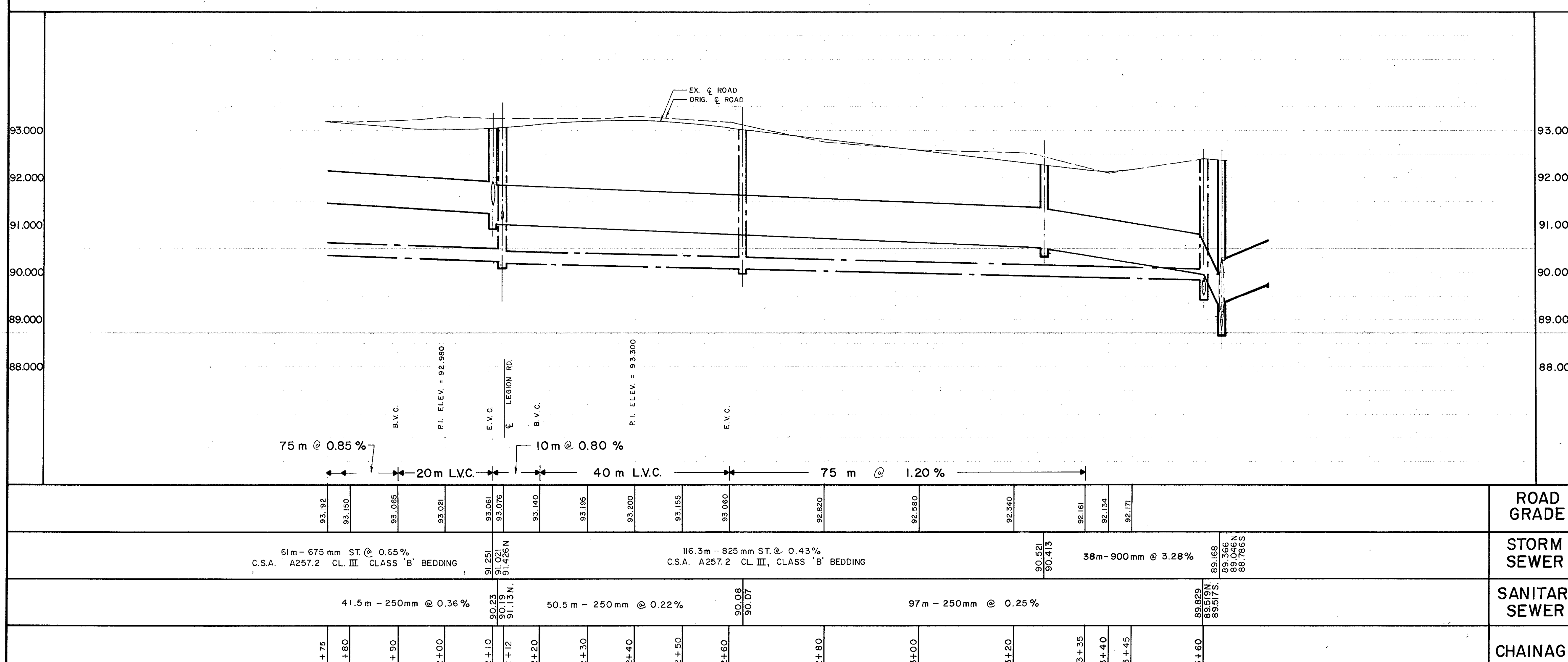
TYPICAL X-SECTION

N.T.S.

GEOD. B.M.

CONC. WALL AT EAST SIDE OF A SMALL BRIDGE AT S/E CORNER OF BRANT ST. & PROSPECT ST., 1.0 MILE N/W OF LAKESHORE RD.; TABLET IN TOP OF WALL 18 INCHES EAST OF GUARD RAIL, 13 INCHES ABOVE GROUND. No. 65-U-125 ELEV. 304.243

GRAHAMS LANE



Nº	Date	By	REVISIONS
1	JAN./80	L.S.	"AS CONSTRUCTED" CONTRACT 79-23 (NOTES G-174)

Design D.K. Checked

Drawn J.A.C. Checked

Date SEPT. 25 1978

Scale 5m 0 5 10 15m HOR. 0.5m 0 0.5 1 1.5m VERT.

REFERENCES S-03-28-8, S-0512-A, S-0513-E, S-0579-A, 20R-3821, P-17, P-18 (CONTOURS)

APPROVALS

Municipal

DIRECTOR OF PUBLIC WORKS

DATE

Regional

FIELD NOTES G-165, G-166, G-166*, G-169

STAMP

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MUNICIPALITY

CITY OF BURLINGTON

DEPARTMENT OF PUBLIC WORKS

TITLE

GRAHAMS LANE

BRANT ST.- LEGION RD.

MUNICIPAL DRAWING Nº MG-2

REGIONAL DRAWING Nº

CONTRACT Nº

SHEET 2 OF 2

MG-2 SHEET 2

R. TRESHAM

SHELL GAS STATION
SHELL CANADA LTD.

NOTE: FOR TRAFFIC INSTALLATIONS SEE DWG. TC-34-1 Tc-300, SH.5

PROSPECT ST.

SEE DWG. MP-2 (SHEET 1 OF 2)

SCOVA INVESTMENTS LTD.
RE-ZONING FILE
9-3-630

R. ARNOLD

N. WALKER

W & J CRAWFORD

ASPH. PARKING LOT

BRANT STREET

GRAHAM'S LANE

SEE DWG. MG-2 (SHEET 2 OF 2)

SHELL GAS STATION

GAS PUMPS

BUS SHELTER

ISLAND MARKER

BURIED B.T. CABLE

MAIN HYDRO DUCT

6" WATERMAIN

16" WATERMAIN

7' CONC. S/W

5' S/W

3' CONC. S/W

2' CONC. S/W

239'-12"ø SAN. SEWER @ 0.50%

251'-48"ø ST. SEWER @ 0.32%

242'-15"ø SAN. SEWER @ 0.52%

265'-8"ø SAN. SEWER @ 0.49%

292'-12"ø SAN. SEWER @ 0.65%

224'-12"ø SAN. SEWER @ 0.43%

498'-60"ø STORM SEWER @ 0.28%

A.S.T.M. - C76 - CL. III. PIPE, R.G., CLASS "B" BEDDING

A.S.T.M. - C76 - CL. V. PIPE, R.G., CLASS "B" BEDDING

EXIST. ℄ ROAD

300.00

290.00

280.00

EXIST. ℄ OF ROAD

ORIG. ℄ OF ROAD

CHAINAGE

304.09 303.97 303.82 303.50 303.24 303.12 303.09 303.97 303.01 302.89 302.81 302.69 302.61 302.39 302.21 302.09 301.98 301.86 301.62 301.50 301.39 301.27 301.32 301.20 301.15 301.03 301.04 300.92

58+00 57+50 51+00 50+75.66 50+72.77 50+50 50+00 49+50 49+00 48+50 48+00 47+50 47+00 46+50

KEY PLAN
SCALE 1"=1000'

MAPLEWOOD DR.
PROSPECT ST.
GHENT AVE.
BRANT ST.
BLAIRHOLM AVE.

TRUE NORTH
CONST NORTH

BENCH MARK (1) GEOD. B.M. 65-U-125 ELEVATION = 304.243
CONC. WALL AT EAST SIDE OF A SMALL BRIDGE AT SOUTHEAST CORNER OF BRANT ST. & PROSPECT ST. 1.0 MILE NORTHWEST OF LAKESHORE ROAD; TABLET IN TOP OF WALL 18 INCHES EAST OF GUARD RAIL, 15 INCHES ABOVE GROUND

BENCH MARK (2) GEOD. B.M. 65-U-124 ELEVATION = 298.092
CENTRAL PUBLIC SCHOOL AT SOUTHWEST OF BRANT ST., 0.60 MILE NORTHWEST OF LAKESHORE RD., AT NORTHWEST SIDE OF BALDWIN ST. TABLET IN NORTHWEST CONC. FOUNDATION WALL, 2.0' FROM WESTERLY CORNER, 12 INCHES ABOVE PAVEMENT

No.	DATE	BY	REVISIONS
3	JUNE/88	D.M.	'AS CONST.' (85-18) MMS-464-D, SH.1
2	APRIL 86	D.M.	'AS CONST.' (85-10) (INSP. MARKED UP DWGS.)
1	OCT/79	A.C.	AS CONSTRUCTED 78-21 FIELD NOTES B-254

DESIGN R.Y. | CHECKED | DATE JULY 1978
DRAWN M.A. | CHECKED

SCALE HORIZ. 1" = 20' (10 0 10 20 30 40) VERT. 1" = 10' (5 0 5 10 15)

REFERENCES
S-0508-E
S-0513-E
S-0537-A

APPROVALS
MUNICIPAL
REGIONAL

FIELD NOTES
B 225
B 241
P 209

STAMP

CONSULTANT

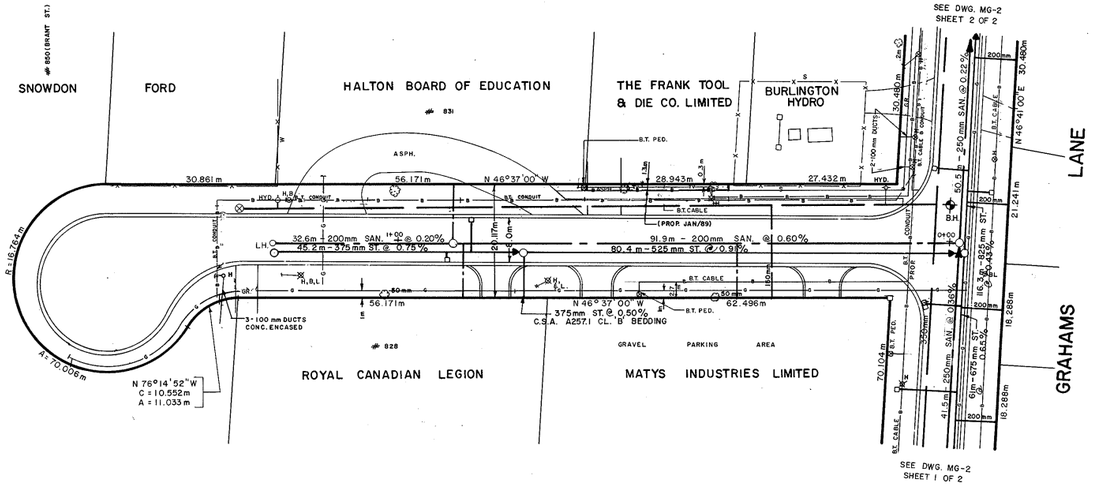
CITY OF BURLINGTON
DEPARTMENT OF PUBLIC WORKS

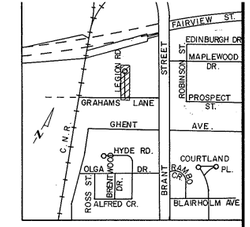
BRANT STREET
100' NORTH OF GHENT AVENUE TO 200' NORTH OF PROSPECT STREET

MUNICIPAL DRAWING No. R 90-2
REGIONAL DRAWING No.
CONTRACT No.
CONSULTANT DRAWING No.
SHEET OF

S-09 R

ML-1



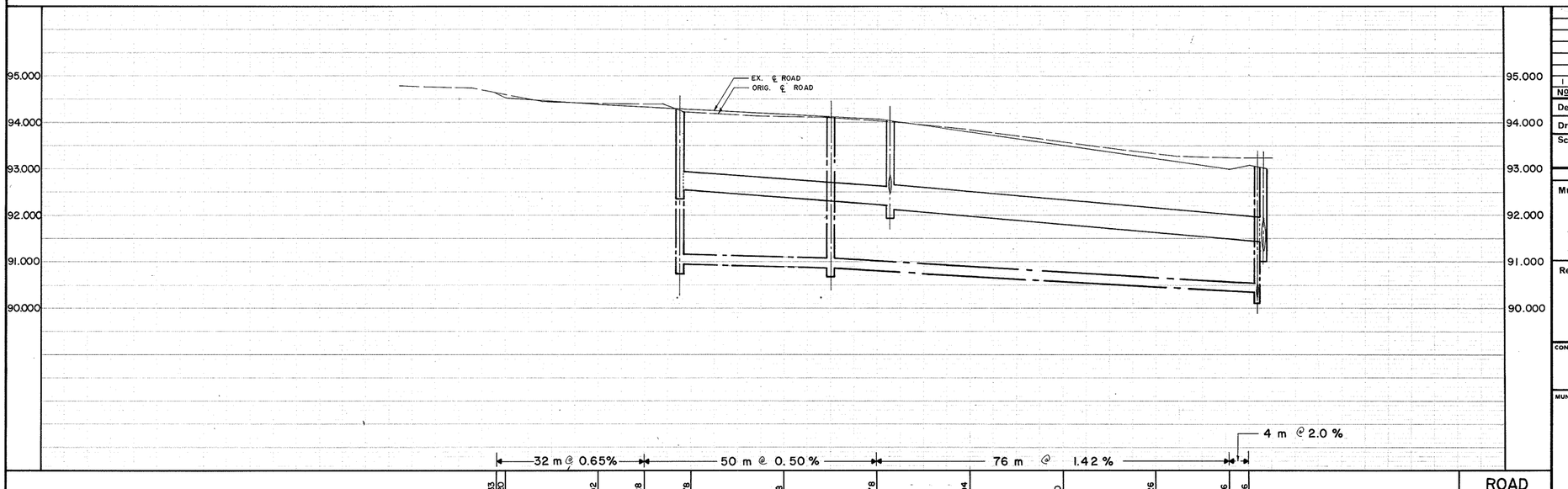


FOR TYPICAL X-SECTION SEE DWG. MG-2 SHEET 2

GEOD. B.M.

CONC. WALL AT EAST SIDE OF A SMALL BRIDGE AT S/E CORNER OF BRANT ST. & PROSPECT ST., 1.0 MILE N/W OF LAKESHORE RD.; TABLET IN TOP OF WALL 18 INCHES EAST OF GUARD RAIL, 13 INCHES ABOVE GROUND. No. 65-U-125 ELEV. 304.243

LEGION ROAD



ROAD GRADE	94.533 / 94.520	94.392	94.328	94.278	94.178	94.078	93.794	93.510	93.226	92.996	93.076
STORM SEWER				92.551 45.2m - 375mm ST @ 0.75% C.S.A. A257.1 E.S., CLASS 'B' BEDDING		92.211 / 92.156 / 92.476W	80.4 m - 525mm ST. @ 0.91% C.S.A. A257.20 CL. III, CLASS 'B' BEDDING			91.426 / 91.251W / 91.021E	
SANITARY SEWER				90.952 32.6m - 200mm @ 0.20%		90.886 / 90.871	91.9 m - 200mm @ 0.60%			90.325 / 90.253W / 90.245E	
CHAINAGE	2+00	1+80	1+62 / 1+60	1+40	1+30	1+20	1+00	0+80	0+60	0+40	0+20	0+04	0+00

No	Date	By	REVISIONS
1	APR./80	L.S.	"AS CONSTRUCTED", CONTRACT 79-23, FIELD NOTES G-174

Design		Checked		Date: SEPT. 25 1978
Drawn	J.A.C.	Checked		
Scale	5m 0 5 10 15m HOR. / 0.5m 0 0.5 1 1.5m VERT.			REFERENCES: 20R-3140, 5-03-40-C, 20R-2624, L-65, M 70, P-17 (CONTOUR)

APPROVALS

Municipal

DIRECTOR OF PUBLIC WORKS

DATE

Regional

FIELD NOTES: L-161, L-161*

STAMP

CONSULTANT

MUNICIPALITY

CITY OF BURLINGTON

DEPARTMENT OF PUBLIC WORKS

TITLE

LEGION ROAD

MUNICIPAL DRAWING No.	REGIONAL DRAWING No.
ML-1	

CONTRACT No.

SHEET 1 OF 1

1-JM

BRANT STREET

MAPLEWOOD DR.

PROSPECT ST.

GRAHAM'S LANE

APARTMENT BUILDING

SHELL GAS STATION

TO BE ABANDONED

BRICK FLOWER BOX TO BE ABANDONED

EXIST 300' - 12" Ø SAN SEWER @ 0.98%

PROP 295' - 15" Ø SAN SEWER @ 50%

PROP 300' - 42" Ø ST SEWER @ 30%

EXIST 8" WATERMAIN

EXIST 6" WATERMAIN (ABANDONED)

EXIST H.T. CONDUIT

PROP 250' - 15" Ø SAN SEWER @ 50%

PROP 251' - 48" Ø ST SEWER @ 30%

PROP 256' - 48" Ø ST SEWER @ 30%

16" ASB CEM CL150 WATERMAIN

EXIST ST. SEWER TO BE ABANDONED

EXIST 12" Ø SAN SEWER TO REMAIN IN OPERATION FOR SERVICING WEST SIDE OF THE STREET

EXIST 24" - 12" Ø SAN SEWER @ 0.50%

EXIST 30" Ø ST SEWER @ 0.50%

EXIST 36" Ø ST SEWER @ 0.50%

EXIST ST. SEWER TO BE ABANDONED

PROP MH 15

PROP MH 16

PROP M.H.S. 10

PROP M.H.S. 11

PROP M.H.S. 8A

PROP M.H.S. 8

EXIST M.H.

PROP INLET C.B. SEE STD. DWG. OD 707-E

PROP 4'W 100' ST. SEWER @ 50%

PROP 45° - 36" Ø ST. SEWER @ 50%

16" Ø CLAY CULVERT TO BE REMOVED

8" CONN. SEE DETAILS ON DWG R90-3B

SEE DETAIL ON DWG R90-3 SHEET 3

SEE DWG R 90-4

SEE DWG R 90-2

PAVED PARKING LOT

GREEN HOUSE & GARDEN AREA

APARTMENT BUILDING

GRAVEL D/W

PAVED D/W

GARDEN AREA

WOODEN BRIDGE

CONC. BRIDGE AREA

GAS PUMPS

PROP CURB

PROP 5' WIDE SIDEWALK

PROP 22' LATER EAST

PROP 4' SIDEWALK

PROP 6' WIDE SIDEWALK

PROP 22' LATER WEST

PROP 4' SIDEWALK

PINE TREE

16'-8" ANCHOR TEE 8" GV & SL & V. BOX

8" GV & SL & V. BOX

8" PLUG

SHARPE'S VARIETY STORE #854

ROADWAY SECTION

STA. 51+50 - STA. 57+75

NOT TO SCALE

22' DETOUR

5' SIDEWALK

1½" M.I.A. ASPHALT

3" GRANULAR 'A' BASE

6" GRANULAR 'B' BASE

PROFILE FOR LATERALS AT MAPLEWOOD RD. INTERSECTION

PROP MH 13

PROP MH 12

PROP MH 11

PROP MH 10

PROP MH 9

PROP MH 8

PROP ℄ ROAD

EXIST ℄ ROAD

305.00

300.00

295.00

290.00

310.00

ASTM C76 - CLASS III RUBBER GASKET CLASS 'C' BEDDING

ASTM C76 - CLASS V, RUBBER GASKET, CLASS 'C' BEDDING

500' @ 1.36%

200' @ 0.75%

	57+00	56+50	56+00	55+50	55+00	54+50	54+00	53+50	53+00	52+50	52+00	51+50
PROP ℄ ROAD	309.57	309.33	308.54	307.90	307.17	306.56	305.92	305.32	304.88	304.43	304.08	303.71
EXIST ℄ ROAD	309.95	308.89	308.21	307.53	306.85	306.17	305.49	304.81	304.44	304.06	303.68	303.31
CHAINAGE												

KEY PLAN

SCALE: 1"=1000

EDINBURGH DR. · MAPLEWOOD DR. · GRAHAMS LANE · PROSPECT ST. · GHENT AVE. · OLGA DR. · RAMBO CR. · BRANT ST. · BLAIRHOLME AVE.

REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY OMISSIONS OR INACCURACIES WHETHER DUE TO ALL OR CONTINUE SHOULD BE VERIFIED.

NOTES:

(1) OTHER MATERIALS WILL BE ACCEPTABLE PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE ENGINEER.

(2) BM S/W CORNER OF PORCH APT #849 MAPLEWOOD & BRANT ST.

REVISION No	DESCRIPTION	DATE	BY
2	AS CONSTRUCTED	25/4/60	D.F.G.
	WATERMAINS & SERVICES ADDED	29/11/60	D.F.G.

TOWN OF BURLINGTON
ENGINEERING DEPARTMENT

WATERMAIN & SERVICE LAYOUT
BRANT STREET
FROM PROSPECT ST. TO MAPLEWOOD DR.

DESIGN	M.KOEVOETS	CHK'D		FIELD NOTES	INDEX No
DRAWN BY	D.A.FRANZ	CHK'D		B70, B72,	
SCALE		DATE		REFERENCES	
APPROVED	DIRECTOR OF PUBLIC WORKS DATE			BRANT ST. - SEWELL SURVEY	R90-3A P.U.C No 261-B SHEET 4 OF 5.

B-00604

AE-089

PLAN OF SURVEY SHOWING TOPOGRAPHY OF PART OF

LOT 69
REGISTERED PLAN 99
IN THE
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

SCALE 1 : 300

0 5 10 20 metres

THE INTENDED PLOT SIZE OF THIS PLAN IS 850mm IN WIDTH BY 580mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:300 (INCLUDING 15mm BEYOND EACH BORDER)

MacKAY, MacKAY & PETERS LIMITED - ONTARIO LAND SURVEYORS

© 2023

METRIC DISTANCES SHOWN HEREON ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

COLOUR THE ORIGINAL SIGNED PRINT OF THIS PLAN OF SURVEY CONTAINS COLOUR

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-67164

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR IN ACCORDANCE WITH REGULATION 1026, SECTION 29(3)

LEGEND

- ■ DENOTES A SURVEY MONUMENT FOUND
- □ DENOTES A SURVEY MONUMENT PLANTED
- SIB DENOTES STANDARD IRON BAR
- SSIB DENOTES SHORT STANDARD IRON BAR
- IB DENOTES IRON BAR
- P1 DENOTES PLAN 20R–19918
- P2 DENOTES PLAN 20R–20020
- P3 DENOTES PLAN 20R–21599
- P4 DENOTES PLAN BY MMP LIMITED DATED OCTOBER 13, 2009 (09–174)
- P5 DENOTES PLAN BY SEWELL & SEWELL DATED DECEMBER 14, 1979 (79–767)
- PIN DENOTES PROPERTY IDENTIFICATION NUMBER
- WIT DENOTES WITNESS MONUMENT
- (OU) DENOTES ORIGIN UNKNOWN
- DS DENOTES DOOR SILL
- CLF DENOTES CHAIN LINK FENCE
- EA DENOTES EDGE OF ASPHALT
- OL DENOTES ORNAMENTAL LIGHT
- WHP DENOTES WOOD HYDRO POLE
- UGW DENOTES UTILITY GUYWIRE
- OHW DENOTES OVERHEAD WIRE
- BOL DENOTES BOLLARD
- WV DENOTES WATER VALVE
- FH DENOTES FIRE HYDRANT
- SAN–MH DENOTES SANITARY MANHOLE
- STM–MH DENOTES STORM MANHOLE
- CB DENOTES CATCH BASIN
- BCC DENOTES BACK OF CONCRETE CURB
- SRW DENOTES STONE RETAINING WALL
- SC DENOTES SECURITY CAMERA POLE
- RS DENOTES ROAD SIGN
- INV DENOTES INVERT
- N/A DENOTES NOT AVAILABLE
- GM DENOTES GAS MAIN LOCATE
- GS DENOTES GAS SERVICE LOCATE
- BSW DENOTES BELL SERVICE WIRE LOCATE
- H DENOTES HYDRO LOCATE
- WM DENOTES WATER MAIN LOCATE
- WS DENOTES WATER SERVICE LOCATE
- SAN DENOTES SANITARY SEWER LOCATE
- STM DENOTES STORM SEWER LOCATE
- AC DENOTES AIR CONDITIONER
- DENOTES DECIDUOUS TREE SCALED TO CANOPY TRUNK SIZE SHOWN IN METRES

ALL BUILDING TIES ARE TO FOUNDATION AND ARE PERPENDICULAR TO PROPERTY LINES UNLESS OTHERWISE NOTED

A ROTATION OF 00°00'50" HAS BEEN APPLIED TO BEARINGS ON P2
A ROTATION OF 00°01'10" HAS BEEN APPLIED TO BEARINGS ON P3
A ROTATION OF 00°48'00" HAS BEEN APPLIED TO BEARINGS ON P4 & P5

BENCHMARK NOTE

CITY OF BURLINGTON BENCHMARK No. 368
ELEVATION = 89.578 METRES (CGVD28:78 ADJUSTMENT)

BRASS PLAQUE ON THE NORTHEAST WING WALL OF THE CONRETE HEAD WALL OF A CULVERT ON THE NORTH SIDE OF BLAIRHOLM AVENUE, 50 METRES WEST OF COURTLAND AVENUE AND 150 METRES EAST OF BRANT STREET

BEARING REFERENCE

BEARINGS ARE GRID AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF GRAHAM'S LANE AS SHOWN ON PLAN 20R–19918 HAVING A BEARING OF N45°55'00"E

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 REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 21st DAY OF DECEMBER, 2023.

DECEMBER 21, 2023
DATE

ROY E. MAYO
ONTARIO LAND SURVEYOR
FOR MACKAY, MACKAY & PETERS LIMITED

E:\(20) Halton\Registered Plans\PP0099\LOT 69\23-182\23-182-PS.dwg

MMP
MacKay, MacKay & Peters Limited
LAND SURVEYORS & MAPPERS
SINCE 1906
3380 South Service Road
Unit 101
Burlington, ON
L7N 3J5
(905) 639-1375
halton@mmplimited.com
mmplimited.com

DRAWN BY:	G.S.
PARTY CHIEF:	N.C.
CHECKED BY:	
PROJECT No.:	23–182–PS

APPENDIX B

Water Servicing Supporting Calculations & Documentation

CROZIER CONSULTING ENGINEERS

Project: 1393 Grahams Lane **Created By:** JKF/SD **Date:** 2024-03-08
Project No.: 2548-6852 **Checked By:** BP **Updated:** -

Domestic Water Demand - City of Burlington Growth Analysis Study PPU

Total Site Area = 1.08 ha

Building	Unit Count
A	316
B	120
C	286
Total	**722**

Residential Population:

Population Density = 1.9 PPU
Population = 1372 persons

Design Parameters:

Residential Average Daily Demand = 0.275 m3/capita/d

Residential Water Demand:

Average Day = 377,245 L/d
= **4.37** **L/s**

Peaking Factors (Residential)

Max Day = 2.25
Peak Hour = 4.00

Average Day = **4.37** **L/s**
Max Day = **9.82** **L/s**
Peak Hour = **17.47** **L/s**

Water Demand Summary:

Development	Average Daily Water Demand (L/s)	Max Day Demand (L/s)	Peak Hourly Demand (L/s)
Residential	5	10	18

Notes & References

Total site area and unit count from Site Plan prepared by Kohn Partnership Architects Inc. (March 2024).

Persons Per Unit (PPU) from City of Burlington Growth Analysis Study's 25 year PPU forecast for new Units Constructed from 2016-2041 based on a medium to high density unit type (Dillion Consulting, June 2019).

Average Daily Demand design criteria from Section 2.4 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019).

Average Day (L/s) = Average Daily Demand (m^3/capita/day) * Population * 1000 / 86400

Peaking factors from Section 2.4 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019).

Max Day = Average Day Demand * Max Day
Peak Hour = Average Day Demand * Peak Hour

CROZIER CONSULTING ENGINEERS

Project: 1393 Grahams Lane **Created By:** JKF/SD **Date:** 2024-03-08
Project No.: 2548-6852 **Checked By:** BP **Updated:** -

Domestic Water Demand - Region of Halton Population Estimates

Total Site Area = 1.08 ha

Residential Population:

Population Density = 285
Population = 308

Design Parameters:

Residential Average Daily Demand = 0.275 m3/capita/d

Residential Water Demand:

Average Day = 84,645 L/d
= **0.98** **L/s**

Peaking Factors (Residential)

Max Day = 2.25
Peak Hour = 4.00

Average Day = **0.98** **L/s**
Max Day = **2.20** **L/s**
Peak Hour = **3.92** **L/s**

Water Demand Summary:

Development	Average Daily Water Demand (L/s)	Max Day Demand (L/s)	Peak Hourly Demand (L/s)
Residential	1	2	4

Notes & References

Total site area from Site Plan prepared by Kohn Partnership Architects Inc. (March 2024).

Population density estimates from Table 2-1 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019). The site is classified as Apartments (over 6 stories high).

Average Daily Demand design criteria from Section 2.4 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019).

Average Day (L/s) = Average Daily Demand (m^3/capita/day) * Population * 1000 / 86400

Peaking factors from Section 2.4 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019).

Max Day = Average Day Demand * Max Day
Peak Hour = Average Day Demand * Peak Hour

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building A (GOVERNS)

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

RFF = 220 * C * sqrt A

where:

RFF = the required fire flow in litres per minute (L/min)
C = the construction coefficient is related to the type of construction of the building
= 1.5 for Type V Wood Frame Construction
= 0.8 for Type IV-A Mass Timber Construction
= 0.9 for Type IV-B Mass Timber Construction
= 1.0 for Type IV-C Mass Timber Construction
= 1.5 for Type IV-D Mass Timber Construction
= 1.0 for Type III Ordinary Construction
= 0.8 for Type II Non-combustible Construction
= 0.6 for Type I Fire Resistive Construction
A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C) 0.8 Type II Non-combustible Construction Assumed

STEP B: Total Effective Floor Area
Proposed Building

Apartment Building A provides most conservative FUS estimate. Building information/characteristics obtained from Site plan prepared by Kohn Partnership Architects Inc. (March 2024) and email Re: 1393 Grahams Lane - Updated Arch Drawings (Nagy to Fletcher, January 31, 2024).

	Yes/No/Unknown	
Is basement at least 50% below grade?	Yes	If yes, basement floor area excluded
Vertical openings protected?	Yes	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	Total Floor Area (m^2)	% of Area Considered	Effective Floor Area (m^2)
Level 1	1,690	0%	0
Level 2	1,682	0%	0
Level 3	1,729	25%	432
Level 4	1,858	100%	1,858
Level 5	1,592	25%	398
Level 6	1,592	0%	0
Level 7	1,500	0%	0
Level 8	1,500	0%	0
Level 9	1,462	0%	0
Level 10	985	0%	0
Level 11	985	0%	0
Level 12	930	0%	0
Level 13	930	0%	0
Level 14	930	0%	0
Level 15	857	0%	0
Level 16	857	0%	0
Total	**21,079**		**2,688**

Total Effective Floor Area **2,688** m^2

STEP C: Therefore RFF = **9,000** **L/min (rounded to nearest 1000 L/min)**

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building A (GOVERNS)

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor	
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy	Adjustment Factor	
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-1,350** **L/min (reduction)**

RFF = **7,650** **L/min (not rounded)**

Note: The RFF flow 7650 L/min is used in Step E and F.

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	Yes	-30%	-30%
Water supply is standard for both the system and Fire Department hose lines?	Yes	-10%	-10%
Fully supervised system?	Yes	-10%	-10%

*Reduction available assumes complete building coverage
*30% reduction typical for building requiring sprinkler system

Total Reduction % **-50%** **(reduction)**

Total Reduced Flow **-3,825** **L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*If a vertical fire wall is properly constructed and has a rating of no less than 2 hours, then the boundary can be treated as protected with no exposure charge
*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings. Where either the subject building or the exposed building is at a diagonal to the other building, the shortest distance should be increased by 3 metres and this adjusted value used as exposure distance.

Exposed buildings		Distance	Surcharge Factor	Surcharge (L/min)
North	Royal Canadain Legion and Ex. 1-ST Commercial Building	>30	0%	0
East	Existing Commercial Building	21	10%	765
South	Existing Commercial Building	33	0%	0
West	Proposed Bulding B	20.1	10%	765

Total Reduced Flow **1,530** **L/min Surcharge (not rounded)**

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building A (GOVERNS)

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	7,650	L/min
Step E - Sprinkler (Reduction)	-3,825	L/min
Step F - Exposure Charge	1,530	L/min
Final Fire Flow:	**5,355**	**L/min**
or	**89**	**L/s**
or	**1,415**	**USGPM**
Required duration:	**1.84**	**hours**

**Refer to Table 1 for Duration*

Table 1 - FUS 2020
Required Duration of Fire Flow

Flow Required (L/min)	Duration (hours)
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

Interpolate for intermediate figures

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building B

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

RFF = 220 * C * sqrt A

where:

RFF = the required fire flow in litres per minute (L/min)
C = the construction coefficient is related to the type of construction of the building
= 1.5 for Type V Wood Frame Construction
= 0.8 for Type IV-A Mass Timber Construction
= 0.9 for Type IV-B Mass Timber Construction
= 1.0 for Type IV-C Mass Timber Construction
= 1.5 for Type IV-D Mass Timber Construction
= 1.0 for Type III Ordinary Construction
= 0.8 for Type II Non-combustible Construction
= 0.6 for Type I Fire Resistive Construction
A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C) — 0.8 — Type II Non-combustible Construction Assumed

STEP B: Total Effective Floor Area
Proposed Building

Apartment Building B. Building information/characteristics obtained from Site plan prepared by Kohn Partnership Architects Inc. (March 2024) and email Re: 1393 Grahams Lane - Updated Arch Drawings (Nagy to Fletcher, January 31, 2024).

	Yes/No/Unknown	
Is basement at least 50% below grade?	Yes	If yes, basement floor area excluded
Vertical openings protected?	Yes	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	Total Floor Area (m^2)	% of Area Considered	Effective Floor Area (m^2)
Basement	0	0%	0.0
Ground Floor	807	0%	0.0
Level 2	807	0%	0.0
Level 3	880	25%	220.0
Level 4	1026	100%	1026.0
Level 5	930	25%	232.5
Level 6	975	0%	0.0
Level 7	975	0%	0.0
Level 8	975	0%	0.0
Level 9	880	0%	0.0
Total	**0**		**1478.5**

Total Effective Floor Area — **1479** m^2

STEP C: Therefore RFF = **7,000** **L/min (rounded to nearest 1000 L/min)**

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building B

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor	
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy		Adjustment Factor
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-1,050** **L/min (reduction)**

RFF = **5,950** **L/min (not rounded)**

Note: The RFF flow 5950 L/min is used in Step E and F.

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	Yes	-30%	-30%
Water supply is standard for both the system and Fire Department hose lines?	Yes	-10%	-10%
Fully supervised system?	Yes	-10%	-10%

*Reduction available assumes complete building coverage
*30% reduction typical for building requiring sprinkler system

Total Reduction % **-50%** **(reduction)**

Total Reduced Flow **-2,975** **L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*If a vertical fire wall is properly constructed and has a rating of no less than 2 hours, then the boundary can be treated as protected with no exposure charge
*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings. Where either the subject building or the exposed building is at a diagonal to the other building, the shortest distance should be increased by 3 metres and this adjusted value used as exposure distance.

Exposed buildings		Distance	Surcharge Factor	Surcharge (L/min)
North	Proposed Building C	11.22	15%	892.5
East	Propsed Building A	20.08	10%	595
South	Exisiting Building	33.8	0%	0
West	Existing Low Rise Residential	73.4	0%	0

Total Reduced Flow **1,488** **L/min Surcharge (not rounded)**

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building B

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	5,950	L/min
Step E - Sprinkler (Reduction)	-2,975	L/min
Step F - Exposure Charge	1,488	L/min
Final Fire Flow:	**4,463**	**L/min**
	74	**L/s**
or	**1,179**	**USGPM**
or	**1.62**	**hours**
Required duration:	**Refer to Table 1 for Duration*	

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	**Duration (hours)**
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

Interpolate for intermediate figures

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building C

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

RFF = 220 * C * sqrt A

where:

RFF = the required fire flow in litres per minute (L/min)
C = the construction coefficient is related to the type of construction of the building
= 1.5 for Type V Wood Frame Construction
= 0.8 for Type IV-A Mass Timber Construction
= 0.9 for Type IV-B Mass Timber Construction
= 1.0 for Type IV-C Mass Timber Construction
= 1.5 for Type IV-D Mass Timber Construction
= 1.0 for Type III Ordinary Construction
= 0.8 for Type II Non-combustible Construction
= 0.6 for Type I Fire Resistive Construction
A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C) 0.8 Type II Non-combustible Construction Assumed

STEP B: Total Effective Floor Area
Proposed Building

Apartment Building C. Building information/characteristics obtained from Site plan prepared by Kohn Partnership Architects Inc. (March 2024) and email Re: 1393 Grahams Lane - Updated Arch Drawings (Nagy to Fletcher, January 31, 2024).

	Yes/No/Unknown	
Is basement at least 50% below grade?	Yes	If yes, basement floor area excluded
Vertical openings protected?	Yes	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	Total Floor Area (m^2)	% of Area Considered	Effective Floor Area (m^2)
Basement	0	0%	0.0
Ground Floor	817	0%	0.0
Level 2	817	0%	0.0
Level 3	871	0%	0.0
Level 4	1071	0%	0.0
Level 5	969	0%	0.0
Level 6	1040	25%	260.0
Level 7	1040	100%	1040.0
Level 8	1040	25%	260.0
Level 9	905	0%	0.0
Level 10	905	0%	0.0
Level 11	930	0%	0.0
Level 12	930	0%	0.0
Level 13	971	0%	0.0
Level 14	971	0%	0.0
Level 15	971	0%	0.0
Level 16	971	0%	0.0
Level 17	971	0%	0.0
Level 18	971	0%	0.0
Level 19	891	0%	0.0
Level 20	891	0%	0.0
Total	**0**		**1560.0**

Total Effective Floor Area **1560** m^2

STEP C: Therefore RFF = **7,000** **L/min (rounded to nearest 1000 L/min)**

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building C

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor	
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy		Adjustment Factor
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-1,050** **L/min (reduction)**

RFF = **5,950** **L/min (not rounded)**

Note: The RFF flow 5950 L/min is used in Step E and F.

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	Yes	-30%	-30%
Water supply is standard for both the system and Fire Department hose lines?	Yes	-10%	-10%
Fully supervised system?	Yes	-10%	-10%

*Reduction available assumes complete building coverage
*30% reduction typical for building requiring sprinkler system

Total Reduction % **-50%** **(reduction)**

Total Reduced Flow **-2,975** **L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*If a vertical fire wall is properly constructed and has a rating of no less than 2 hours, then the boundary can be treated as protected with no exposure charge
*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings. Where either the subject building or the exposed building is at a diagonal to the other building, the shortest distance should be increased by 3 metres and this adjusted value used as exposure distance.

Exposed buildings		Distance	Surcharge Factor	Surcharge (L/min)
North	Existing Commercial Building	11.05	15%	892.5
East	Existing Royal Canadian Legion	105.6	0%	0
South	Proposed Building B	11.22	15%	892.5
West	Existing Low-Rise Residential	87.95	0%	0

Total Reduced Flow **1,785** **L/min Surcharge (not rounded)**

PROJECT NAME: 1393 Grahams Lane
PROJECT NUMBER: 2548-6852
PREPARED BY: SD
CHECKED BY: JKF/BP
DATE: 2024-03-08

Fire Flow Determination Per Fire Underwriters Survey (2020) - Building C

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	5,950	L/min
Step E - Sprinkler (Reduction)	-2,975	L/min
Step F - Exposure Charge	1,785	L/min
Final Fire Flow:	**4,760**	**L/min**
	79	**L/s**
or	**1,257**	**USGPM**
or	**1.69**	**hours**
Required duration:	**Refer to Table 1 for Duration*	

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	**Duration (hours)**
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

Interpolate for intermediate figures

Hydrant Flow Test Report

Residual Hydrant Number _____

Operator: Colin Powell

Date: 30-Oct-23 Time: 1:10 PM

Witness: Halton Region

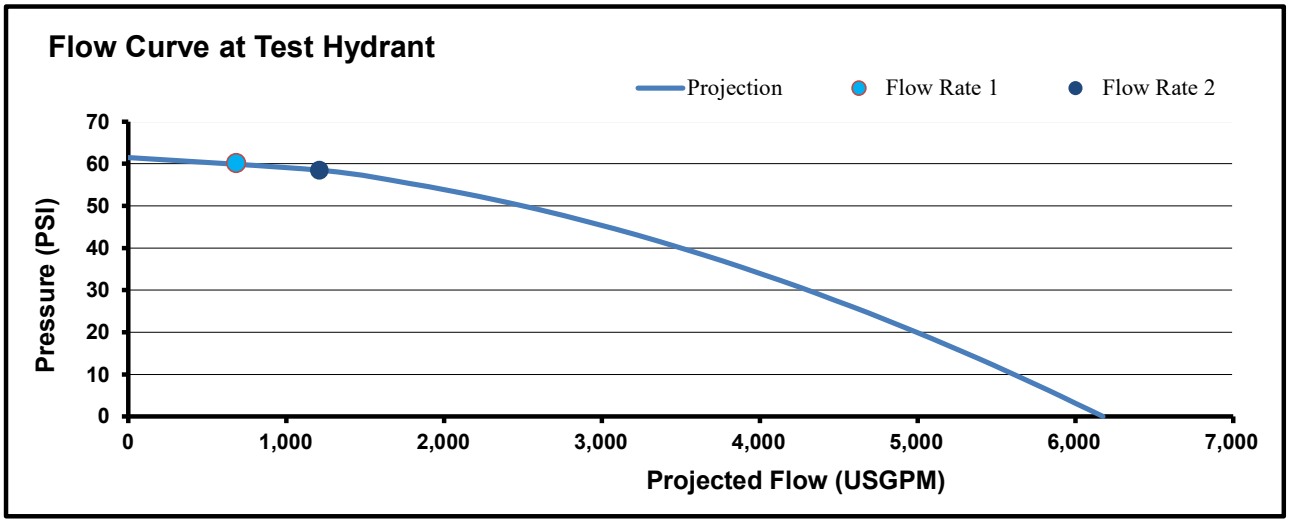
Residual Test Hydrant:	1395 Grahams Lane		
Hydrant Number:		NFPA Colour Code:	**CLASS AA - BLUE**
Owner:			

STATIC PRESSURE:	61.5 psi	424 kPa	Pressure Drop
RESIDUAL PRESSURE 1:	60.2 psi	415 kPa	2.1%
RESIDUAL PRESSURE 2:	58.5 psi	403 kPa	4.9%

			Hydrant Number
Flow Hydrants:	A	1440 Grahams Lane	
	B		
	C		

Hydrant No.	Flow Device	Outlet Dia. (in.)	Flow Rate 1 Reading (psi)	Flow Rate 1 (USGPM)	Flow Rate 2 Reading (psi)	Flow Rate 2 (USGPM)
A	Pitot	2.5	19	680	15	604
A	Pitot	2.5		0	15	604
A	HoseMonster	4"				
Total Flow (USGPM)			680		1208	
Total Flow (L/second)			43		76	
Available Flow At Test Hydrant at 20 ps			4,413	USGPM	4,992	USGPM
			278	L/second	315	L/second

Average Projection at 20 PSI	4,703	USGPM



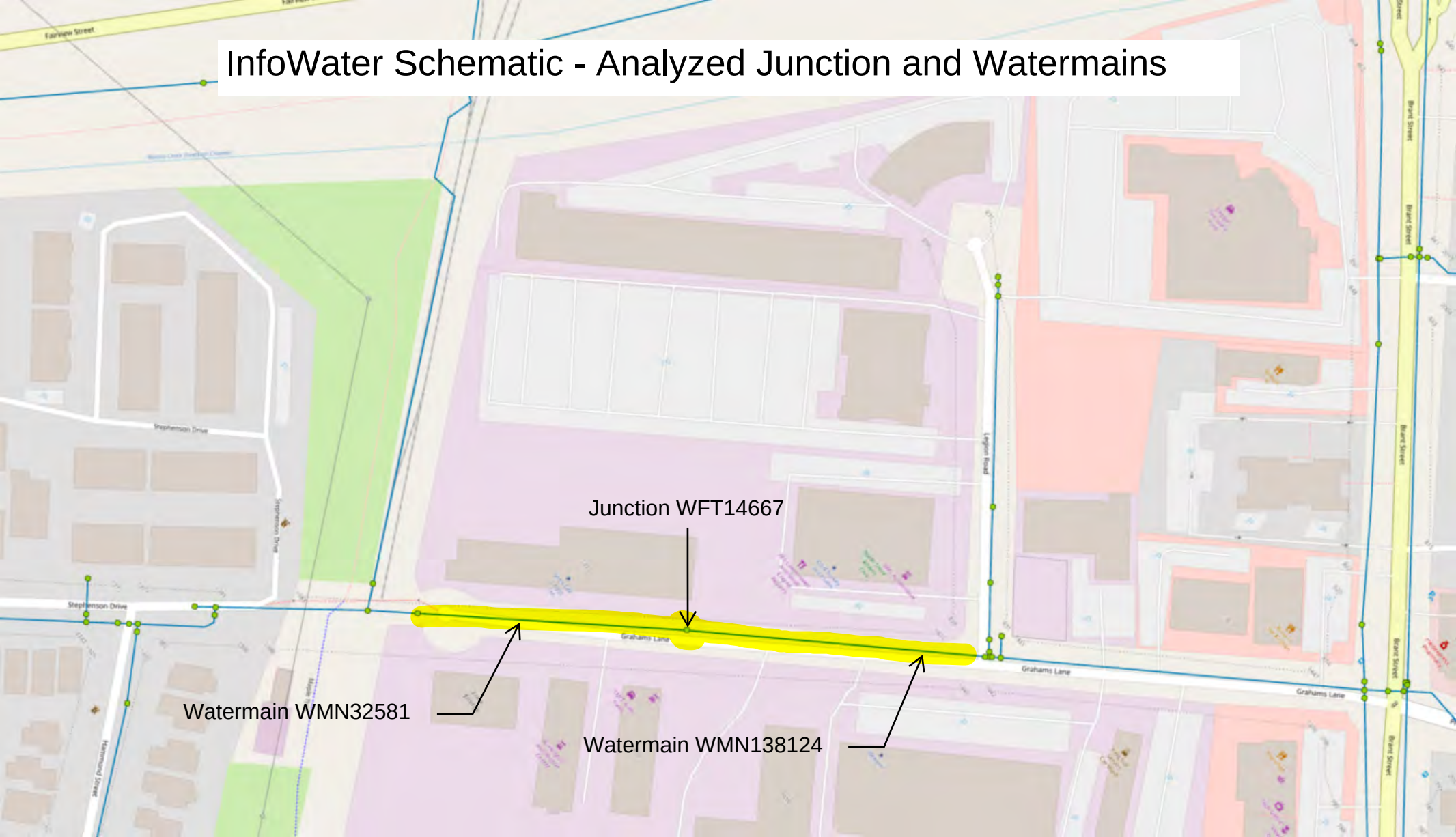
Comments/Discrepencies/Diagram:

Test may not be accurate due to insignifigant pressure drop

Recommend retest utilizing multiple flow hydrants, primary on Grahams Lane, secondary flow hydrant on Stephenson Drive

Watermark Solutions Limited
(705) 250-0368 www.watermark.ca

InfoWater Schematic - Analyzed Junction and Watermains



APPENDIX C

Sanitary Servicing Supporting Calculations & Documentation

CROZIER CONSULTING ENGINEERS

Project: 1393 Grahams Lane **Created By:** JKF/SD **Date:** 2024-03-08
Project No.: 2548-6852 **Checked By:** BP **Updated:** -

Domestic Wastewater Design Flow - City of Burlington Growth Analysis Study PPU

Total Site Area = 1.08 ha

Building	Unit Count
A	316
B	120
C	286
Total	**722**

Residential Population:

Population Density = 1.9 PPU
Population = 1372 persons

Design Parameters:

Residential Dry Weather Flow = 0.275 m^3/capita/d

Residential Average Dry Weather Wastewater Flow:

Average Dry Weather Daily Flow = 377,245 L/d
= **4.37** L/s

Modified Harmon Peak Factor:

K_{av} = 1.0

M = 3.71

Peak Dry Weather Flow = **16.19** L/s

Infiltration Flow: Infiltration = 0.286 L/ha/s
Total Infiltration = **0.31** L/s

Total Peak Design Flow = **16.50** L/s

Summary Table:

Average Dry Weather Daily Flow (L/s)	Peaking Factor	Peak Dry Weather Flow (L/s)	Infiltration Flow (L/s)	Total Peak Wastewater Design Flow (L/s)
5	3.71	17	0.3	17

Notes & References

Total site area and unit count from Site Plan prepared by Kohn Partnership Architects Inc. (March 2024).

Population Per Unit (PPU) from City of Burlington Growth Analysis Study's 25 year PPU forecast for new Units Constructed from 2016-2041 based on a medium to high density unit type (Dillion Consulting, June 2019).

Wastewater design flow criteria from Table 3-1 from the Region of Halton Linear Design Manual (Version 5, October 2019)

Residential Average Dry Weather Daily Flow (L/s) = Average Dry Weather Flow (m^3/capita/day) * Population * 1000 / 86400

$$M = K_{av} \times \left(1 + \frac{14}{4 + \sqrt{P + P_e}}\right)$$

where, $$K_{av} = \frac{A_R + 0.80 \times (A_I + A_C)}{A_R + A_I + A_C}$$

and
M = ratio of peak flow to average flow*
P = tributary population in thousands
P_e = equivalent tributary population in thousands
A_R = residential land use area (ha)
A_I = industrial land use area (ha)
A_C = commercial land use area (ha)

Peak Dry Weather Flow = Total Average Dry Sanitary Flow * M

Total Peak Design Flow = Peak Dry Weather Flow + Total Infiltration

Infiltration flow from Section 3.2.1 from the Region of Halton Linear Design Manual (Version 5, October 2019)

CROZIER CONSULTING ENGINEERS

Project: 1393 Grahams Lane **Created By:** JKF/SD **Date:** 2024-03-08
Project No.: 2548-6852 **Checked By:** BP **Updated:** -

Domestic Wastewater Design Flow - Region of Halton Population Estimates

Total Site Area = 1.08 ha

Residential Population:

Population Density = 285
Population = 308

Design Parameters:

Residential Dry Weather Flow = 0.275 m^3/capita/d

Residential Average Dry Weather Wastewater Flow:

Average Dry Weather Daily Flow = 84,645 L/d
= **0.98** L/s

Modified Harmon Peak Factor:

K_{av} = 1.0

M = 4.00

Peak Dry Weather Flow = **3.92** L/s

Infiltration Flow: Infiltration = 0.286 L/ha/s
Total Infiltration = **0.31** L/s

Total Peak Design Flow = **4.23** L/s

Summary Table:

Average Dry Weather Daily Flow (L/s)	Peaking Factor	Peak Dry Weather Flow (L/s)	Infiltration Flow (L/s)	Total Peak Wastewater Design Flow (L/s)
1	4.00	4	0.3	4

Notes & References

Total site area from Site Plan prepared by Kohn Partnership Architects Inc. (March 2024).

Population density estimates from Tables 3-1 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019).

Wastewater design flow criteria from Table 3-1 from the Region of Halton Linear Design Manual (Version 5, October 2019)

Residential Average Dry Weather Daily Flow (L/s) = Average Dry Weather Flow (m^3/capita/day) * Population * 1000 / 86400

$$M = K_{av} \times \left(1 + \frac{14}{4 + \sqrt{P + P_e}}\right)$$

where, $$K_{av} = \frac{A_R + 0.80 \times (A_I + A_C)}{A_R + A_I + A_C}$$

and
M = ratio of peak flow to average flow*
P = tributary population in thousands
P_e = equivalent tributary population in thousands
A_R = residential land use area (ha)
A_I = industrial land use area (ha)
A_C = commercial land use area (ha)

Peak Dry Weather Flow = Total Average Dry Sanitary Flow * M

Total Peak Design Flow = Peak Dry Weather Flow + Total Infiltration

Infiltration flow from Section 3.2.1 from the Region of Halton Linear Design Manual (Version 5, October 2019)

1393 Grahams Lane
EXISTING CONDITIONS
EXTERNAL SANITARY SEWER CAPACITY ANALYSIS

PREPARED BY: JKF/SD **DATE:** 2024.03.08
CHECKED BY: BP **UPDATED:** /
PROJECT No.: 2548-6852

Type of Development[1]	Equivalent Population Density
Light Commercial (MXE & MXG)[6]	90 persons/ha
Medium to High Density Residential Apartment Units[7]	1.9 PPU

Mannings "n":	0.013
Peak Factor (M):	1+(14/4+(P/1000)^0.5) <= 4
Avg. Daily/Capita Flow (L/cap/d)[6]:	275
Commercial Avg. Daily/Capita Flow (m^3/ha/d)[6]:	24.75
Infiltration Allowance (L/ha.s):	0.286

Building	Unit Count
A	316
B	120
C	286
Total	**722**

CATCHMENT I.D.[2,3,4]	STREET Address	FROM MH NO	TO MH NO	AREA (Ha)	POP.[6]	TOTAL TRIB. POP.	COMMERCIAL PEAK FACTOR	COMMERCIAL AVG. FLOW (l/s)	COMMERICAL MAX. FLOW (l/s)	MAX FLOW (l/s)	INFILT. (l/s)	TOTAL FLOW (l/s)	Cumulative Flow (l/s)	LENGTH (m)	PIPE DIAM. (mm)	SLOPE (%)	CAP. (l/s)	CAP. (%)	FULL FLOW VELOCITY (m/s)
101	1380 Grahams Lane	1	2	0.19	17	17	4.00	0.05	0.22	0.22	0.05	**0.27**	**0.27**	85.5	250	0.25%	**30**	**1%**	0.61
G1	Grahams Lane ROW	1	2	0.19	0	17	NA	0.00	0.00	0.00	0.05	**0.05**	**0.33**	85.5	250	0.25%	**30**	**1%**	0.61
102	1393 Grahams Lane	1	2	1.08	97	114	4.00	0.31	1.24	1.24	0.31	**1.55**	**1.87**	106.5	250	0.27%	**31**	**6%**	0.63
103	1392 & 1400 Grahams Lane	2	3	0.42	38	152	4.00	0.12	0.48	0.48	0.12	**0.60**	**2.47**	106.5	250	0.27%	**31**	**8%**	0.63
104	1416 Grahams Lane	2	3	0.44	40	192	4.00	0.13	0.50	0.50	0.13	**0.63**	**3.10**	106.5	250	0.27%	**31**	**10%**	0.63
105	1421, 1423 &1425 Grahams Lane	2	3	0.44	40	231	4.00	0.13	0.50	0.50	0.13	**0.63**	**3.73**	106.5	250	0.27%	**31**	**12%**	0.63
G2	Grahams Lane ROW	2	3	0.22	0	231	NA	0.00	0.00	0.00	0.06	**0.06**	**3.80**	106.5	250	0.27%	**31**	**12%**	0.63
106	1440 Grahams Lane	3	4	0.77	69	301	4.00	0.22	0.88	0.88	0.22	**1.10**	**4.90**	41.5	250	0.36%	**36**	**14%**	0.73
G3	Grahams Lane ROW	3	4	0.07	0	301	NA	0.00	0.00	0.00	0.02	**0.02**	**4.92**	41.5	250	0.36%	**36**	**14%**	0.73
107	850 Legion Road	5	6	1.04	94	94	4.00	0.30	1.19	1.19	0.30	**1.49**	**1.49**	85.5	200	0.20%	**15**	**10%**	**0.47**
L1	Legion Road ROW	5	6	0.19	0	94	NA	0.00	0.00	0.00	0.05	**0.05**	**1.54**	85.5	200	0.20%	**15**	**11%**	**0.47**
108	831 Legion Road	6	4	0.29	26	120	4.00	0.08	0.33	0.33	0.08	**0.42**	**1.96**	91.9	200	0.60%	**25**	**8%**	0.81
109	828 Legion Road	6	4	0.72	65	185	4.00	0.21	0.83	0.83	0.21	**1.03**	**2.99**	91.9	200	0.60%	**25**	**12%**	0.81
110	1439 Grahams Lane	6	4	0.16	14	199	4.00	0.05	0.18	0.18	0.05	**0.23**	**3.22**	91.9	200	0.60%	**25**	**13%**	0.81
L2	Legion Road ROW	6	4	0.17	0	199	NA	0.00	0.00	0.00	0.05	**0.05**	**3.27**	91.9	200	0.60%	**25**	**13%**	0.81
111	1431 Grahams Lane	4	7	0.09	8	508	4.00	0.03	0.10	0.10	0.03	**0.13**	**8.32**	50.5	250	0.22%	**28**	**30%**	**0.57**
G4	Grahams Lane ROW	4	7	0.10	0	508	NA	0.00	0.00	0.00	0.03	**0.03**	**8.34**	50.5	250	0.22%	**28**	**30%**	**0.57**
112	1448 Grahams Lane	7	8	0.32	29	536	4.00	0.09	0.37	0.37	0.09	**0.46**	**8.80**	97.0	250	0.25%	**30**	**30%**	0.61
113	1451 & 1453 Grahams Lane	7	8	0.16	14	551	4.00	0.05	0.18	0.18	0.05	**0.23**	**9.03**	97.0	250	0.25%	**30**	**30%**	0.61
114	796 Brant Street	7	8	0.19	17	568	4.00	0.05	0.22	0.22	0.05	**0.27**	**9.30**	97.0	250	0.25%	**30**	**31%**	0.61
115	814 Brant Street	7	8	0.16	14	582	4.00	0.05	0.18	0.18	0.05	**0.23**	**9.53**	97.0	250	0.25%	**30**	**32%**	0.61
G5	Grahams Lane ROW	7	8	0.21	0	582	NA	0.00	0.00	0.00	0.06	**0.06**	**9.59**	97.0	250	0.25%	**30**	**32%**	0.61
116	834 Brant Street	9	10	0.12	11	11	4.00	0.03	0.14	0.14	0.03	**0.17**	**0.17**	74.0	300	0.64%	**77**	**0%**	1.09
117	824 Brant Street	9	10	0.43	39	50	4.00	0.12	0.49	0.49	0.12	**0.62**	**0.79**	74.0	300	0.64%	**77**	**1%**	1.09
B1	Brant Street ROW	9	10	0.11	0	50	NA	0.00	0.00	0.00	0.03	**0.03**	**0.82**	74.0	300	0.64%	**77**	**1%**	1.09
B2	Brant Street ROW	10	8	0.11	0	50	NA	0.00	0.00	0.00	0.03	**0.03**	**0.85**	71.7	300	0.50%	**68**	**1%**	0.97
118	790 Brant Street	8	11	0.14	13	644	4.00	0.04	0.16	0.16	0.04	**0.20**	**10.64**	87.6	300	0.65%	**78**	**14%**	1.10
B3	Brant Street ROW	8	11	0.13	0	644	NA	0.00	0.00	0.00	0.04	**0.04**	**10.68**	87.6	300	0.65%	**78**	**14%**	1.10

Notes:
1. Zoning designations and parcel boundaries were obtained from City of Burlington's Zoning Bylaw Interactive Map accessed February 14, 2024. MXE and MXG Zoning was assumed to match Light Commercial Type of Development according to Table 3-2 in the Region of Halton Linear Design Manual (Version 5, October 2019) and based on existing land use.
2. Under current conditions, Catchments 108 and 111 do not contain infrastructure or have a permanent population that would generate wastewater. To be conservative, a population and wastewater flow generated from Catchments 108 and 111 were included to account for possible development in the future.
3. Based on Halton Region's GIS Mapping, Catchments 114 and 115 are shown to have two separate service connections to the Grahams Lane municipal sanitary sewer and the West Brant Street sanitary trunk sewer. To be conservative, it was assumed the wastewater generated within these catchments are only conveyed through the service connections connected to the Grahams Lane municipal sanitary sewer.
4. Grahams Lane, Legion Road, and Brant Street ROW areas only contribute infiltration flow to the sanitary sewer system as no population is associated with these areas.
5. The location of the existing sanitary sewer infrastructure and service laterals were obtained from engineering as-built drawings and GIS Mapping provided by the City and the Region (October 2023).
6. Equivalent Population Densities and Unit Sewage Flows taken from Table 3-1 and 3-2 of the Region of Halton's Water and Wastewater Linear Design Manual (Version 5, October 2019)
7. Proposed residential population for Catchment 102 (1393 Grahams Lane) based on Population Per Unit (PPU) from City of Burlington Growth Analysis Study's 25 year PPU forecast for new Units Constructed from 2016-2041 based on a medium to high density unit type (Dillion Consulting, June 2019).

1393 Grahams Lane

PROPOSED CONDITIONS - FULL-BULDOUT

EXTERNAL SANITARY SEWER CAPACITY ANALYSIS

PREPARED BY: JKF/SD **DATE:** 2024.03.08
CHECKED BY: BP **UPDATED:** /
PROJECT No.: 2548-6852

Type of Development[1]	Equivalent Population Density
Light Commercial (MXE & MXG)[4]	90 persons/ha
Medium to High Density Residential Apartment Units[7]	1.9 PPU

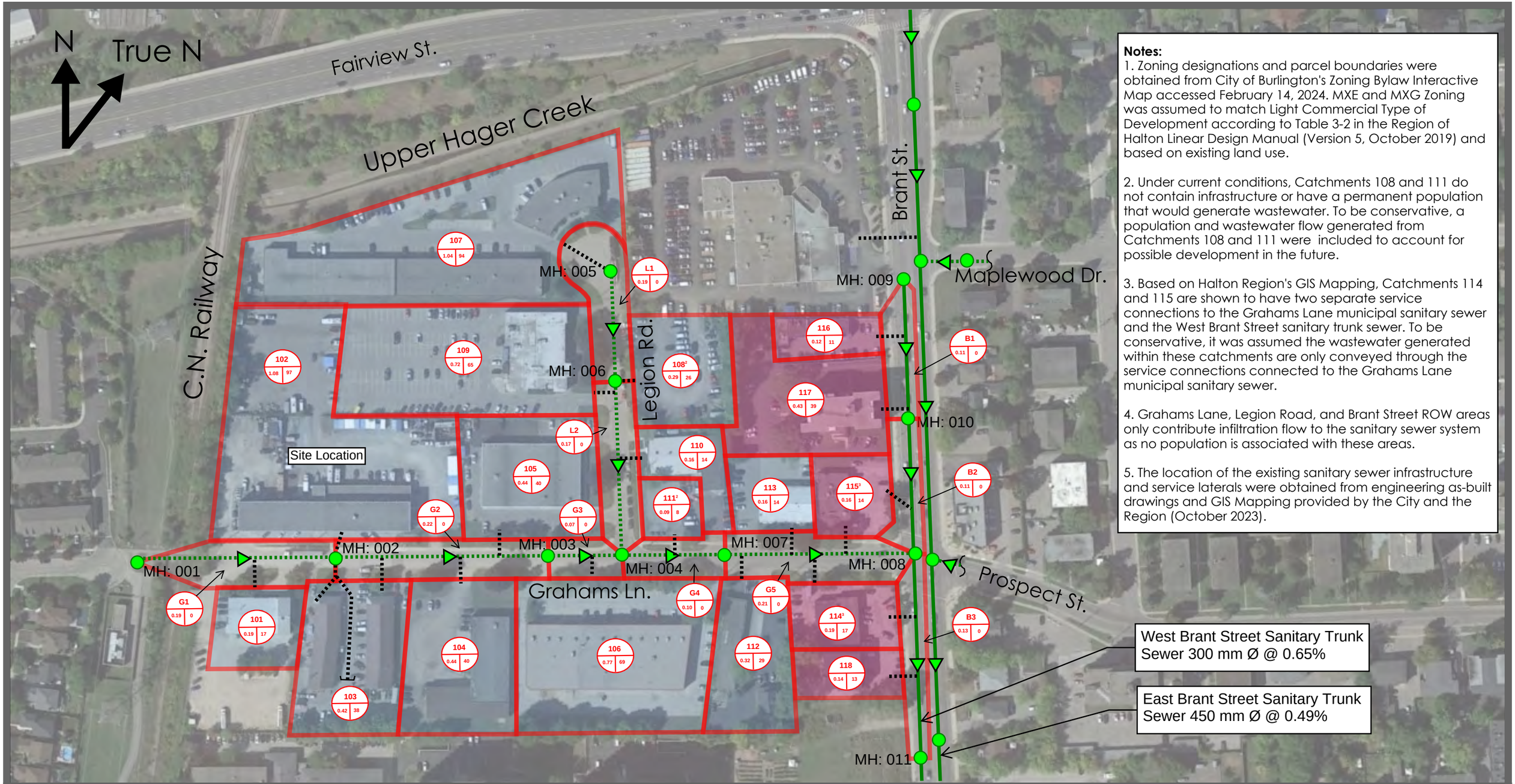
Mannings "n":	0.013
Peak Factor (M):	1+(14/4+(P/1000)^0.5) <= 4
Avg. Daily/Capita Flow (L/cap/d)[6]:	275
Commercial Avg. Daily/Capita Flow (m^3/ha/d)[6]:	24.75
Infiltration Allowance (L/ha.s):	0.286

Building	Unit Count
A	316
B	120
C	286
Total	**722**

CATCHMENT I.D.[2,3,4]	STREET Address	FROM MH NO	TO MH NO	AREA (Ha)	POP.[6,7]	TOTAL TRIB. POP.	RESIDENTIAL PEAK FACTOR	RESIDENTIAL AVG. FLOW (l/s)	RESIDENTIAL MAX. FLOW (l/s)	COMMERCIAL PEAK FACTOR	COMMERCIAL AVG. FLOW (l/s)	COMMERICAL MAX. FLOW (l/s)	MAX FLOW (l/s)	INFILT. (l/s)	TOTAL FLOW (l/s)	Cumulative Flow (l/s)	LENGTH (m)	PIPE DIAM. (mm)	SLOPE (%)	CAP. (l/s)	CAP. (%)	FULL FLOW VELOCITY (m/s)
101	1380 Grahams Lane	1	2	0.19	17	17				4.00	0.05	0.22	0.22	0.05	**0.27**	**0.27**	85.5	250	0.25%	**30**	**1%**	0.61
G1	Grahams Lane ROW	1	2	0.19	0	17				NA	0.00	0.00	0.00	0.05	**0.05**	**0.33**	85.5	250	0.25%	**30**	**1%**	0.61
103	1392 & 1400 Grahams Lane	2	PR. MH 1	0.42	38	55				4.00	0.12	0.48	0.48	0.12	**0.60**	**0.93**	58.0	250	0.27%	**31**	**3%**	0.63
G2A	Grahams Lane ROW	2	PR. MH 1	0.12	0	55				NA	0.00	0.00	0.00	0.03	**0.03**	**0.96**	58.0	250	0.27%	**31**	**3%**	0.63
102	1393 Grahams Lane	PR. MH1	3	1.08	1372	1427	3.71	4.37	16.19				16.19	0.31	**16.50**	**17.46**	48.5	250	0.27%	**31**	**56%**	0.63
104	1416 Grahams Lane	PR. MH1	3	0.44	40	1466				4.00	0.13	0.50	0.50	0.13	**0.63**	**18.09**	48.5	250	0.27%	**31**	**59%**	0.63
105	1421, 1423 &1425 Grahams Lane	PR. MH1	3	0.44	40	1506				4.00	0.13	0.50	0.50	0.13	**0.63**	**18.72**	48.5	250	0.27%	**31**	**61%**	0.63
G2B	Grahams Lane ROW	PR. MH1	3	0.10	0	1506				NA	0.00	0.00	0.00	0.03	**0.03**	**18.75**	48.5	250	0.27%	**31**	**61%**	0.63
106	1440 Grahams Lane	3	4	0.77	69	1575				4.00	0.22	0.88	0.88	0.22	**1.10**	**19.85**	41.5	250	0.36%	**36**	**56%**	0.73
G3	Grahams Lane ROW	3	4	0.07	0	1575				NA	0.00	0.00	0.00	0.02	**0.02**	**19.87**	41.5	250	0.36%	**36**	**56%**	0.73
107	850 Legion Road	5	6	1.04	94	94				4.00	0.30	1.19	1.19	0.30	**1.49**	**1.49**	85.5	200	0.20%	**15**	**10%**	**0.47**
L1	Legion Road ROW	5	6	0.19	0	94				NA	0.00	0.00	0.00	0.05	**0.05**	**1.54**	85.5	200	0.20%	**15**	**11%**	**0.47**
108	831 Legion Road	6	4	0.29	26	120				4.00	0.08	0.33	0.33	0.08	**0.42**	**1.96**	91.9	200	0.60%	**25**	**8%**	0.81
109	828 Legion Road	6	4	0.72	65	185				4.00	0.21	0.83	0.83	0.21	**1.03**	**2.99**	91.9	200	0.60%	**25**	**12%**	0.81
110	1439 Grahams Lane	6	4	0.16	14	199				4.00	0.05	0.18	0.18	0.05	**0.23**	**3.22**	91.9	200	0.60%	**25**	**13%**	0.81
L2	Legion Road ROW	6	4	0.17	0	199				NA	0.00	0.00	0.00	0.05	**0.05**	**3.27**	91.9	200	0.60%	**25**	**13%**	0.81
111	1431 Grahams Lane	4	7	0.09	8	1782				4.00	0.03	0.10	0.10	0.03	**0.13**	**23.27**	50.5	250	0.22%	**28**	**83%**	**0.57**
G4	Grahams Lane ROW	4	7	0.10	0	1782				NA	0.00	0.00	0.00	0.03	**0.03**	**23.29**	50.5	250	0.22%	**28**	**84%**	**0.57**
112	1448 Grahams Lane	7	8	0.32	29	1811				4.00	0.09	0.37	0.37	0.09	**0.46**	**23.75**	97.0	250	0.25%	**30**	**80%**	0.61
113	1451 & 1453 Grahams Lane	7	8	0.16	14	1825				4.00	0.05	0.18	0.18	0.05	**0.23**	**23.98**	97.0	250	0.25%	**30**	**81%**	0.61
114	796 Brant Street	7	8	0.19	17	1843				4.00	0.05	0.22	0.22	0.05	**0.27**	**24.25**	97.0	250	0.25%	**30**	**82%**	0.61
115	814 Brant Street	7	8	0.16	14	1857				4.00	0.05	0.18	0.18	0.05	**0.23**	**24.48**	97.0	250	0.25%	**30**	**82%**	0.61
G5	Grahams Lane ROW	7	8	0.21	0	1857				NA	0.00	0.00	0.00	0.06	**0.06**	**24.54**	97.0	250	0.25%	**30**	**83%**	0.61
116	834 Brant Street	9	10	0.12	11	11				4.00	0.03	0.14	0.14	0.03	**0.17**	**0.17**	74.0	300	0.64%	**77**	**0%**	1.09
117	824 Brant Street	9	10	0.43	39	50				4.00	0.12	0.49	0.49	0.12	**0.62**	**0.79**	74.0	300	0.64%	**77**	**1%**	1.09
B1	Brant Street ROW	9	10	0.11	0	50				NA	0.00	0.00	0.00	0.03	**0.03**	**0.82**	74.0	300	0.64%	**77**	**1%**	1.09
B2	Brant Street ROW	10	8	0.11	0	50				NA	0.00	0.00	0.00	0.03	**0.03**	**0.85**	71.7	300	0.50%	**68**	**1%**	0.97
118	790 Brant Street	8	11	0.14	13	1919				4.00	0.04	0.16	0.16	0.04	**0.20**	**25.59**	87.6	300	0.65%	**78**	**33%**	1.10
B3	Brant Street ROW	8	11	0.13	0	1919				NA	0.00	0.00	0.00	0.04	**0.04**	**25.63**	87.6	300	0.65%	**78**	**33%**	1.10

Notes:

1. Zoning designations and parcel boundaries were obtained from City of Burlington's Zoning Bylaw Interactive Map accessed February 14, 2024. MXE and MXG Zoning was assumed to match Light Commercial Type of Development according to Table 3-2 in the Region of Halton Linear Design Manual (Version 5, October 2019) and based on existing land use.
2. Under current conditions, Catchments 108 and 111 do not contain infrastructure or have a permanent population that would generate wastewater. To be conservative, a population and wastewater flow generated from Catchments 108 and 111 were included to account for possible development in the future.
3. Based on Halton Region's GIS Mapping, Catchments 114 and 115 are shown to have two separate service connections to the Grahams Lane municipal sanitary sewer and the West Brant Street sanitary trunk sewer. To be conservative, it was assumed the wastewater generated within these catchments are only conveyed through the service connections connected to the Grahams Lane municipal sanitary sewer.
4. Grahams Lane, Legion Road, and Brant Street ROW areas only contribute infiltration flow to the sanitary sewer system as no population is associated with these areas.
5. The location of the existing sanitary sewer infrastructure and service laterals were obtained from engineering as-built drawings and GIS Mapping provided by the City and the Region (October 2023).
6. Equivalent Population Densities and Unit Sewage Flows taken from Table 3-1 and 3-2 of the Region of Halton's Water and Wastewater Linear Design Manual (Version 5, October 2019)
7. Proposed residential population for Catchment 102 (1393 Grahams Lane) based on Population Per Unit (PPU) from City of Burlington Growth Analysis Study's 25 year PPU forecast for new Units Constructed from 2016-2041 based on a medium to high density unit type (Dillion Consulting, June 2019).



Notes:

1. Zoning designations and parcel boundaries were obtained from City of Burlington's Zoning Bylaw Interactive Map accessed February 14, 2024. MXE and MXG Zoning was assumed to match Light Commercial Type of Development according to Table 3-2 in the Region of Halton Linear Design Manual (Version 5, October 2019) and based on existing land use.

2. Under current conditions, Catchments 108 and 111 do not contain infrastructure or have a permanent population that would generate wastewater. To be conservative, a population and wastewater flow generated from Catchments 108 and 111 were included to account for possible development in the future.

3. Based on Halton Region's GIS Mapping, Catchments 114 and 115 are shown to have two separate service connections to the Grahams Lane municipal sanitary sewer and the West Brant Street sanitary trunk sewer. To be conservative, it was assumed the wastewater generated within these catchments are only conveyed through the service connections connected to the Grahams Lane municipal sanitary sewer.

4. Grahams Lane, Legion Road, and Brant Street ROW areas only contribute infiltration flow to the sanitary sewer system as no population is associated with these areas.

5. The location of the existing sanitary sewer infrastructure and service laterals were obtained from engineering as-built drawings and GIS Mapping provided by the City and the Region (October 2023).

Legend

- Existing Sanitary Sewer
- Existing Sanitary Service Lateral
- Existing Trunk Sewer (Brant Street)
- Existing Sanitary Maintenance Hole
- Employment Corridor (MXE) Zoning[1]
- Mixed Use General (MXG) Zoning[1]

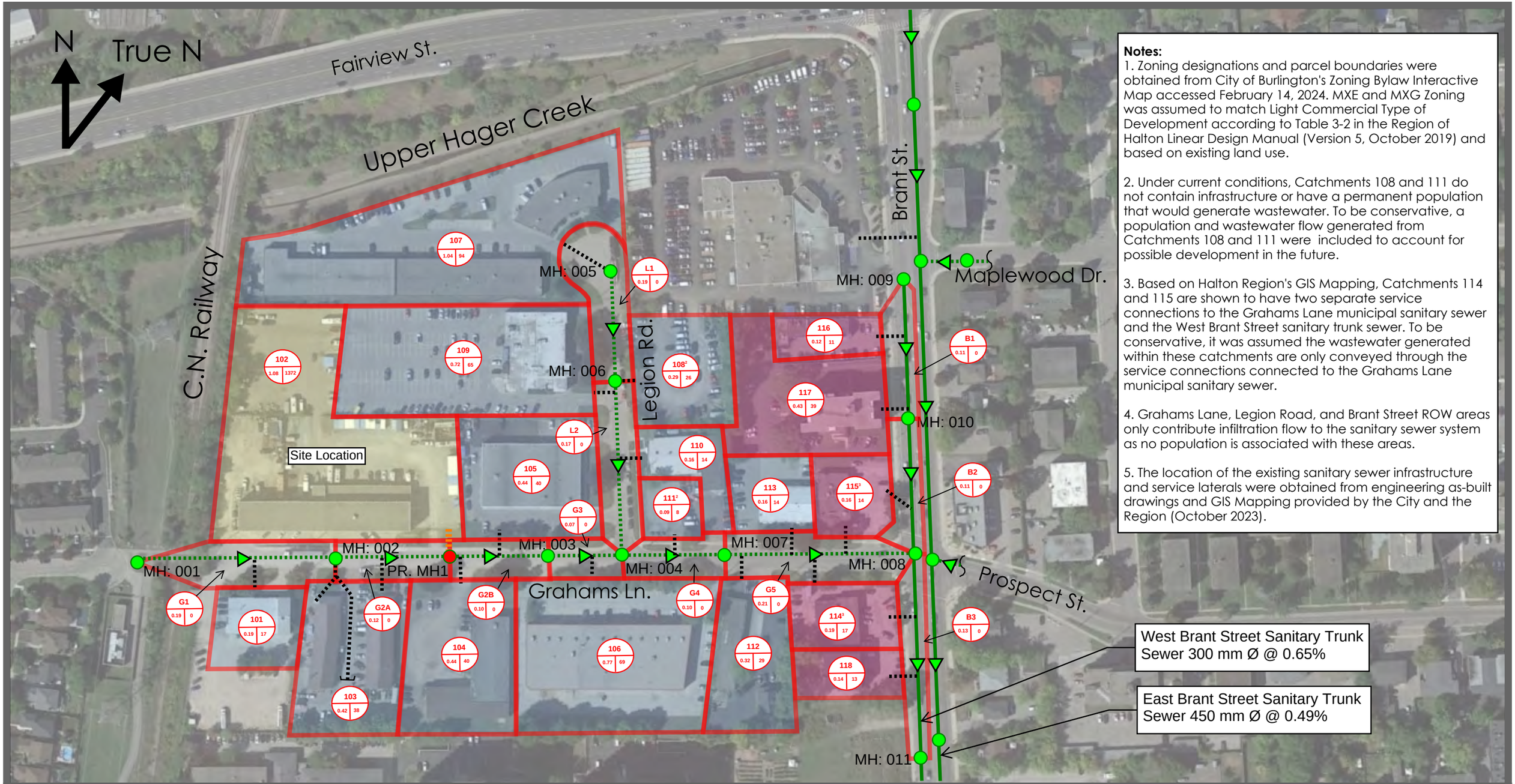
Drainage Catchment Label (ID / A (ha) / POP)

Grahams Lane External Sanitary Drainage Plan
Existing Conditions

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Project Number: 2548-6852
Date: March 2024
Drawn By: SD/JKF

Scale: N.T.S
Checked By: BP



Notes:

1. Zoning designations and parcel boundaries were obtained from City of Burlington's Zoning Bylaw Interactive Map accessed February 14, 2024. MXE and MXG Zoning was assumed to match Light Commercial Type of Development according to Table 3-2 in the Region of Halton Linear Design Manual (Version 5, October 2019) and based on existing land use.

2. Under current conditions, Catchments 108 and 111 do not contain infrastructure or have a permanent population that would generate wastewater. To be conservative, a population and wastewater flow generated from Catchments 108 and 111 were included to account for possible development in the future.

3. Based on Halton Region's GIS Mapping, Catchments 114 and 115 are shown to have two separate service connections to the Grahams Lane municipal sanitary sewer and the West Brant Street sanitary trunk sewer. To be conservative, it was assumed the wastewater generated within these catchments are only conveyed through the service connections connected to the Grahams Lane municipal sanitary sewer.

4. Grahams Lane, Legion Road, and Brant Street ROW areas only contribute infiltration flow to the sanitary sewer system as no population is associated with these areas.

5. The location of the existing sanitary sewer infrastructure and service laterals were obtained from engineering as-built drawings and GIS Mapping provided by the City and the Region (October 2023).

Legend

- Existing Sanitary Sewer
- Existing Sanitary Service Lateral
- Proposed Sanitary Service Lateral
- Existing Trunk Sewer (Brant Street)
- Existing Sanitary Maintenance Hole
- Proposed Sanitary Maintenance Hole
- Employment Corridor (MXE) Zoning[1]
- Mixed Use General (MXG) Zoning[1]
- Drainage Catchment Label (ID / A (ha) / POP)
- Residential Land Use

Grahams Lane External Sanitary Drainage Plan
Proposed Conditions (Full-Buildout)

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Project Number: 2548-6852
Date: March 2024
Drawn By: SD/JKF

Scale: N.T.S
Checked By: BP

1393 Grahams Lane, Burlington



Legend

- Water Control Valve
  - System
  - SystemDP
  - Zone
  - ZoneDP
- Water Service Valve
  - CurbStop
  - PropertyLine
  - Secondary
  - TappingValve
- Water Hydrant
- Water Fitting
  - Cap
  - Cross
  - HBend
  - MainStop
  - Reducer
  - Sleeve
  - TappingSleeve
  - Tee
  - VBend
- Water Chamber
  - Chamber

Notes:

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Information Valid as of: 10/20/2023

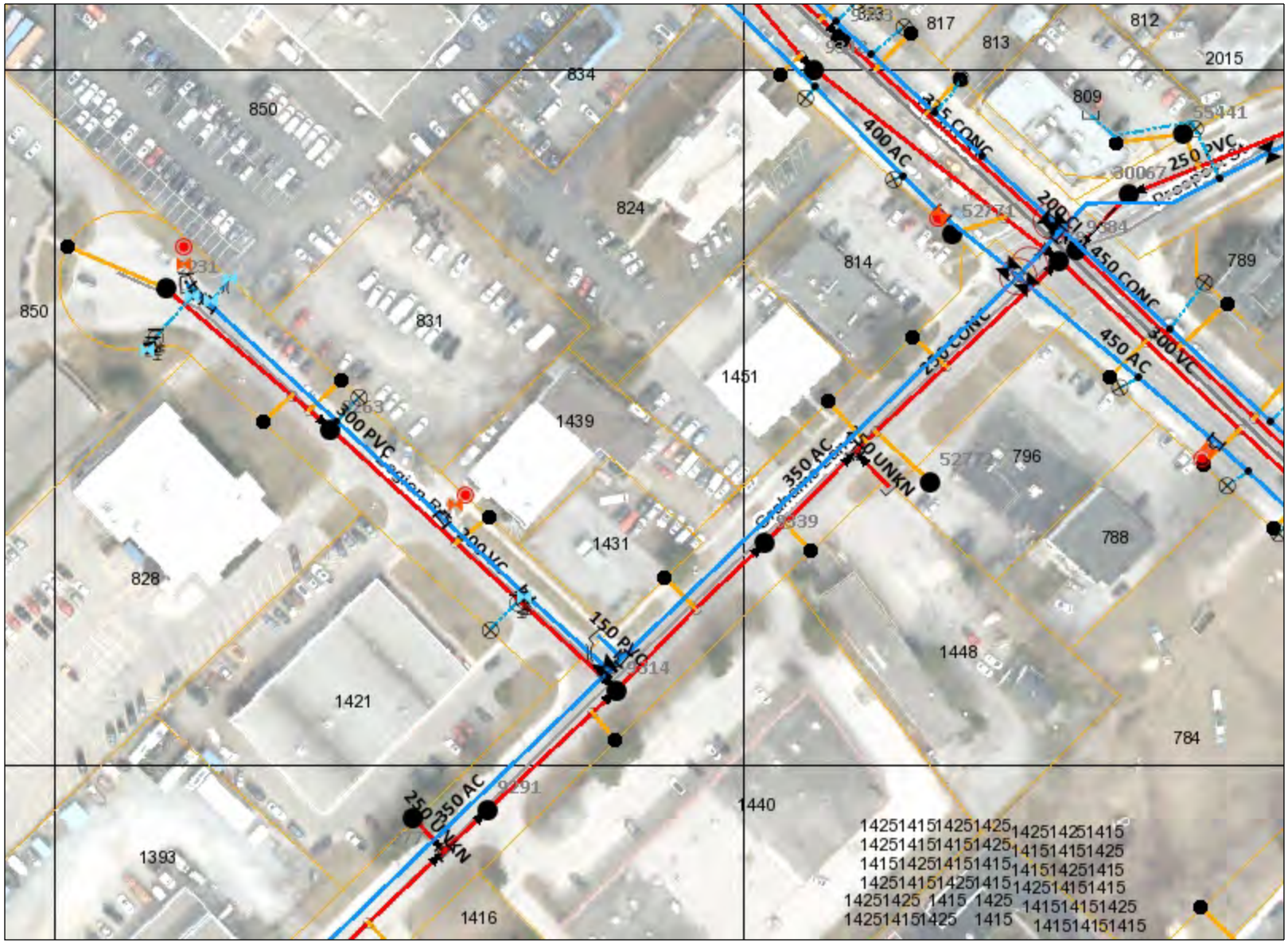
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1393 Grahams Lane, Burlington



Legend

Water Control Valve
- System
- SystemDP
- Zone
- ZoneDP

Water Service Valve
- CurbStop
- PropertyLine
- Secondary
- TappingValve

Water Hydrant

Water Fitting
- Cap
- Cross
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Water Chamber
- Chamber

Notes:

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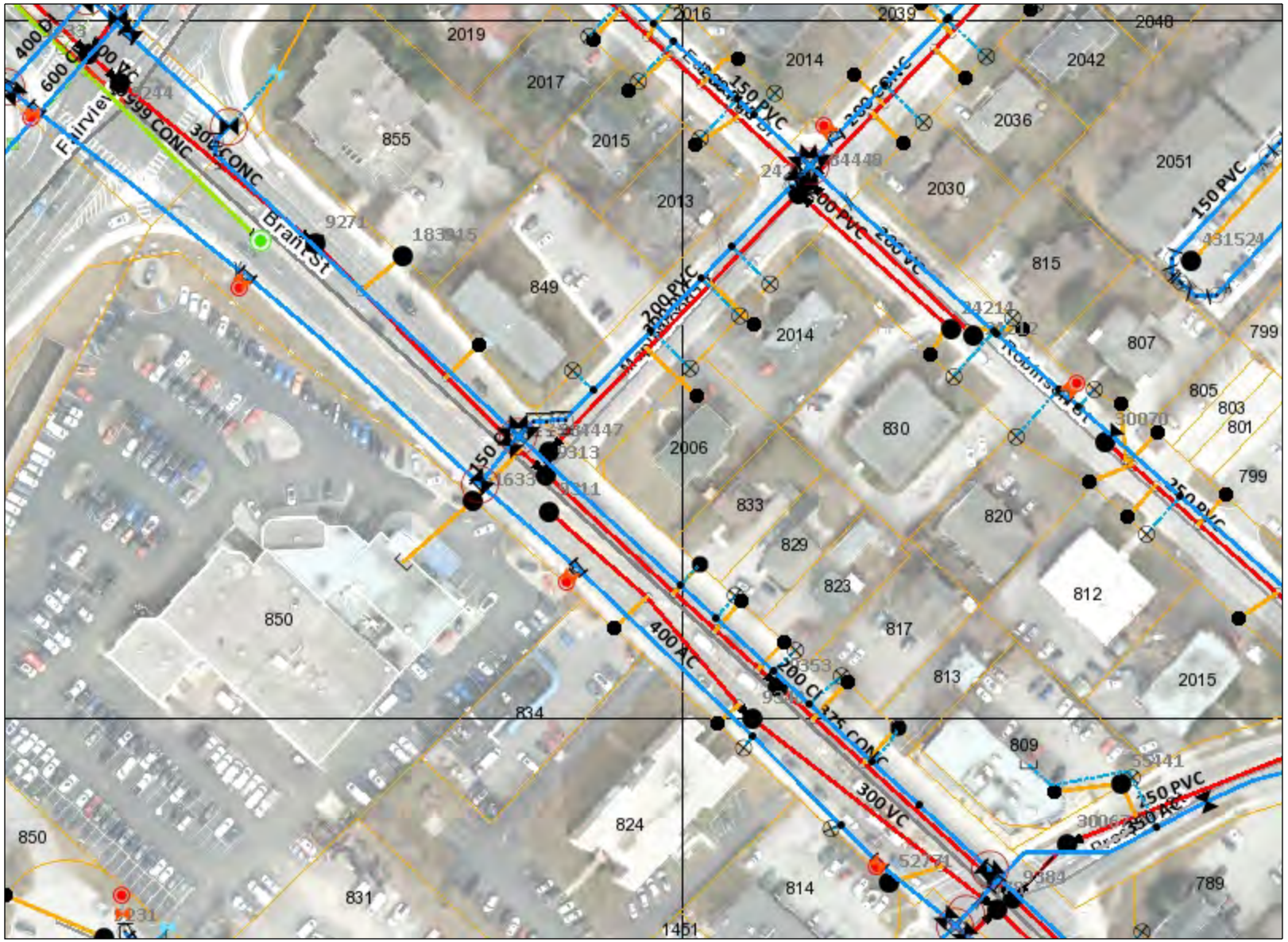
72.8 0 36.38 72.8 Metres

1: 1,455

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Brant St, Burlington



Legend

Water Control Valve
- System
- SystemDP
- Zone
- ZoneDP

Water Service Valve
- CurbStop
- PropertyLine
- Secondary
- TappingValve

Water Hydrant

Water Fitting
- Cap
- Cross
- HBend
- MainStop
- Reducer
- Sleeve
- TappingSleeve
- Tee
- VBend

Water Chamber
- Chamber

Notes:

72.8 0 36.38 72.8 Metres

1: 1,455

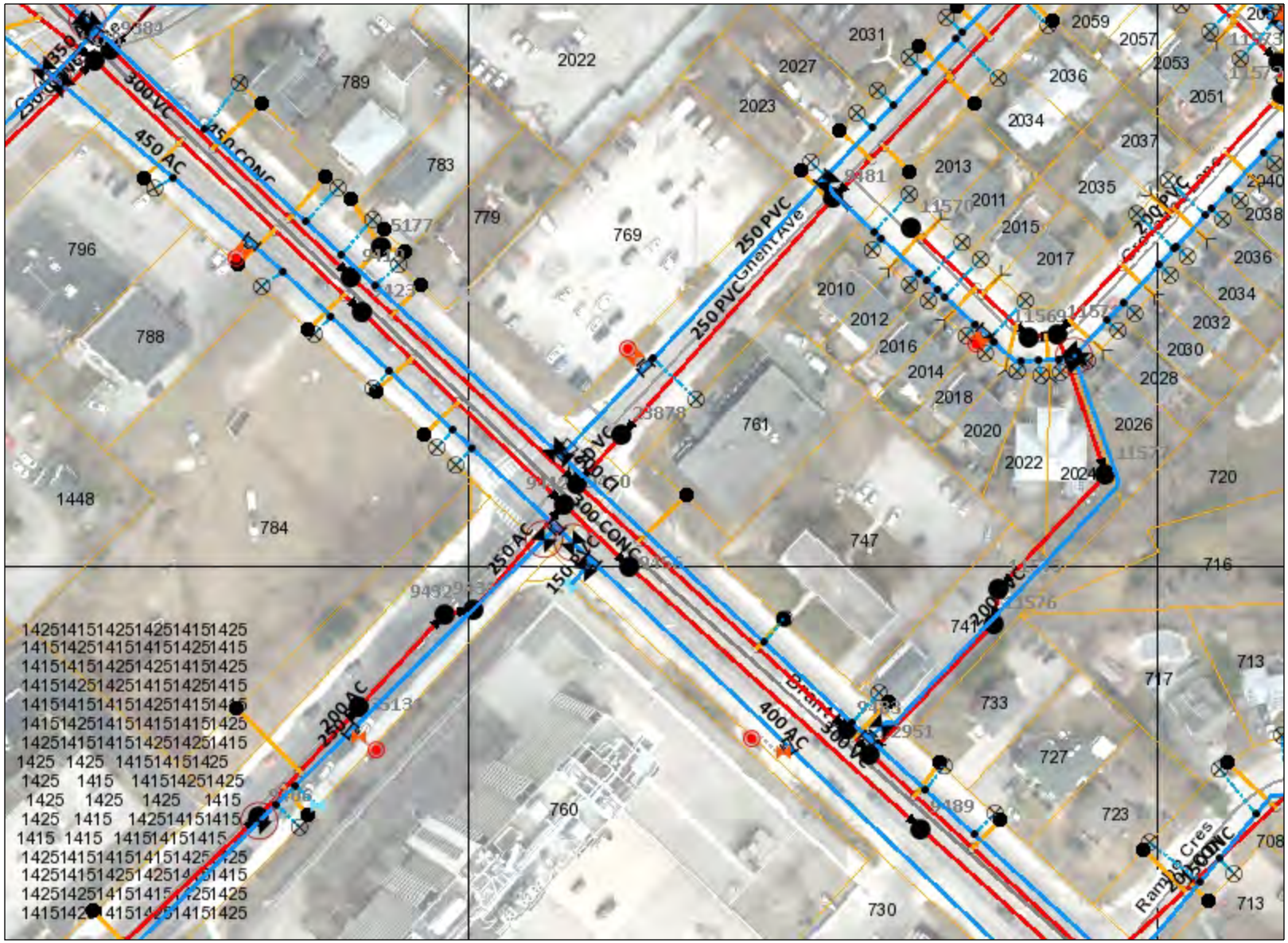
THIS MAP IS NOT TO BE USED FOR NAVIGATION

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Brant St, Burlington



Legend

Water Control Valve
- System
- SystemDP
- Zone
- ZoneDP

Water Service Valve
- CurbStop
- PropertyLine
- Secondary
- TappingValve

Water Hydrant

Water Fitting
- Cap
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Water Chamber
- Chamber

Notes:

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Information Valid as of: 10/20/2023

72.8 0 36.38 72.8 Metres

1: 1,455

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APPENDIX D

Stormwater Management Supporting Calculations & Documentation

Project:	1393 Graham's Lane
Project No.:	2548-6852
Date:	February 22, 2024
Designed By:	JNL
Checked By:	

Percent Imperviousness Calculations

Pre-Development Conditions

Catchment ID	Catchment Area (ha)	Pervious Area (ha)	Impervious Area (ha)	Percent Impervious (%)
101	1.08	0.01	1.07	99%
EXT1	0.07	0.00	0.07	100%
TOTAL	**1.15**	**0.01**	**1.14**	99%

Post-Development Conditions

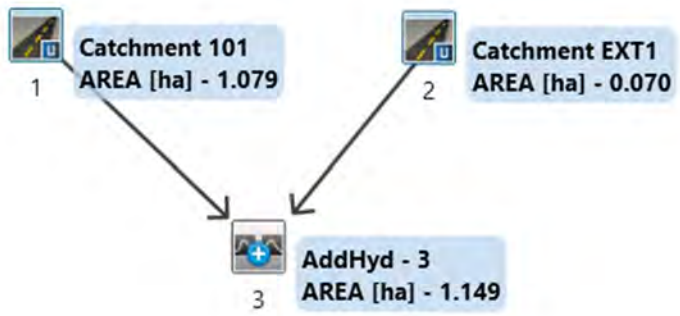
Catchment ID	Catchment Area (ha)	Pervious Area (ha)	Impervious Area (ha)	Percent Impervious (%)
Building A	0.18	0.00	0.18	100%
Building B	0.10	0.00	0.10	100%
Building C	0.10	0.00	0.10	100%
101	0.71	0.29*	0.42	100%
TOTAL (SITE)	**1.08**	**0.29**	**0.79**	100%
EXT1	0.07	0.00	0.07	100%
TOTAL	**1.15**	**0.29**	**0.86**	100%

Note:
Pervious areas marked by * are above undergound parking and will therefore be counted as impervious for hydrology calculations

Project #: 2548-6852
Project Name: 1393 Grahams Lane

Pre-Development Condition VO Model Output
5-Year 6, 12, 24 hour Chicago and 5-Year 6, 12, 24 hour SCS Type II
March, 2024

VO Model Schematic



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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 03-05-2024                          TIME: 11:02:51

USER:


COMMENTS: _____

--------------------------------------------------------------------------------------------------
------
  ************************************************
  ** SIMULATION : 5yr 6hr 10min Chicago         **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 802.040
| Ptotal= 53.05 mm |                          B=   5.000
--------------------                          C=   0.764
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  6.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.36 |  1.50   10.76 |  3.00    5.88 |  4.50    2.99
                0.17    2.55 |  1.67   24.57 |  3.17    5.26 |  4.67    2.85
                0.33    2.79 |  1.83  101.31 |  3.33    4.77 |  4.83    2.72
                0.50    3.07 |  2.00   31.90 |  3.50    4.38 |  5.00    2.61
                0.67    3.43 |  2.17   17.28 |  3.67    4.05 |  5.17    2.51
                0.83    3.91 |  2.33   12.11 |  3.83    3.77 |  5.33    2.41
                1.00    4.57 |  2.50    9.44 |  4.00    3.54 |  5.50    2.32
                1.17    5.56 |  2.67    7.80 |  4.17    3.33 |  5.67    2.24
                1.33    7.23 |  2.83    6.69 |  4.33    3.15 |  5.83    2.17

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=   1.08
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.00   Dir. Conn.(%)=  36.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.39         0.69
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      84.81        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.36 | 1.583   10.76 | 3.083    5.88 |  4.58    2.99
               0.167    2.36 | 1.667   10.76 | 3.167    5.88 |  4.67    2.99
               0.250    2.55 | 1.750   24.57 | 3.250    5.26 |  4.75    2.85
               0.333    2.55 | 1.833   24.57 | 3.333    5.26 |  4.83    2.85
               0.417    2.79 | 1.917  101.31 | 3.417    4.77 |  4.92    2.72
               0.500    2.79 | 2.000  101.31 | 3.500    4.77 |  5.00    2.72
               0.583    3.07 | 2.083   31.90 | 3.583    4.38 |  5.08    2.61
               0.667    3.07 | 2.167   31.90 | 3.667    4.38 |  5.17    2.61
               0.750    3.43 | 2.250   17.28 | 3.750    4.05 |  5.25    2.51
               0.833    3.43 | 2.333   17.28 | 3.833    4.05 |  5.33    2.51
               0.917    3.91 | 2.417   12.11 | 3.917    3.77 |  5.42    2.41
               1.000    3.91 | 2.500   12.11 | 4.000    3.77 |  5.50    2.41
               1.083    4.57 | 2.583    9.44 | 4.083    3.54 |  5.58    2.32
               1.167    4.57 | 2.667    9.44 | 4.167    3.54 |  5.67    2.32
               1.250    5.56 | 2.750    7.80 | 4.250    3.33 |  5.75    2.24
               1.333    5.56 | 2.833    7.80 | 4.333    3.33 |  5.83    2.24
               1.417    7.23 | 2.917    6.69 | 4.417    3.15 |  5.92    2.17
               1.500    7.23 | 3.000    6.69 | 4.500    3.15 |  6.00    2.17

     Max.Eff.Inten.(mm/hr)=     101.31        22.95
               over (min)          5.00        20.00
     Storage Coeff.  (min)=       2.30 (ii)   15.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.30         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.03       0.119 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.25       2.00
     RUNOFF VOLUME    (mm)=      52.05        17.11      29.68
     TOTAL RAINFALL   (mm)=      53.05        53.05      53.05
     RUNOFF COEFFICIENT   =       0.98         0.32       0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area     (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.00   Dir. Conn.(%)=  36.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.03         0.04
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.36 | 1.583   10.76 | 3.083    5.88 |  4.58    2.99
               0.167    2.36 | 1.667   10.76 | 3.167    5.88 |  4.67    2.99
               0.250    2.55 | 1.750   24.57 | 3.250    5.26 |  4.75    2.85
               0.333    2.55 | 1.833   24.57 | 3.333    5.26 |  4.83    2.85
               0.417    2.79 | 1.917  101.31 | 3.417    4.77 |  4.92    2.72
               0.500    2.79 | 2.000  101.31 | 3.500    4.77 |  5.00    2.72
               0.583    3.07 | 2.083   31.90 | 3.583    4.38 |  5.08    2.61
               0.667    3.07 | 2.167   31.90 | 3.667    4.38 |  5.17    2.61
               0.750    3.43 | 2.250   17.28 | 3.750    4.05 |  5.25    2.51
```

0.833	3.43	2.333	17.28	3.833	4.05	5.33	2.51
0.917	3.91	2.417	12.11	3.917	3.77	5.42	2.41
1.000	3.91	2.500	12.11	4.000	3.77	5.50	2.41
1.083	4.57	2.583	9.44	4.083	3.54	5.58	2.32
1.167	4.57	2.667	9.44	4.167	3.54	5.67	2.32
1.250	5.56	2.750	7.80	4.250	3.33	5.75	2.24
1.333	5.56	2.833	7.80	4.333	3.33	5.83	2.24
1.417	7.23	2.917	6.69	4.417	3.15	5.92	2.17
1.500	7.23	3.000	6.69	4.500	3.15	6.00	2.17

			TOTALS
Max.Eff.Inten.(mm/hr)=	101.31	22.95	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.01 (ii)	13.73 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.34	0.08	
PEAK FLOW (cms)=	0.01	0.00	0.008 (iii)
TIME TO PEAK (hrs)=	2.00	2.17	2.00
RUNOFF VOLUME (mm)=	52.05	17.11	29.58
TOTAL RAINFALL (mm)=	53.05	53.05	53.05
RUNOFF COEFFICIENT =	0.98	0.32	0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	1.08	0.119	2.00	29.68
	+ ID2= 2 (0002):	0.07	0.008	2.00	29.58
	ID = 3 (0003):	1.15	0.127	2.00	29.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 03-05-2024 TIME: 11:02:51

USER:

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : 5yr 12hr 10min Chicago        **
  ************************************************
```

CHICAGO STORM	IDF curve parameters: A= 802.040
Ptotal= 62.82 mm	B= 5.000
	C= 0.764

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

Duration of storm = 12.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.31	3.00	4.57	6.00	3.54	9.00	1.77
0.17	1.36	3.17	5.56	6.17	3.33	9.17	1.73
0.33	1.41	3.33	7.23	6.33	3.15	9.33	1.69
0.50	1.47	3.50	10.76	6.50	2.99	9.50	1.65
0.67	1.53	3.67	24.57	6.67	2.85	9.67	1.61
0.83	1.59	3.83	101.31	6.83	2.72	9.83	1.58
1.00	1.67	4.00	31.90	7.00	2.61	10.00	1.54
1.17	1.75	4.17	17.28	7.17	2.51	10.17	1.51
1.33	1.84	4.33	12.11	7.33	2.41	10.33	1.48
1.50	1.95	4.50	9.44	7.50	2.32	10.50	1.45
1.67	2.07	4.67	7.80	7.67	2.24	10.67	1.42
1.83	2.20	4.83	6.69	7.83	2.17	10.83	1.40
2.00	2.36	5.00	5.88	8.00	2.10	11.00	1.37
2.17	2.55	5.17	5.26	8.17	2.04	11.17	1.35
2.33	2.79	5.33	4.77	8.33	1.98	11.33	1.32
2.50	3.07	5.50	4.38	8.50	1.92	11.50	1.30
2.67	3.43	5.67	4.05	8.67	1.87	11.67	1.28
2.83	3.91	5.83	3.77	8.83	1.82	11.83	1.26

CALIB		
STANDHYD (0001)	Area (ha)=	1.08
ID= 1 DT= 5.0 min	Total Imp(%)=	36.00 Dir. Conn.(%)= 36.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	84.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.31	3.083	4.57	6.083	3.54	9.08	1.77
0.167	1.31	3.167	4.57	6.167	3.54	9.17	1.77
0.250	1.36	3.250	5.56	6.250	3.33	9.25	1.73
0.333	1.36	3.333	5.56	6.333	3.33	9.33	1.73
0.417	1.41	3.417	7.23	6.417	3.15	9.42	1.69
0.500	1.41	3.500	7.23	6.500	3.15	9.50	1.69
0.583	1.47	3.583	10.76	6.583	2.99	9.58	1.65
0.667	1.47	3.667	10.76	6.667	2.99	9.67	1.65
0.750	1.53	3.750	24.57	6.750	2.85	9.75	1.61
0.833	1.53	3.833	24.57	6.833	2.85	9.83	1.61
0.917	1.59	3.917	101.31	6.917	2.72	9.92	1.58
1.000	1.59	4.000	101.31	7.000	2.72	10.00	1.58
1.083	1.67	4.083	31.90	7.083	2.61	10.08	1.54
1.167	1.67	4.167	31.90	7.167	2.61	10.17	1.54
1.250	1.75	4.250	17.28	7.250	2.51	10.25	1.51

1.333	1.75	4.333	17.28	7.333	2.51	10.33	1.51
1.417	1.84	4.417	12.11	7.417	2.41	10.42	1.48
1.500	1.84	4.500	12.11	7.500	2.41	10.50	1.48
1.583	1.95	4.583	9.44	7.583	2.32	10.58	1.45
1.667	1.95	4.667	9.44	7.667	2.32	10.67	1.45
1.750	2.07	4.750	7.80	7.750	2.24	10.75	1.42
1.833	2.07	4.833	7.80	7.833	2.24	10.83	1.42
1.917	2.20	4.917	6.69	7.917	2.17	10.92	1.40
2.000	2.20	5.000	6.69	8.000	2.17	11.00	1.40
2.083	2.36	5.083	5.88	8.083	2.10	11.08	1.37
2.167	2.36	5.167	5.88	8.167	2.10	11.17	1.37
2.250	2.55	5.250	5.26	8.250	2.04	11.25	1.35
2.333	2.55	5.333	5.26	8.333	2.04	11.33	1.35
2.417	2.79	5.417	4.77	8.417	1.98	11.42	1.32
2.500	2.79	5.500	4.77	8.500	1.98	11.50	1.32
2.583	3.07	5.583	4.38	8.583	1.92	11.58	1.30
2.667	3.07	5.667	4.38	8.667	1.92	11.67	1.30
2.750	3.43	5.750	4.05	8.750	1.87	11.75	1.28
2.833	3.43	5.833	4.05	8.833	1.87	11.83	1.28
2.917	3.91	5.917	3.77	8.917	1.82	11.92	1.26
3.000	3.91	6.000	3.77	9.000	1.82	12.00	1.26

Max.Eff.Inten.(mm/hr)=	101.31	25.84	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.30 (ii)	14.43 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.30	0.08	
			TOTALS
PEAK FLOW (cms)=	0.11	0.03	0.126 (iii)
TIME TO PEAK (hrs)=	4.00	4.17	4.00
RUNOFF VOLUME (mm)=	61.82	22.78	36.82
TOTAL RAINFALL (mm)=	62.82	62.82	62.82
RUNOFF COEFFICIENT =	0.98	0.36	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (0002)	Area (ha)= 0.07	
ID= 1 DT= 5.0 min	Total Imp(%)= 36.00	Dir. Conn.(%)= 36.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	21.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.31	3.083	4.57	6.083	3.54	9.08	1.77
0.167	1.31	3.167	4.57	6.167	3.54	9.17	1.77
0.250	1.36	3.250	5.56	6.250	3.33	9.25	1.73
0.333	1.36	3.333	5.56	6.333	3.33	9.33	1.73
0.417	1.41	3.417	7.23	6.417	3.15	9.42	1.69
0.500	1.41	3.500	7.23	6.500	3.15	9.50	1.69
0.583	1.47	3.583	10.76	6.583	2.99	9.58	1.65
0.667	1.47	3.667	10.76	6.667	2.99	9.67	1.65
0.750	1.53	3.750	24.57	6.750	2.85	9.75	1.61
0.833	1.53	3.833	24.57	6.833	2.85	9.83	1.61
0.917	1.59	3.917	101.31	6.917	2.72	9.92	1.58
1.000	1.59	4.000	101.31	7.000	2.72	10.00	1.58
1.083	1.67	4.083	31.90	7.083	2.61	10.08	1.54
1.167	1.67	4.167	31.90	7.167	2.61	10.17	1.54
1.250	1.75	4.250	17.28	7.250	2.51	10.25	1.51

1.333	1.75	4.333	17.28	7.333	2.51	10.33	1.51
1.417	1.84	4.417	12.11	7.417	2.41	10.42	1.48
1.500	1.84	4.500	12.11	7.500	2.41	10.50	1.48
1.583	1.95	4.583	9.44	7.583	2.32	10.58	1.45
1.667	1.95	4.667	9.44	7.667	2.32	10.67	1.45
1.750	2.07	4.750	7.80	7.750	2.24	10.75	1.42
1.833	2.07	4.833	7.80	7.833	2.24	10.83	1.42
1.917	2.20	4.917	6.69	7.917	2.17	10.92	1.40
2.000	2.20	5.000	6.69	8.000	2.17	11.00	1.40
2.083	2.36	5.083	5.88	8.083	2.10	11.08	1.37
2.167	2.36	5.167	5.88	8.167	2.10	11.17	1.37
2.250	2.55	5.250	5.26	8.250	2.04	11.25	1.35
2.333	2.55	5.333	5.26	8.333	2.04	11.33	1.35
2.417	2.79	5.417	4.77	8.417	1.98	11.42	1.32
2.500	2.79	5.500	4.77	8.500	1.98	11.50	1.32
2.583	3.07	5.583	4.38	8.583	1.92	11.58	1.30
2.667	3.07	5.667	4.38	8.667	1.92	11.67	1.30
2.750	3.43	5.750	4.05	8.750	1.87	11.75	1.28
2.833	3.43	5.833	4.05	8.833	1.87	11.83	1.28
2.917	3.91	5.917	3.77	8.917	1.82	11.92	1.26
3.000	3.91	6.000	3.77	9.000	1.82	12.00	1.26

Max.Eff.Inten.(mm/hr)=	101.31	25.84	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.01 (ii)	13.14 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.34	0.08	
			TOTALS
PEAK FLOW (cms)=	0.01	0.00	0.008 (iii)
TIME TO PEAK (hrs)=	4.00	4.17	4.00
RUNOFF VOLUME (mm)=	61.82	22.78	36.69
TOTAL RAINFALL (mm)=	62.82	62.82	62.82
RUNOFF COEFFICIENT =	0.98	0.36	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	1.08	0.126	4.00	36.82
+ ID2= 2 (0002):	0.07	0.008	4.00	36.69
ID = 3 (0003):	1.15	0.134	4.00	36.82

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M M M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

CROZIER CONSULTING ENGINEERS

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DATE: 03-05-2024 TIME: 11:02:51

USER:

COMMENTS: _____

****
** SIMULATION : 5yr 24hr 10min Chicago **
****

| CHICAGO STORM |
| Ptotal= 74.18 mm |

IDF curve parameters: A= 802.040
B= 5.000
C= 0.764
used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.75	6.00	2.36	12.00	2.10	18.00	1.05
0.17	0.76	6.17	2.55	12.17	2.04	18.17	1.03
0.33	0.78	6.33	2.79	12.33	1.98	18.33	1.02
0.50	0.79	6.50	3.07	12.50	1.92	18.50	1.01
0.67	0.80	6.67	3.43	12.67	1.87	18.67	1.00
0.83	0.82	6.83	3.91	12.83	1.82	18.83	0.98
1.00	0.84	7.00	4.57	13.00	1.77	19.00	0.97
1.17	0.85	7.17	5.56	13.17	1.73	19.17	0.96
1.33	0.87	7.33	7.23	13.33	1.69	19.33	0.95
1.50	0.89	7.50	10.76	13.50	1.65	19.50	0.94
1.67	0.90	7.67	24.57	13.67	1.61	19.67	0.93
1.83	0.92	7.83	101.31	13.83	1.58	19.83	0.92
2.00	0.94	8.00	31.90	14.00	1.54	20.00	0.91
2.17	0.97	8.17	17.28	14.17	1.51	20.17	0.90
2.33	0.99	8.33	12.11	14.33	1.48	20.33	0.89
2.50	1.01	8.50	9.44	14.50	1.45	20.50	0.88
2.67	1.04	8.67	7.80	14.67	1.42	20.67	0.87
2.83	1.07	8.83	6.69	14.83	1.40	20.83	0.86
3.00	1.09	9.00	5.88	15.00	1.37	21.00	0.86
3.17	1.12	9.17	5.26	15.17	1.35	21.17	0.85
3.33	1.16	9.33	4.77	15.33	1.32	21.33	0.84
3.50	1.19	9.50	4.38	15.50	1.30	21.50	0.83
3.67	1.23	9.67	4.05	15.67	1.28	21.67	0.82
3.83	1.27	9.83	3.77	15.83	1.26	21.83	0.82
4.00	1.31	10.00	3.54	16.00	1.24	22.00	0.81
4.17	1.36	10.17	3.33	16.17	1.22	22.17	0.80
4.33	1.41	10.33	3.15	16.33	1.20	22.33	0.80
4.50	1.47	10.50	2.99	16.50	1.18	22.50	0.79
4.67	1.53	10.67	2.85	16.67	1.17	22.67	0.78
4.83	1.59	10.83	2.72	16.83	1.15	22.83	0.77
5.00	1.67	11.00	2.61	17.00	1.13	23.00	0.77
5.17	1.75	11.17	2.51	17.17	1.12	23.17	0.76
5.33	1.84	11.33	2.41	17.33	1.10	23.33	0.76
5.50	1.95	11.50	2.32	17.50	1.09	23.50	0.75
5.67	2.07	11.67	2.24	17.67	1.07	23.67	0.74
5.83	2.20	11.83	2.17	17.83	1.06	23.83	0.74

| CALIB |
| STANDHYD (0001) | Area (ha)= 1.08

|ID= 1 DT= 5.0 min | Total Imp(%)= 36.00 Dir. Conn.(%)= 36.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	84.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.75	6.083	2.36	12.083	2.10	18.08	1.05
0.167	0.75	6.167	2.36	12.167	2.10	18.17	1.05
0.250	0.76	6.250	2.55	12.250	2.04	18.25	1.03
0.333	0.76	6.333	2.55	12.333	2.04	18.33	1.03
0.417	0.78	6.417	2.79	12.417	1.98	18.42	1.02
0.500	0.78	6.500	2.79	12.500	1.98	18.50	1.02
0.583	0.79	6.583	3.07	12.583	1.92	18.58	1.01
0.667	0.79	6.667	3.07	12.667	1.92	18.67	1.01
0.750	0.80	6.750	3.43	12.750	1.87	18.75	1.00
0.833	0.80	6.833	3.43	12.833	1.87	18.83	1.00
0.917	0.82	6.917	3.91	12.917	1.82	18.92	0.98
1.000	0.82	7.000	3.91	13.000	1.82	19.00	0.98
1.083	0.84	7.083	4.57	13.083	1.77	19.08	0.97
1.167	0.84	7.167	4.57	13.167	1.77	19.17	0.97
1.250	0.85	7.250	5.56	13.250	1.73	19.25	0.96
1.333	0.85	7.333	5.56	13.333	1.73	19.33	0.96
1.417	0.87	7.417	7.23	13.417	1.69	19.42	0.95
1.500	0.87	7.500	7.23	13.500	1.69	19.50	0.95
1.583	0.89	7.583	10.76	13.583	1.65	19.58	0.94
1.667	0.89	7.667	10.76	13.667	1.65	19.67	0.94
1.750	0.90	7.750	24.57	13.750	1.61	19.75	0.93
1.833	0.90	7.833	24.58	13.833	1.61	19.83	0.93
1.917	0.92	7.917	101.31	13.917	1.58	19.92	0.92
2.000	0.92	8.000	101.31	14.000	1.58	20.00	0.92
2.083	0.94	8.083	31.90	14.083	1.54	20.08	0.91
2.167	0.94	8.167	31.89	14.167	1.54	20.17	0.91
2.250	0.97	8.250	17.28	14.250	1.51	20.25	0.90
2.333	0.97	8.333	17.28	14.333	1.51	20.33	0.90
2.417	0.99	8.417	12.11	14.417	1.48	20.42	0.89
2.500	0.99	8.500	12.11	14.500	1.48	20.50	0.89
2.583	1.01	8.583	9.44	14.583	1.45	20.58	0.88
2.667	1.01	8.667	9.44	14.667	1.45	20.67	0.88
2.750	1.04	8.750	7.80	14.750	1.42	20.75	0.87
2.833	1.04	8.833	7.80	14.833	1.42	20.83	0.87
2.917	1.07	8.917	6.69	14.917	1.40	20.92	0.86
3.000	1.07	9.000	6.69	15.000	1.40	21.00	0.86
3.083	1.09	9.083	5.88	15.083	1.37	21.08	0.86
3.167	1.09	9.167	5.88	15.167	1.37	21.17	0.86
3.250	1.12	9.250	5.26	15.250	1.35	21.25	0.85
3.333	1.12	9.333	5.26	15.333	1.35	21.33	0.85
3.417	1.16	9.417	4.77	15.417	1.32	21.42	0.84
3.500	1.16	9.500	4.77	15.500	1.32	21.50	0.84
3.583	1.19	9.583	4.38	15.583	1.30	21.58	0.83
3.667	1.19	9.667	4.38	15.667	1.30	21.67	0.83
3.750	1.23	9.750	4.05	15.750	1.28	21.75	0.82
3.833	1.23	9.833	4.05	15.833	1.28	21.83	0.82
3.917	1.27	9.917	3.77	15.917	1.26	21.92	0.82
4.000	1.27	10.000	3.77	16.000	1.26	22.00	0.82
4.083	1.31	10.083	3.54	16.083	1.24	22.08	0.81
4.167	1.31	10.167	3.54	16.167	1.24	22.17	0.81
4.250	1.36	10.250	3.33	16.250	1.22	22.25	0.80
4.333	1.36	10.333	3.33	16.333	1.22	22.33	0.80
4.417	1.41	10.417	3.15	16.417	1.20	22.42	0.80
4.500	1.41	10.500	3.15	16.500	1.20	22.50	0.80
4.583	1.47	10.583	2.99	16.583	1.18	22.58	0.79
4.667	1.47	10.667	2.99	16.667	1.18	22.67	0.79
4.750	1.53	10.750	2.85	16.750	1.17	22.75	0.78
4.833	1.53	10.833	2.85	16.833	1.17	22.83	0.78
4.917	1.59	10.917	2.72	16.917	1.15	22.92	0.77
5.000	1.59	11.000	2.72	17.000	1.15	23.00	0.77
5.083	1.67	11.083	2.61	17.083	1.13	23.08	0.77

5.167	1.67	11.167	2.61	17.167	1.13	23.17	0.77
5.250	1.75	11.250	2.51	17.250	1.12	23.25	0.76
5.333	1.75	11.333	2.51	17.333	1.12	23.33	0.76
5.417	1.84	11.417	2.41	17.417	1.10	23.42	0.76
5.500	1.84	11.500	2.41	17.500	1.10	23.50	0.76
5.583	1.95	11.583	2.32	17.583	1.09	23.58	0.75
5.667	1.95	11.667	2.32	17.667	1.09	23.67	0.75
5.750	2.07	11.750	2.24	17.750	1.07	23.75	0.74
5.833	2.07	11.833	2.24	17.833	1.07	23.83	0.74
5.917	2.20	11.917	2.17	17.917	1.06	23.92	0.74
6.000	2.20	12.000	2.17	18.000	1.06	24.00	0.74

Max.Eff.Inten.(mm/hr)=		101.31	28.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.30 (ii)	13.90 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.30	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.11	0.04	0.129 (iii)
TIME TO PEAK	(hrs)=	8.00	8.17	8.00
RUNOFF VOLUME	(mm)=	73.18	29.94	45.50
TOTAL RAINFALL	(mm)=	74.18	74.18	74.18
RUNOFF COEFFICIENT	=	0.99	0.40	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0002)	Area (ha)=	0.07	
ID= 1 DT= 5.0 min	Total Imp(%)=	36.00	Dir. Conn.(%)= 36.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	21.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.75	6.083	2.36	12.083	2.10	18.08	1.05
0.167	0.75	6.167	2.36	12.167	2.10	18.17	1.05
0.250	0.76	6.250	2.55	12.250	2.04	18.25	1.03
0.333	0.76	6.333	2.55	12.333	2.04	18.33	1.03
0.417	0.78	6.417	2.79	12.417	1.98	18.42	1.02
0.500	0.78	6.500	2.79	12.500	1.98	18.50	1.02
0.583	0.79	6.583	3.07	12.583	1.92	18.58	1.01
0.667	0.79	6.667	3.07	12.667	1.92	18.67	1.01
0.750	0.80	6.750	3.43	12.750	1.87	18.75	1.00
0.833	0.80	6.833	3.43	12.833	1.87	18.83	1.00
0.917	0.82	6.917	3.91	12.917	1.82	18.92	0.98
1.000	0.82	7.000	3.91	13.000	1.82	19.00	0.98
1.083	0.84	7.083	4.57	13.083	1.77	19.08	0.97
1.167	0.84	7.167	4.57	13.167	1.77	19.17	0.97
1.250	0.85	7.250	5.56	13.250	1.73	19.25	0.96
1.333	0.85	7.333	5.56	13.333	1.73	19.33	0.96
1.417	0.87	7.417	7.23	13.417	1.69	19.42	0.95
1.500	0.87	7.500	7.23	13.500	1.69	19.50	0.95
1.583	0.89	7.583	10.76	13.583	1.65	19.58	0.94
1.667	0.89	7.667	10.76	13.667	1.65	19.67	0.94
1.750	0.90	7.750	24.57	13.750	1.61	19.75	0.93
1.833	0.90	7.833	24.58	13.833	1.61	19.83	0.93
1.917	0.92	7.917	101.31	13.917	1.58	19.92	0.92
2.000	0.92	8.000	101.31	14.000	1.58	20.00	0.92
2.083	0.94	8.083	31.90	14.083	1.54	20.08	0.91
2.167	0.94	8.167	31.89	14.167	1.54	20.17	0.91
2.250	0.97	8.250	17.28	14.250	1.51	20.25	0.90
2.333	0.97	8.333	17.28	14.333	1.51	20.33	0.90
2.417	0.99	8.417	12.11	14.417	1.48	20.42	0.89
2.500	0.99	8.500	12.11	14.500	1.48	20.50	0.89
2.583	1.01	8.583	9.44	14.583	1.45	20.58	0.88
2.667	1.01	8.667	9.44	14.667	1.45	20.67	0.88
2.750	1.04	8.750	7.80	14.750	1.42	20.75	0.87
2.833	1.04	8.833	7.80	14.833	1.42	20.83	0.87
2.917	1.07	8.917	6.69	14.917	1.40	20.92	0.86
3.000	1.07	9.000	6.69	15.000	1.40	21.00	0.86
3.083	1.09	9.083	5.88	15.083	1.37	21.08	0.86
3.167	1.09	9.167	5.88	15.167	1.37	21.17	0.86
3.250	1.12	9.250	5.26	15.250	1.35	21.25	0.85
3.333	1.12	9.333	5.26	15.333	1.35	21.33	0.85
3.417	1.16	9.417	4.77	15.417	1.32	21.42	0.84
3.500	1.16	9.500	4.77	15.500	1.32	21.50	0.84
3.583	1.19	9.583	4.38	15.583	1.30	21.58	0.83
3.667	1.19	9.667	4.38	15.667	1.30	21.67	0.83
3.750	1.23	9.750	4.05	15.750	1.28	21.75	0.82
3.833	1.23	9.833	4.05	15.833	1.28	21.83	0.82
3.917	1.27	9.917	3.77	15.917	1.26	21.92	0.82
4.000	1.27	10.000	3.77	16.000	1.26	22.00	0.82
4.083	1.31	10.083	3.54	16.083	1.24	22.08	0.81
4.167	1.31	10.167	3.54	16.167	1.24	22.17	0.81
4.250	1.36	10.250	3.33	16.250	1.22	22.25	0.80
4.333	1.36	10.333	3.33	16.333	1.22	22.33	0.80
4.417	1.41	10.417	3.15	16.417	1.20	22.42	0.80
4.500	1.41	10.500	3.15	16.500	1.20	22.50	0.80
4.583	1.47	10.583	2.99	16.583	1.18	22.58	0.79
4.667	1.47	10.667	2.99	16.667	1.18	22.67	0.79
4.750	1.53	10.750	2.85	16.750	1.17	22.75	0.78
4.833	1.53	10.833	2.85	16.833	1.17	22.83	0.78
4.917	1.59	10.917	2.72	16.917	1.15	22.92	0.77
5.000	1.59	11.000	2.72	17.000	1.15	23.00	0.77
5.083	1.67	11.083	2.61	17.083	1.13	23.08	0.77
5.167	1.67	11.167	2.61	17.167	1.13	23.17	0.77
5.250	1.75	11.250	2.51	17.250	1.12	23.25	0.76
5.333	1.75	11.333	2.51	17.333	1.12	23.33	0.76
5.417	1.84	11.417	2.41	17.417	1.10	23.42	0.76
5.500	1.84	11.500	2.41	17.500	1.10	23.50	0.76
5.583	1.95	11.583	2.32	17.583	1.09	23.58	0.75
5.667	1.95	11.667	2.32	17.667	1.09	23.67	0.75
5.750	2.07	11.750	2.24	17.750	1.07	23.75	0.74
5.833	2.07	11.833	2.24	17.833	1.07	23.83	0.74
5.917	2.20	11.917	2.17	17.917	1.06	23.92	0.74
6.000	2.20	12.000	2.17	18.000	1.06	24.00	0.74

Max.Eff.Inten.(mm/hr)=		101.31	28.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.01 (ii)	12.61 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.34	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.01	0.00	0.009 (iii)
TIME TO PEAK	(hrs)=	8.00	8.17	8.00
RUNOFF VOLUME	(mm)=	73.18	29.94	45.42
TOTAL RAINFALL	(mm)=	74.18	74.18	74.18
RUNOFF COEFFICIENT	=	0.99	0.40	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		1.08	0.129	8.00	45.50
+ ID2= 2 (0002):		0.07	0.009	8.00	45.42

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       ================================================
       ID = 3 (  0003):     1.15   0.138     8.00    45.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M  M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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DATE: 03-05-2024                          TIME: 11:02:51

USER:


COMMENTS: _____________________________________________________

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  ***********************************************
  ** SIMULATION : 5yr 6hr 10min SCS Type II (MT **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              7fa4acbb-0c25-48f4-a560-49f1a961dde0\c403a94e
| Ptotal= 53.06 mm |    Comments: 5yr 6hr 10min SCS Type II (MTO)
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  1.67    5.31 |  3.33   11.67 |  5.00    3.18
                0.17    2.12 |  1.83    5.31 |  3.50   11.67 |  5.17    2.12
                0.33    2.12 |  2.00    5.31 |  3.67    5.31 |  5.33    2.12
                0.50    2.12 |  2.17    6.37 |  3.83    5.31 |  5.50    2.12
                0.67    3.18 |  2.33    6.37 |  4.00    5.31 |  5.67    2.12
                0.83    3.18 |  2.50    6.37 |  4.17    4.24 |  5.83    2.12
                1.00    3.18 |  2.67   31.84 |  4.33    4.24 |  6.00    2.12
                1.17    3.18 |  2.83   57.30 |  4.50    4.24 |
                1.33    3.18 |  3.00   82.77 |  4.67    3.18 |
                1.50    3.18 |  3.17   11.67 |  4.83    3.18 |

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| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=   1.08
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.00   Dir. Conn.(%)=  36.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.39         0.69
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      84.81        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    3.18 | 3.250   11.67 |  4.83    3.18
               0.167    0.00 | 1.750    5.31 | 3.333   11.67 |  4.92    3.18
               0.250    2.12 | 1.833    5.31 | 3.417   11.67 |  5.00    3.18
               0.333    2.12 | 1.917    5.31 | 3.500   11.67 |  5.08    3.18
               0.417    2.12 | 2.000    5.31 | 3.583   11.67 |  5.17    3.18
               0.500    2.12 | 2.083    5.31 | 3.667   11.67 |  5.25    2.12
               0.583    2.12 | 2.167    5.31 | 3.750    5.31 |  5.33    2.12
               0.667    2.12 | 2.250    6.37 | 3.833    5.31 |  5.42    2.12
               0.750    3.18 | 2.333    6.37 | 3.917    5.31 |  5.50    2.12
               0.833    3.18 | 2.417    6.37 | 4.000    5.31 |  5.58    2.12
               0.917    3.18 | 2.500    6.37 | 4.083    5.31 |  5.67    2.12
               1.000    3.18 | 2.583    6.37 | 4.167    5.31 |  5.75    2.12
               1.083    3.18 | 2.667    6.37 | 4.250    4.24 |  5.83    2.12
               1.167    3.18 | 2.750   31.84 | 4.333    4.24 |  5.92    2.12
               1.250    3.18 | 2.833   31.84 | 4.417    4.24 |  6.00    2.12
               1.333    3.18 | 2.917   57.30 | 4.500    4.24 |  6.08    2.12
               1.417    3.18 | 3.000   57.30 | 4.583    4.24 |  6.17    2.12
               1.500    3.18 | 3.083   82.77 | 4.667    4.24 |
               1.583    3.18 | 3.167   82.77 | 4.750    3.18 |

     Max.Eff.Inten.(mm/hr)=      82.77        27.95
               over (min)        5.00        15.00
     Storage Coeff.  (min)=      2.50 (ii)   14.25 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.29         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.09         0.03        0.118 (iii)
     TIME TO PEAK    (hrs)=      3.17         3.25         3.17
     RUNOFF VOLUME    (mm)=     52.06        17.12        29.69
     TOTAL RAINFALL   (mm)=     53.06        53.06        53.06
     RUNOFF COEFFICIENT   =      0.98         0.32         0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area     (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.00   Dir. Conn.(%)=  36.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.03         0.04
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    3.18 | 3.250   11.67 |  4.83    3.18
               0.167    0.00 | 1.750    5.31 | 3.333   11.67 |  4.92    3.18
               0.250    2.12 | 1.833    5.31 | 3.417   11.67 |  5.00    3.18
               0.333    2.12 | 1.917    5.31 | 3.500   11.67 |  5.08    3.18
               0.417    2.12 | 2.000    5.31 | 3.583   11.67 |  5.17    3.18
```

0.500	2.12	2.083	5.31	3.667	11.67	5.25	2.12
0.583	2.12	2.167	5.31	3.750	5.31	5.33	2.12
0.667	2.12	2.250	6.37	3.833	5.31	5.42	2.12
0.750	3.18	2.333	6.37	3.917	5.31	5.50	2.12
0.833	3.18	2.417	6.37	4.000	5.31	5.58	2.12
0.917	3.18	2.500	6.37	4.083	5.31	5.67	2.12
1.000	3.18	2.583	6.37	4.167	5.31	5.75	2.12
1.083	3.18	2.667	6.37	4.250	4.24	5.83	2.12
1.167	3.18	2.750	31.84	4.333	4.24	5.92	2.12
1.250	3.18	2.833	31.84	4.417	4.24	6.00	2.12
1.333	3.18	2.917	57.30	4.500	4.24	6.08	2.12
1.417	3.18	3.000	57.30	4.583	4.24	6.17	2.12
1.500	3.18	3.083	82.77	4.667	4.24		
1.583	3.18	3.167	82.77	4.750	3.18		

Max.Eff.Inten.(mm/hr)=	82.77	27.95	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.10 (ii)	12.85 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.34	0.08	
		TOTALS	
PEAK FLOW (cms)=	0.01	0.00	0.008 (iii)
TIME TO PEAK (hrs)=	3.17	3.25	3.17
RUNOFF VOLUME (mm)=	52.06	17.12	29.60
TOTAL RAINFALL (mm)=	53.06	53.06	53.06
RUNOFF COEFFICIENT =	0.98	0.32	0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		1.08	0.118	3.17	29.69
+ ID2= 2 (0002):		0.07	0.008	3.17	29.60
ID = 3 (0003):		1.15	0.125	3.17	29.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

OOO TTTTT TTTTT H H Y Y M M M OOO TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
OOO T T H H Y M M OOO

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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DATE: 03-05-2024 TIME: 11:02:51

USER:

COMMENTS: _____

** SIMULATION : 5yr 12hr 10min SCS Type II (M **

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\7fa4acbb-0c25-48f4-a560-49f1a961dde0\3300468b
Ptotal= 62.82 mm | Comments: 5yr 12hr 10min SCS Type II (MTO)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.17	2.51	6.33	11.31	9.50	2.20
0.17	1.57	3.33	2.51	6.50	11.31	9.67	2.20
0.33	1.57	3.50	2.51	6.67	5.03	9.83	2.20
0.50	1.57	3.67	2.51	6.83	5.03	10.00	2.20
0.67	1.57	3.83	2.51	7.00	5.03	10.17	1.26
0.83	1.57	4.00	2.51	7.17	3.77	10.33	1.26
1.00	1.57	4.17	3.77	7.33	3.77	10.50	1.26
1.17	1.57	4.33	3.77	7.50	3.77	10.67	1.26
1.33	1.57	4.50	3.77	7.67	3.77	10.83	1.26
1.50	1.57	4.67	5.03	7.83	3.77	11.00	1.26
1.67	1.57	4.83	5.03	8.00	3.77	11.17	1.26
1.83	1.57	5.00	5.03	8.17	2.20	11.33	1.26
2.00	1.57	5.17	7.54	8.33	2.20	11.50	1.26
2.17	1.88	5.33	7.54	8.50	2.20	11.67	1.26
2.33	1.88	5.50	7.54	8.67	2.20	11.83	1.26
2.50	1.88	5.67	30.15	8.83	2.20	12.00	1.26
2.67	1.88	5.83	56.54	9.00	2.20		
2.83	1.88	6.00	82.92	9.17	2.20		
3.00	1.88	6.17	11.31	9.33	2.20		

CALIB | STANDHYD (0001) | ID= 1 DT= 5.0 min | Area (ha)= 1.08 | Total Imp(%)= 36.00 | Dir. Conn.(%)= 36.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	84.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.88	6.250	11.31	9.33	2.20
0.167	0.00	3.250	2.51	6.333	11.31	9.42	2.20
0.250	1.57	3.333	2.51	6.417	11.31	9.50	2.20
0.333	1.57	3.417	2.51	6.500	11.31	9.58	2.20
0.417	1.57	3.500	2.51	6.583	11.31	9.67	2.20
0.500	1.57	3.583	2.51	6.667	11.31	9.75	2.20
0.583	1.57	3.667	2.51	6.750	5.03	9.83	2.20
0.667	1.57	3.750	2.51	6.833	5.03	9.92	2.20
0.750	1.57	3.833	2.51	6.917	5.03	10.00	2.20
0.833	1.57	3.917	2.51	7.000	5.03	10.08	2.20
0.917	1.57	4.000	2.51	7.083	5.03	10.17	2.20
1.000	1.57	4.083	2.51	7.167	5.03	10.25	1.26

1.083	1.57	4.167	2.51	7.250	3.77	10.33	1.26
1.167	1.57	4.250	3.77	7.333	3.77	10.42	1.26
1.250	1.57	4.333	3.77	7.417	3.77	10.50	1.26
1.333	1.57	4.417	3.77	7.500	3.77	10.58	1.26
1.417	1.57	4.500	3.77	7.583	3.77	10.67	1.26
1.500	1.57	4.583	3.77	7.667	3.77	10.75	1.26
1.583	1.57	4.667	3.77	7.750	3.77	10.83	1.26
1.667	1.57	4.750	5.03	7.833	3.77	10.92	1.26
1.750	1.57	4.833	5.03	7.917	3.77	11.00	1.26
1.833	1.57	4.917	5.03	8.000	3.77	11.08	1.26
1.917	1.57	5.000	5.03	8.083	3.77	11.17	1.26
2.000	1.57	5.083	5.03	8.167	3.77	11.25	1.26
2.083	1.57	5.167	5.03	8.250	2.20	11.33	1.26
2.167	1.57	5.250	7.54	8.333	2.20	11.42	1.26
2.250	1.88	5.333	7.54	8.417	2.20	11.50	1.26
2.333	1.88	5.417	7.54	8.500	2.20	11.58	1.26
2.417	1.88	5.500	7.54	8.583	2.20	11.67	1.26
2.500	1.88	5.583	7.54	8.667	2.20	11.75	1.26
2.583	1.88	5.667	7.54	8.750	2.20	11.83	1.26
2.667	1.88	5.750	30.15	8.833	2.20	11.92	1.26
2.750	1.88	5.833	30.15	8.917	2.20	12.00	1.26
2.833	1.88	5.917	56.54	9.000	2.20	12.08	1.26
2.917	1.88	6.000	56.54	9.083	2.20	12.17	1.26
3.000	1.88	6.083	82.92	9.167	2.20		
3.083	1.88	6.167	82.92	9.250	2.20		

Max.Eff.Inten.(mm/hr)=	82.92	31.39	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.49 (ii)	13.71 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.29	0.08	
			TOTALS
PEAK FLOW (cms)=	0.09	0.04	0.123 (iii)
TIME TO PEAK (hrs)=	6.17	6.25	6.17
RUNOFF VOLUME (mm)=	61.82	22.78	36.83
TOTAL RAINFALL (mm)=	62.82	62.82	62.82
RUNOFF COEFFICIENT =	0.98	0.36	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0002)	Area (ha)= 0.07
ID= 1 DT= 5.0 min	Total Imp(%)= 36.00 Dir. Conn.(%)= 36.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	21.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.88	6.250	11.31	9.33	2.20
0.167	0.00	3.250	2.51	6.333	11.31	9.42	2.20
0.250	1.57	3.333	2.51	6.417	11.31	9.50	2.20
0.333	1.57	3.417	2.51	6.500	11.31	9.58	2.20
0.417	1.57	3.500	2.51	6.583	11.31	9.67	2.20
0.500	1.57	3.583	2.51	6.667	11.31	9.75	2.20
0.583	1.57	3.667	2.51	6.750	5.03	9.83	2.20
0.667	1.57	3.750	2.51	6.833	5.03	9.92	2.20
0.750	1.57	3.833	2.51	6.917	5.03	10.00	2.20
0.833	1.57	3.917	2.51	7.000	5.03	10.08	2.20
0.917	1.57	4.000	2.51	7.083	5.03	10.17	2.20
1.000	1.57	4.083	2.51	7.167	5.03	10.25	1.26
1.083	1.57	4.167	2.51	7.250	3.77	10.33	1.26
1.167	1.57	4.250	3.77	7.333	3.77	10.42	1.26
1.250	1.57	4.333	3.77	7.417	3.77	10.50	1.26
1.333	1.57	4.417	3.77	7.500	3.77	10.58	1.26
1.417	1.57	4.500	3.77	7.583	3.77	10.67	1.26
1.500	1.57	4.583	3.77	7.667	3.77	10.75	1.26
1.583	1.57	4.667	3.77	7.750	3.77	10.83	1.26
1.667	1.57	4.750	5.03	7.833	3.77	10.92	1.26
1.750	1.57	4.833	5.03	7.917	3.77	11.00	1.26
1.833	1.57	4.917	5.03	8.000	3.77	11.08	1.26
1.917	1.57	5.000	5.03	8.083	3.77	11.17	1.26
2.000	1.57	5.083	5.03	8.167	3.77	11.25	1.26
2.083	1.57	5.167	5.03	8.250	2.20	11.33	1.26
2.167	1.57	5.250	7.54	8.333	2.20	11.42	1.26
2.250	1.88	5.333	7.54	8.417	2.20	11.50	1.26
2.333	1.88	5.417	7.54	8.500	2.20	11.58	1.26
2.417	1.88	5.500	7.54	8.583	2.20	11.67	1.26
2.500	1.88	5.583	7.54	8.667	2.20	11.75	1.26
2.583	1.88	5.667	7.54	8.750	2.20	11.83	1.26
2.667	1.88	5.750	30.15	8.833	2.20	11.92	1.26
2.750	1.88	5.833	30.15	8.917	2.20	12.00	1.26
2.833	1.88	5.917	56.54	9.000	2.20	12.08	1.26
2.917	1.88	6.000	56.54	9.083	2.20	12.17	1.26
3.000	1.88	6.083	82.92	9.167	2.20		
3.083	1.88	6.167	82.92	9.250	2.20		

Max.Eff.Inten.(mm/hr)=	82.92	31.39	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.10 (ii)	12.32 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.34	0.09	
			TOTALS
PEAK FLOW (cms)=	0.01	0.00	0.008 (iii)
TIME TO PEAK (hrs)=	6.17	6.25	6.17
RUNOFF VOLUME (mm)=	61.82	22.78	36.71
TOTAL RAINFALL (mm)=	62.82	62.82	62.82
RUNOFF COEFFICIENT =	0.98	0.36	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	1.08	0.123	6.17	36.83
+ ID2= 2 (0002):	0.07	0.008	6.17	36.71
ID = 3 (0003):	1.15	0.131	6.17	36.82

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-b6f920a4c6d7\46c8a047-bb29-40b2-8d2e-feac10565656\sce

DATE: 03-05-2024 TIME: 11:02:51

USER:

COMMENTS: _____

****
** SIMULATION : 5yr 24hr 10min SCS Type II (M **
****

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\7fa4acbb-0c25-48f4-a560-49f1a961dde0\74dc67d0
Ptotal= 74.18 mm | Comments: 5yr 24hr 10min SCS Type II (MTO)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.17	1.34	12.33	10.68	18.50	1.34
0.17	0.82	6.33	1.34	12.50	10.68	18.67	1.34
0.33	0.82	6.50	1.34	12.67	5.49	18.83	1.34
0.50	0.82	6.67	1.34	12.83	5.49	19.00	1.34
0.67	0.82	6.83	1.34	13.00	5.49	19.17	1.34
0.83	0.82	7.00	1.34	13.17	4.01	19.33	1.34
1.00	0.82	7.17	1.63	13.33	4.01	19.50	1.34
1.17	0.82	7.33	1.63	13.50	4.01	19.67	1.34
1.33	0.82	7.50	1.63	13.67	3.12	19.83	1.34
1.50	0.82	7.67	1.63	13.83	3.12	20.00	1.34
1.67	0.82	7.83	1.63	14.00	3.12	20.17	0.89
1.83	0.82	8.00	1.63	14.17	2.23	20.33	0.89
2.00	0.82	8.17	1.93	14.33	2.23	20.50	0.89
2.17	0.96	8.33	1.93	14.50	2.23	20.67	0.89
2.33	0.96	8.50	1.93	14.67	2.23	20.83	0.89
2.50	0.96	8.67	2.08	14.83	2.23	21.00	0.89
2.67	0.96	8.83	2.08	15.00	2.23	21.17	0.89
2.83	0.96	9.00	2.08	15.17	2.23	21.33	0.89
3.00	0.96	9.17	2.37	15.33	2.23	21.50	0.89
3.17	0.96	9.33	2.37	15.50	2.23	21.67	0.89
3.33	0.96	9.50	2.37	15.67	2.23	21.83	0.89
3.50	0.96	9.67	2.67	15.83	2.23	22.00	0.89
3.67	0.96	9.83	2.67	16.00	2.23	22.17	0.89
3.83	0.96	10.00	2.67	16.17	1.34	22.33	0.89
4.00	0.96	10.17	3.41	16.33	1.34	22.50	0.89
4.17	1.19	10.33	3.41	16.50	1.34	22.67	0.89
4.33	1.19	10.50	3.41	16.67	1.34	22.83	0.89
4.50	1.19	10.67	4.60	16.83	1.34	23.00	0.89
4.67	1.19	10.83	4.60	17.00	1.34	23.17	0.89
4.83	1.19	11.00	4.60	17.17	1.34	23.33	0.89
5.00	1.19	11.17	7.12	17.33	1.34	23.50	0.89
5.17	1.19	11.33	7.12	17.50	1.34	23.67	0.89
5.33	1.19	11.50	7.12	17.67	1.34	23.83	0.89
5.50	1.19	11.67	21.96	17.83	1.34	24.00	0.89
5.67	1.19	11.83	56.38	18.00	1.34		
5.83	1.19	12.00	90.80	18.17	1.34		
6.00	1.19	12.17	10.68	18.33	1.34		

CALIB
STANDHYD (0001) | Area (ha)= 1.08
ID= 1 DT= 5.0 min | Total Imp(%)= 36.00 Dir. Conn.(%)= 36.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	84.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.19	12.250	10.69	18.33	1.34
0.167	0.00	6.250	1.34	12.333	10.68	18.42	1.34
0.250	0.82	6.333	1.34	12.417	10.68	18.50	1.34
0.333	0.82	6.417	1.34	12.500	10.68	18.58	1.34
0.417	0.82	6.500	1.34	12.583	10.68	18.67	1.34
0.500	0.82	6.583	1.34	12.667	10.68	18.75	1.34
0.583	0.82	6.667	1.34	12.750	5.49	18.83	1.34
0.667	0.82	6.750	1.34	12.833	5.49	18.92	1.34
0.750	0.82	6.833	1.34	12.917	5.49	19.00	1.34
0.833	0.82	6.917	1.34	13.000	5.49	19.08	1.34
0.917	0.82	7.000	1.34	13.083	5.49	19.17	1.34
1.000	0.82	7.083	1.34	13.167	5.49	19.25	1.34
1.083	0.82	7.167	1.34	13.250	4.01	19.33	1.34
1.167	0.82	7.250	1.63	13.333	4.01	19.42	1.34
1.250	0.82	7.333	1.63	13.417	4.01	19.50	1.34
1.333	0.82	7.417	1.63	13.500	4.01	19.58	1.34
1.417	0.82	7.500	1.63	13.583	4.01	19.67	1.34
1.500	0.82	7.583	1.63	13.667	4.01	19.75	1.34
1.583	0.82	7.667	1.63	13.750	3.12	19.83	1.34
1.667	0.82	7.750	1.63	13.833	3.12	19.92	1.34
1.750	0.82	7.833	1.63	13.917	3.12	20.00	1.34
1.833	0.82	7.917	1.63	14.000	3.12	20.08	1.34
1.917	0.82	8.000	1.63	14.083	3.12	20.17	1.34
2.000	0.82	8.083	1.63	14.167	3.12	20.25	0.89
2.083	0.82	8.167	1.63	14.250	2.23	20.33	0.89
2.167	0.82	8.250	1.93	14.333	2.23	20.42	0.89
2.250	0.96	8.333	1.93	14.417	2.23	20.50	0.89
2.333	0.96	8.417	1.93	14.500	2.23	20.58	0.89
2.417	0.96	8.500	1.93	14.583	2.23	20.67	0.89
2.500	0.96	8.583	1.93	14.667	2.23	20.75	0.89
2.583	0.96	8.667	1.93	14.750	2.23	20.83	0.89
2.667	0.96	8.750	2.08	14.833	2.23	20.92	0.89
2.750	0.96	8.833	2.08	14.917	2.23	21.00	0.89
2.833	0.96	8.917	2.08	15.000	2.23	21.08	0.89
2.917	0.96	9.000	2.08	15.083	2.23	21.17	0.89
3.000	0.96	9.083	2.08	15.167	2.23	21.25	0.89
3.083	0.96	9.167	2.08	15.250	2.23	21.33	0.89
3.167	0.96	9.250	2.37	15.333	2.23	21.42	0.89
3.250	0.96	9.333	2.37	15.417	2.23	21.50	0.89
3.333	0.96	9.417	2.37	15.500	2.23	21.58	0.89
3.417	0.96	9.500	2.37	15.583	2.23	21.67	0.89
3.500	0.96	9.583	2.37	15.667	2.23	21.75	0.89
3.583	0.96	9.667	2.37	15.750	2.23	21.83	0.89
3.667	0.96	9.750	2.67	15.833	2.23	21.92	0.89
3.750	0.96	9.833	2.67	15.917	2.23	22.00	0.89
3.833	0.96	9.917	2.67	16.000	2.23	22.08	0.89
3.917	0.96	10.000	2.67	16.083	2.23	22.17	0.89
4.000	0.96	10.083	2.67	16.167	2.23	22.25	0.89
4.083	0.96	10.167	2.67	16.250	1.34	22.33	0.89
4.167	0.96	10.250	3.41	16.333	1.34	22.42	0.89
4.250	1.19	10.333	3.41	16.417	1.34	22.50	0.89
4.333	1.19	10.417	3.41	16.500	1.34	22.58	0.89
4.417	1.19	10.500	3.41	16.583	1.34	22.67	0.89
4.500	1.19	10.583	3.41	16.667	1.34	22.75	0.89
4.583	1.19	10.667	3.41	16.750	1.34	22.83	0.89
4.667	1.19	10.750	4.60	16.833	1.34	22.92	0.89
4.750	1.19	10.833	4.60	16.917	1.34	23.00	0.89

4.833	1.19	10.917	4.60	17.000	1.34	23.08	0.89	
4.917	1.19	11.000	4.60	17.083	1.34	23.17	0.89	
5.000	1.19	11.083	4.60	17.167	1.34	23.25	0.89	
5.083	1.19	11.167	4.60	17.250	1.34	23.33	0.89	
5.167	1.19	11.250	7.12	17.333	1.34	23.42	0.89	
5.250	1.19	11.333	7.12	17.417	1.34	23.50	0.89	
5.333	1.19	11.417	7.12	17.500	1.34	23.58	0.89	
5.417	1.19	11.500	7.12	17.583	1.34	23.67	0.89	
5.500	1.19	11.583	7.12	17.667	1.34	23.75	0.89	
5.583	1.19	11.667	7.12	17.750	1.34	23.83	0.89	
5.667	1.19	11.750	21.96	17.833	1.34	23.92	0.89	
5.750	1.19	11.833	21.96	17.917	1.34	24.00	0.89	
5.833	1.19	11.917	56.37	18.000	1.34	24.08	0.89	
5.917	1.19	12.000	56.38	18.083	1.34	24.17	0.89	
6.000	1.19	12.083	90.79	18.167	1.34			
6.083	1.19	12.167	90.80	18.250	1.34			

Max.Eff.Inten.(mm/hr)=		90.80	43.44	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.41 (ii)	12.26 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.30	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.10	0.05	0.138 (iii)
TIME TO PEAK	(hrs)=	12.17	12.25	12.17
RUNOFF VOLUME	(mm)=	73.18	29.94	45.50
TOTAL RAINFALL	(mm)=	74.18	74.18	74.18
RUNOFF COEFFICIENT	=	0.99	0.40	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
STANDHYD (0002)	Area	(ha)=	0.07		
ID= 1 DT= 5.0 min	Total Imp(%)=	36.00	Dir. Conn.(%)=	36.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	21.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.19	12.250	10.69	18.33	1.34
0.167	0.00	6.250	1.34	12.333	10.68	18.42	1.34
0.250	0.82	6.333	1.34	12.417	10.68	18.50	1.34
0.333	0.82	6.417	1.34	12.500	10.68	18.58	1.34
0.417	0.82	6.500	1.34	12.583	10.68	18.67	1.34
0.500	0.82	6.583	1.34	12.667	10.68	18.75	1.34
0.583	0.82	6.667	1.34	12.750	5.49	18.83	1.34
0.667	0.82	6.750	1.34	12.833	5.49	18.92	1.34
0.750	0.82	6.833	1.34	12.917	5.49	19.00	1.34
0.833	0.82	6.917	1.34	13.000	5.49	19.08	1.34
0.917	0.82	7.000	1.34	13.083	5.49	19.17	1.34
1.000	0.82	7.083	1.34	13.167	5.49	19.25	1.34
1.083	0.82	7.167	1.34	13.250	4.01	19.33	1.34
1.167	0.82	7.250	1.63	13.333	4.01	19.42	1.34
1.250	0.82	7.333	1.63	13.417	4.01	19.50	1.34
1.333	0.82	7.417	1.63	13.500	4.01	19.58	1.34
1.417	0.82	7.500	1.63	13.583	4.01	19.67	1.34
1.500	0.82	7.583	1.63	13.667	4.01	19.75	1.34
1.583	0.82	7.667	1.63	13.750	3.12	19.83	1.34
1.667	0.82	7.750	1.63	13.833	3.12	19.92	1.34
1.750	0.82	7.833	1.63	13.917	3.12	20.00	1.34
1.833	0.82	7.917	1.63	14.000	3.12	20.08	1.34
1.917	0.82	8.000	1.63	14.083	3.12	20.17	1.34
2.000	0.82	8.083	1.63	14.167	3.12	20.25	0.89
2.083	0.82	8.167	1.63	14.250	2.23	20.33	0.89
2.167	0.82	8.250	1.93	14.333	2.23	20.42	0.89
2.250	0.96	8.333	1.93	14.417	2.23	20.50	0.89
2.333	0.96	8.417	1.93	14.500	2.23	20.58	0.89
2.417	0.96	8.500	1.93	14.583	2.23	20.67	0.89
2.500	0.96	8.583	1.93	14.667	2.23	20.75	0.89
2.583	0.96	8.667	1.93	14.750	2.23	20.83	0.89
2.667	0.96	8.750	2.08	14.833	2.23	20.92	0.89
2.750	0.96	8.833	2.08	14.917	2.23	21.00	0.89
2.833	0.96	8.917	2.08	15.000	2.23	21.08	0.89
2.917	0.96	9.000	2.08	15.083	2.23	21.17	0.89
3.000	0.96	9.083	2.08	15.167	2.23	21.25	0.89
3.083	0.96	9.167	2.08	15.250	2.23	21.33	0.89
3.167	0.96	9.250	2.37	15.333	2.23	21.42	0.89
3.250	0.96	9.333	2.37	15.417	2.23	21.50	0.89
3.333	0.96	9.417	2.37	15.500	2.23	21.58	0.89
3.417	0.96	9.500	2.37	15.583	2.23	21.67	0.89
3.500	0.96	9.583	2.37	15.667	2.23	21.75	0.89
3.583	0.96	9.667	2.37	15.750	2.23	21.83	0.89
3.667	0.96	9.750	2.67	15.833	2.23	21.92	0.89
3.750	0.96	9.833	2.67	15.917	2.23	22.00	0.89
3.833	0.96	9.917	2.67	16.000	2.23	22.08	0.89
3.917	0.96	10.000	2.67	16.083	2.23	22.17	0.89
4.000	0.96	10.083	2.67	16.167	2.23	22.25	0.89
4.083	0.96	10.167	2.67	16.250	1.34	22.33	0.89
4.167	0.96	10.250	3.41	16.333	1.34	22.42	0.89
4.250	1.19	10.333	3.41	16.417	1.34	22.50	0.89
4.333	1.19	10.417	3.41	16.500	1.34	22.58	0.89
4.417	1.19	10.500	3.41	16.583	1.34	22.67	0.89
4.500	1.19	10.583	3.41	16.667	1.34	22.75	0.89
4.583	1.19	10.667	3.41	16.750	1.34	22.83	0.89
4.667	1.19	10.750	4.60	16.833	1.34	22.92	0.89
4.750	1.19	10.833	4.60	16.917	1.34	23.00	0.89
4.833	1.19	10.917	4.60	17.000	1.34	23.08	0.89
4.917	1.19	11.000	4.60	17.083	1.34	23.17	0.89
5.000	1.19	11.083	4.60	17.167	1.34	23.25	0.89
5.083	1.19	11.167	4.60	17.250	1.34	23.33	0.89
5.167	1.19	11.250	7.12	17.333	1.34	23.42	0.89
5.250	1.19	11.333	7.12	17.417	1.34	23.50	0.89
5.333	1.19	11.417	7.12	17.500	1.34	23.58	0.89
5.417	1.19	11.500	7.12	17.583	1.34	23.67	0.89
5.500	1.19	11.583	7.12	17.667	1.34	23.75	0.89
5.583	1.19	11.667	7.12	17.750	1.34	23.83	0.89
5.667	1.19	11.750	21.96	17.833	1.34	23.92	0.89
5.750	1.19	11.833	21.96	17.917	1.34	24.00	0.89
5.833	1.19	11.917	56.37	18.000	1.34	24.08	0.89
5.917	1.19	12.000	56.38	18.083	1.34	24.17	0.89
6.000	1.19	12.083	90.79	18.167	1.34		
6.083	1.19	12.167	90.80	18.250	1.34		

Max.Eff.Inten.(mm/hr)=		90.80	43.44	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.06 (ii)	10.91 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.34	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.01	0.00	0.009 (iii)
TIME TO PEAK	(hrs)=	12.17	12.25	12.17
RUNOFF VOLUME	(mm)=	73.18	29.94	45.42
TOTAL RAINFALL	(mm)=	74.18	74.18	74.18
RUNOFF COEFFICIENT	=	0.99	0.40	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.



```
--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)     (cms)    (hrs)      (mm)
        ID1= 1 (  0001):     1.08   0.138    12.17     45.50
      + ID2= 2 (  0002):     0.07   0.009    12.17     45.42
        ==========================================================
        ID = 3 (  0003):     1.15   0.147    12.17     45.50

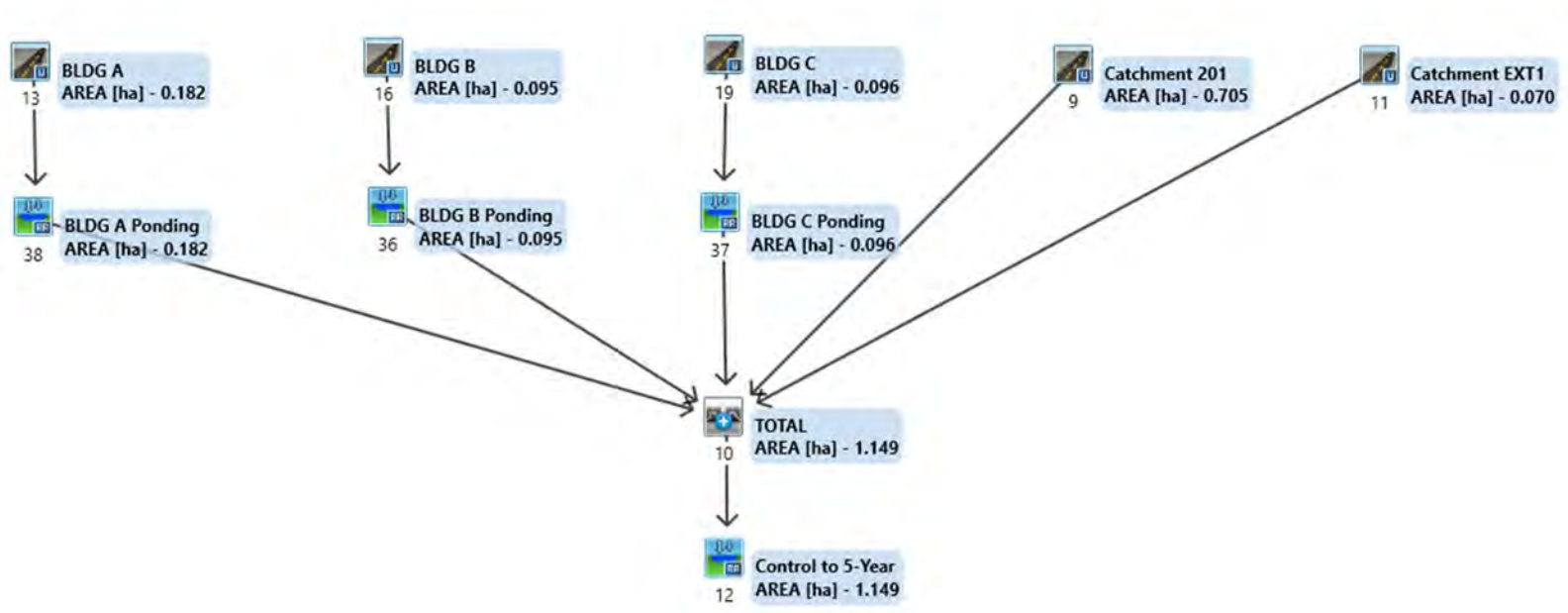
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

 FINISH
================================================================================================
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Project #: 2548-6852
Project Name: 1393 Grahams Lane

Post-Development Condition VO Model Output
100-Year 6, 12, 24 hour Chicago, 100-Year 6, 12, 24 hour SCS Type II, and Hurricane Hazel
March, 2024

VO Model Schematic



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================================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 03-05-2024                          TIME: 10:59:20

USER:


COMMENTS: _____________________________________________________


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  ************************************************
  ** SIMULATION : 100yr 6hr 10min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1281.340
| Ptotal= 86.27 mm |                          B=   5.000
--------------------                          C=   0.761
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  6.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.89 |  1.50   17.56 |  3.00    9.62 |  4.50    4.92
                0.17    4.20 |  1.67   39.89 |  3.17    8.62 |  4.67    4.69
                0.33    4.58 |  1.83  163.18 |  3.33    7.83 |  4.83    4.48
                0.50    5.04 |  2.00   51.70 |  3.50    7.18 |  5.00    4.29
                0.67    5.63 |  2.17   28.13 |  3.67    6.65 |  5.17    4.12
                0.83    6.41 |  2.33   19.74 |  3.83    6.20 |  5.33    3.96
                1.00    7.49 |  2.50   15.41 |  4.00    5.81 |  5.50    3.82
                1.17    9.11 |  2.67   12.75 |  4.17    5.47 |  5.67    3.69
                1.33   11.83 |  2.83   10.94 |  4.33    5.18 |  5.83    3.57

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0011)|   Area     (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.89 | 1.583   17.56 | 3.083    9.62 |  4.58    4.92
               0.167    3.89 | 1.667   17.56 | 3.167    9.62 |  4.67    4.92
               0.250    4.20 | 1.750   39.89 | 3.250    8.62 |  4.75    4.69
               0.333    4.20 | 1.833   39.89 | 3.333    8.62 |  4.83    4.69
               0.417    4.58 | 1.917  163.18 | 3.417    7.83 |  4.92    4.48
               0.500    4.58 | 2.000  163.18 | 3.500    7.83 |  5.00    4.48
               0.583    5.04 | 2.083   51.70 | 3.583    7.18 |  5.08    4.29
               0.667    5.04 | 2.167   51.70 | 3.667    7.18 |  5.17    4.29
               0.750    5.63 | 2.250   28.13 | 3.750    6.65 |  5.25    4.12
               0.833    5.63 | 2.333   28.13 | 3.833    6.65 |  5.33    4.12
               0.917    6.41 | 2.417   19.74 | 3.917    6.20 |  5.42    3.96
               1.000    6.41 | 2.500   19.74 | 4.000    6.20 |  5.50    3.96
               1.083    7.49 | 2.583   15.41 | 4.083    5.81 |  5.58    3.82
               1.167    7.49 | 2.667   15.41 | 4.167    5.81 |  5.67    3.82
               1.250    9.11 | 2.750   12.75 | 4.250    5.47 |  5.75    3.69
               1.333    9.11 | 2.833   12.75 | 4.333    5.47 |  5.83    3.69
               1.417   11.83 | 2.917   10.94 | 4.417    5.18 |  5.92    3.57
               1.500   11.83 | 3.000   10.94 | 4.500    5.18 |  6.00    3.57

     Max.Eff.Inten.(mm/hr)=     163.18        65.99
           over (min)        5.00          5.00
     Storage Coeff.  (min)=      0.84 (ii)    1.76 (ii)
     Unit Hyd. Tpeak (min)=      5.00          5.00
     Unit Hyd. peak  (cms)=      0.34          0.32
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.03          0.00          0.032 (iii)
     TIME TO PEAK    (hrs)=      2.00          2.00          2.00
     RUNOFF VOLUME    (mm)=     85.27         38.12         84.79
     TOTAL RAINFALL   (mm)=     86.27         86.27         86.27
     RUNOFF COEFFICIENT   =      0.99          0.44          0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0016)|   Area     (ha)=   0.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.09         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      25.21        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.89 | 1.583   17.56 | 3.083    9.62 |  4.58    4.92
               0.167    3.89 | 1.667   17.56 | 3.167    9.62 |  4.67    4.92
               0.250    4.20 | 1.750   39.89 | 3.250    8.62 |  4.75    4.69
               0.333    4.20 | 1.833   39.89 | 3.333    8.62 |  4.83    4.69
               0.417    4.58 | 1.917  163.18 | 3.417    7.83 |  4.92    4.48
               0.500    4.58 | 2.000  163.18 | 3.500    7.83 |  5.00    4.48
               0.583    5.04 | 2.083   51.70 | 3.583    7.18 |  5.08    4.29
               0.667    5.04 | 2.167   51.70 | 3.667    7.18 |  5.17    4.29
               0.750    5.63 | 2.250   28.13 | 3.750    6.65 |  5.25    4.12
```

0.833	5.63	2.333	28.13	3.833	6.65	5.33	4.12
0.917	6.41	2.417	19.74	3.917	6.20	5.42	3.96
1.000	6.41	2.500	19.74	4.000	6.20	5.50	3.96
1.083	7.49	2.583	15.41	4.083	5.81	5.58	3.82
1.167	7.49	2.667	15.41	4.167	5.81	5.67	3.82
1.250	9.11	2.750	12.75	4.250	5.47	5.75	3.69
1.333	9.11	2.833	12.75	4.333	5.47	5.83	3.69
1.417	11.83	2.917	10.94	4.417	5.18	5.92	3.57
1.500	11.83	3.000	10.94	4.500	5.18	6.00	3.57

Max.Eff.Inten.(mm/hr)=	163.18	65.99	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.92 (ii)	1.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.32	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.043 (iii)
TIME TO PEAK (hrs)=	2.00	2.00	2.00
RUNOFF VOLUME (mm)=	85.27	38.12	84.79
TOTAL RAINFALL (mm)=	86.27	86.27	86.27
RUNOFF COEFFICIENT =	0.99	0.44	0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0036)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0140	0.0038

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0016)	0.095	0.043	2.00	84.79
OUTFLOW: ID= 1 (0036)	0.095	0.012	2.17	84.13

PEAK FLOW REDUCTION [Qout/Qin](%)= 27.79
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0033

CALIB			
STANDHYD (0009)	Area (ha)= 0.71		
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.70	0.01	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	68.58	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.89	1.583	17.56	3.083	9.62	4.58	4.92
0.167	3.89	1.667	17.56	3.167	9.62	4.67	4.92
0.250	4.20	1.750	39.89	3.250	8.62	4.75	4.69
0.333	4.20	1.833	39.89	3.333	8.62	4.83	4.69
0.417	4.58	1.917	163.18	3.417	7.83	4.92	4.48
0.500	4.58	2.000	163.18	3.500	7.83	5.00	4.48
0.583	5.04	2.083	51.70	3.583	7.18	5.08	4.29
0.667	5.04	2.167	51.70	3.667	7.18	5.17	4.29
0.750	5.63	2.250	28.13	3.750	6.65	5.25	4.12
0.833	5.63	2.333	28.13	3.833	6.65	5.33	4.12
0.917	6.41	2.417	19.74	3.917	6.20	5.42	3.96
1.000	6.41	2.500	19.74	4.000	6.20	5.50	3.96
1.083	7.49	2.583	15.41	4.083	5.81	5.58	3.82
1.167	7.49	2.667	15.41	4.167	5.81	5.67	3.82
1.250	9.11	2.750	12.75	4.250	5.47	5.75	3.69
1.333	9.11	2.833	12.75	4.333	5.47	5.83	3.69
1.417	11.83	2.917	10.94	4.417	5.18	5.92	3.57
1.500	11.83	3.000	10.94	4.500	5.18	6.00	3.57

Max.Eff.Inten.(mm/hr)=	163.18	65.99	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.67 (ii)	2.60 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.29	
			TOTALS
PEAK FLOW (cms)=	0.32	0.00	0.317 (iii)
TIME TO PEAK (hrs)=	2.00	2.00	2.00
RUNOFF VOLUME (mm)=	85.27	38.12	84.79
TOTAL RAINFALL (mm)=	86.27	86.27	86.27
RUNOFF COEFFICIENT =	0.99	0.44	0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0013)	Area (ha)= 0.18		
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.18	0.00	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	34.83	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.89	1.583	17.56	3.083	9.62	4.58	4.92
0.167	3.89	1.667	17.56	3.167	9.62	4.67	4.92
0.250	4.20	1.750	39.89	3.250	8.62	4.75	4.69
0.333	4.20	1.833	39.89	3.333	8.62	4.83	4.69
0.417	4.58	1.917	163.18	3.417	7.83	4.92	4.48
0.500	4.58	2.000	163.18	3.500	7.83	5.00	4.48
0.583	5.04	2.083	51.70	3.583	7.18	5.08	4.29
0.667	5.04	2.167	51.70	3.667	7.18	5.17	4.29
0.750	5.63	2.250	28.13	3.750	6.65	5.25	4.12
0.833	5.63	2.333	28.13	3.833	6.65	5.33	4.12
0.917	6.41	2.417	19.74	3.917	6.20	5.42	3.96
1.000	6.41	2.500	19.74	4.000	6.20	5.50	3.96
1.083	7.49	2.583	15.41	4.083	5.81	5.58	3.82
1.167	7.49	2.667	15.41	4.167	5.81	5.67	3.82
1.250	9.11	2.750	12.75	4.250	5.47	5.75	3.69
1.333	9.11	2.833	12.75	4.333	5.47	5.83	3.69
1.417	11.83	2.917	10.94	4.417	5.18	5.92	3.57
1.500	11.83	3.000	10.94	4.500	5.18	6.00	3.57

Max.Eff.Inten.(mm/hr)=	163.18	65.99	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.12 (ii)	2.04 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	
			TOTALS
PEAK FLOW (cms)=	0.08	0.00	0.082 (iii)
TIME TO PEAK (hrs)=	2.00	2.00	2.00
RUNOFF VOLUME (mm)=	85.27	38.12	84.79

```
     TOTAL RAINFALL   (mm)=      86.27        86.27          86.27
     RUNOFF COEFFICIENT   =       0.99         0.44           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0038)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0270     0.0073

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0013)    0.182     0.082      2.00      84.79
   OUTFLOW: ID= 1 (  0038)    0.182     0.023      2.17      84.46

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.96
                  TIME SHIFT OF PEAK FLOW          (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0062

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   0.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.10         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      25.34        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.89 | 1.583   17.56 | 3.083    9.62 |  4.58    4.92
               0.167    3.89 | 1.667   17.56 | 3.167    9.62 |  4.67    4.92
               0.250    4.20 | 1.750   39.89 | 3.250    8.62 |  4.75    4.69
               0.333    4.20 | 1.833   39.89 | 3.333    8.62 |  4.83    4.69
               0.417    4.58 | 1.917  163.18 | 3.417    7.83 |  4.92    4.48
               0.500    4.58 | 2.000  163.18 | 3.500    7.83 |  5.00    4.48
               0.583    5.04 | 2.083   51.70 | 3.583    7.18 |  5.08    4.29
               0.667    5.04 | 2.167   51.70 | 3.667    7.18 |  5.17    4.29
               0.750    5.63 | 2.250   28.13 | 3.750    6.65 |  5.25    4.12
               0.833    5.63 | 2.333   28.13 | 3.833    6.65 |  5.33    4.12
               0.917    6.41 | 2.417   19.74 | 3.917    6.20 |  5.42    3.96
               1.000    6.41 | 2.500   19.74 | 4.000    6.20 |  5.50    3.96
               1.083    7.49 | 2.583   15.41 | 4.083    5.81 |  5.58    3.82
               1.167    7.49 | 2.667   15.41 | 4.167    5.81 |  5.67    3.82
               1.250    9.11 | 2.750   12.75 | 4.250    5.47 |  5.75    3.69
               1.333    9.11 | 2.833   12.75 | 4.333    5.47 |  5.83    3.69
               1.417   11.83 | 2.917   10.94 | 4.417    5.18 |  5.92    3.57
               1.500   11.83 | 3.000   10.94 | 4.500    5.18 |  6.00    3.57

     Max.Eff.Inten.(mm/hr)=     163.18        65.99
           over (min)             5.00         5.00
     Storage Coeff.  (min)=       0.92 (ii)    1.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.043 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.00           2.00
     RUNOFF VOLUME    (mm)=      85.27        38.12          84.79
     TOTAL RAINFALL   (mm)=      86.27        86.27          86.27
     RUNOFF COEFFICIENT   =       0.99         0.44           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0150     0.0039

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0019)    0.096     0.043      2.00      84.79
   OUTFLOW: ID= 1 (  0037)    0.096     0.013      2.17      84.17

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.86
                  TIME SHIFT OF PEAK FLOW          (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0032

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0011):     0.07   0.032     2.00    84.79
     + ID2= 2 (  0036):     0.10   0.012     2.17    84.13
       ==================================================
       ID = 3 (  0010):     0.17   0.041     2.00    84.41

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

-------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0010):     0.17   0.041     2.00    84.41
     + ID2= 2 (  0037):     0.10   0.013     2.17    84.17
       ==================================================
       ID = 1 (  0010):     0.26   0.052     2.00    84.32

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

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.26   0.052     2.00    84.32
     + ID2= 2 (  0038):     0.18   0.023     2.17    84.46
       ==================================================
       ID = 3 (  0010):     0.44   0.070     2.00    84.38

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

-------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0010):     0.44   0.070     2.00    84.38
     + ID2= 2 (  0009):     0.71   0.317     2.00    84.79
       ==================================================
       ID = 1 (  0010):     1.15   0.388     2.00    84.63

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

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--------------------
| RESERVOIR(  0012)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1250     0.0360
                          0.1240     0.0018   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)      1.149     0.388      2.00      84.63
   OUTFLOW: ID= 1 (  0012)      1.149     0.124      2.25      84.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 32.10
                  TIME SHIFT OF PEAK FLOW          (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0188
```

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================================================================================================================
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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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```
                  *****  D E T A I L E D   O U T P U T *****


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  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-
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b6f920a4c6d7\239bd5a4-664d-43ae-abef-afd92494df3f\sce


DATE: 03-05-2024                          TIME: 10:59:19

USER:



COMMENTS: _____________________________________________________
```

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------
  ***********************************************
  ** SIMULATION : 100yr 12hr 10min Chicago      **
  ***********************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A=1281.340
| Ptotal=102.36 mm |                           B=   5.000
--------------------                           C=   0.761
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 12.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.16	3.00	7.49	6.00	5.81	9.00	2.92
0.17	2.24	3.17	9.11	6.17	5.47	9.17	2.85
0.33	2.32	3.33	11.83	6.33	5.18	9.33	2.78
0.50	2.42	3.50	17.56	6.50	4.92	9.50	2.72
0.67	2.52	3.67	39.89	6.67	4.69	9.67	2.66
0.83	2.62	3.83	163.18	6.83	4.48	9.83	2.60
1.00	2.75	4.00	51.70	7.00	4.29	10.00	2.54
1.17	2.88	4.17	28.13	7.17	4.12	10.17	2.49
1.33	3.03	4.33	19.74	7.33	3.96	10.33	2.44
1.50	3.20	4.50	15.41	7.50	3.82	10.50	2.39
1.67	3.40	4.67	12.75	7.67	3.69	10.67	2.35
1.83	3.63	4.83	10.94	7.83	3.57	10.83	2.31
2.00	3.89	5.00	9.62	8.00	3.46	11.00	2.26
2.17	4.20	5.17	8.62	8.17	3.35	11.17	2.22
2.33	4.58	5.33	7.83	8.33	3.25	11.33	2.19
2.50	5.04	5.50	7.18	8.50	3.16	11.50	2.15
2.67	5.63	5.67	6.65	8.67	3.08	11.67	2.11
2.83	6.41	5.83	6.20	8.83	3.00	11.83	2.08

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--------------------
| CALIB            |
| STANDHYD (  0011)|   Area     (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.07          0.00
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=      21.60         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
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TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.16	3.083	7.49	6.083	5.81	9.08	2.92
0.167	2.16	3.167	7.49	6.167	5.81	9.17	2.92
0.250	2.24	3.250	9.11	6.250	5.47	9.25	2.85
0.333	2.24	3.333	9.11	6.333	5.47	9.33	2.85
0.417	2.32	3.417	11.83	6.417	5.18	9.42	2.78
0.500	2.32	3.500	11.83	6.500	5.18	9.50	2.78
0.583	2.42	3.583	17.56	6.583	4.92	9.58	2.72
0.667	2.42	3.667	17.56	6.667	4.92	9.67	2.72
0.750	2.52	3.750	39.89	6.750	4.69	9.75	2.66
0.833	2.52	3.833	39.89	6.833	4.69	9.83	2.66
0.917	2.62	3.917	163.17	6.917	4.48	9.92	2.60
1.000	2.62	4.000	163.18	7.000	4.48	10.00	2.60
1.083	2.75	4.083	51.71	7.083	4.29	10.08	2.54
1.167	2.75	4.167	51.70	7.167	4.29	10.17	2.54
1.250	2.88	4.250	28.13	7.250	4.12	10.25	2.49
1.333	2.88	4.333	28.13	7.333	4.12	10.33	2.49
1.417	3.03	4.417	19.74	7.417	3.96	10.42	2.44
1.500	3.03	4.500	19.74	7.500	3.96	10.50	2.44
1.583	3.20	4.583	15.41	7.583	3.82	10.58	2.39
1.667	3.20	4.667	15.41	7.667	3.82	10.67	2.39
1.750	3.40	4.750	12.75	7.750	3.69	10.75	2.35
1.833	3.40	4.833	12.75	7.833	3.69	10.83	2.35
1.917	3.63	4.917	10.94	7.917	3.57	10.92	2.31
2.000	3.63	5.000	10.94	8.000	3.57	11.00	2.31
2.083	3.89	5.083	9.62	8.083	3.46	11.08	2.26
2.167	3.89	5.167	9.62	8.167	3.46	11.17	2.26
2.250	4.20	5.250	8.62	8.250	3.35	11.25	2.22
2.333	4.20	5.333	8.62	8.333	3.35	11.33	2.22
2.417	4.58	5.417	7.83	8.417	3.25	11.42	2.19
2.500	4.58	5.500	7.83	8.500	3.25	11.50	2.19
2.583	5.04	5.583	7.18	8.583	3.16	11.58	2.15
2.667	5.04	5.667	7.18	8.667	3.16	11.67	2.15
2.750	5.63	5.750	6.65	8.750	3.08	11.75	2.11
2.833	5.63	5.833	6.65	8.833	3.08	11.83	2.11
2.917	6.41	5.917	6.20	8.917	3.00	11.92	2.08
3.000	6.41	6.000	6.20	9.000	3.00	12.00	2.08

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    Max.Eff.Inten.(mm/hr)=     163.18        73.55
              over (min)        5.00         5.00
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Storage Coeff. (min)=	0.84 (ii)	1.76 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.34	0.32		
			TOTALS	
PEAK FLOW (cms)=	0.03	0.00	0.032 (iii)	
TIME TO PEAK (hrs)=	4.00	4.00	4.00	
RUNOFF VOLUME (mm)=	101.36	49.72	100.84	
TOTAL RAINFALL (mm)=	102.36	102.36	102.36	
RUNOFF COEFFICIENT =	0.99	0.49	0.99	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0016) | Area (ha)= 0.10
ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.09	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.21	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.16	3.083	7.49	6.083	5.81	9.08	2.92
0.167	2.16	3.167	7.49	6.167	5.81	9.17	2.92
0.250	2.24	3.250	9.11	6.250	5.47	9.25	2.85
0.333	2.24	3.333	9.11	6.333	5.47	9.33	2.85
0.417	2.32	3.417	11.83	6.417	5.18	9.42	2.78
0.500	2.32	3.500	11.83	6.500	5.18	9.50	2.78
0.583	2.42	3.583	17.56	6.583	4.92	9.58	2.72
0.667	2.42	3.667	17.56	6.667	4.92	9.67	2.72
0.750	2.52	3.750	39.89	6.750	4.69	9.75	2.66
0.833	2.52	3.833	39.89	6.833	4.69	9.83	2.66
0.917	2.62	3.917	163.17	6.917	4.48	9.92	2.60
1.000	2.62	4.000	163.18	7.000	4.48	10.00	2.60
1.083	2.75	4.083	51.71	7.083	4.29	10.08	2.54
1.167	2.75	4.167	51.70	7.167	4.29	10.17	2.54
1.250	2.88	4.250	28.13	7.250	4.12	10.25	2.49
1.333	2.88	4.333	28.13	7.333	4.12	10.33	2.49
1.417	3.03	4.417	19.74	7.417	3.96	10.42	2.44
1.500	3.03	4.500	19.74	7.500	3.96	10.50	2.44
1.583	3.20	4.583	15.41	7.583	3.82	10.58	2.39
1.667	3.20	4.667	15.41	7.667	3.82	10.67	2.39
1.750	3.40	4.750	12.75	7.750	3.69	10.75	2.35
1.833	3.40	4.833	12.75	7.833	3.69	10.83	2.35
1.917	3.63	4.917	10.94	7.917	3.57	10.92	2.31
2.000	3.63	5.000	10.94	8.000	3.57	11.00	2.31
2.083	3.89	5.083	9.62	8.083	3.46	11.08	2.26
2.167	3.89	5.167	9.62	8.167	3.46	11.17	2.26
2.250	4.20	5.250	8.62	8.250	3.35	11.25	2.22
2.333	4.20	5.333	8.62	8.333	3.35	11.33	2.22
2.417	4.58	5.417	7.83	8.417	3.25	11.42	2.19
2.500	4.58	5.500	7.83	8.500	3.25	11.50	2.19
2.583	5.04	5.583	7.18	8.583	3.16	11.58	2.15
2.667	5.04	5.667	7.18	8.667	3.16	11.67	2.15
2.750	5.63	5.750	6.65	8.750	3.08	11.75	2.11
2.833	5.63	5.833	6.65	8.833	3.08	11.83	2.11
2.917	6.41	5.917	6.20	8.917	3.00	11.92	2.08
3.000	6.41	6.000	6.20	9.000	3.00	12.00	2.08

Max.Eff.Inten.(mm/hr)=	163.18	73.55	
over (min)	5.00	5.00	

Storage Coeff. (min)=	0.92 (ii)	1.84 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.34	0.32		
			TOTALS	
PEAK FLOW (cms)=	0.04	0.00	0.043 (iii)	
TIME TO PEAK (hrs)=	4.00	4.00	4.00	
RUNOFF VOLUME (mm)=	101.36	49.72	100.84	
TOTAL RAINFALL (mm)=	102.36	102.36	102.36	
RUNOFF COEFFICIENT =	0.99	0.49	0.99	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0036) | OVERFLOW IS OFF
IN= 2---> OUT= 1 |
DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0140	0.0038

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0016)	0.095	0.043	4.00	100.84
OUTFLOW: ID= 1 (0036)	0.095	0.012	4.17	100.21

PEAK FLOW REDUCTION [Qout/Qin](%)= 27.95
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0033

CALIB
STANDHYD (0009) | Area (ha)= 0.71
ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.16	3.083	7.49	6.083	5.81	9.08	2.92
0.167	2.16	3.167	7.49	6.167	5.81	9.17	2.92
0.250	2.24	3.250	9.11	6.250	5.47	9.25	2.85
0.333	2.24	3.333	9.11	6.333	5.47	9.33	2.85
0.417	2.32	3.417	11.83	6.417	5.18	9.42	2.78
0.500	2.32	3.500	11.83	6.500	5.18	9.50	2.78
0.583	2.42	3.583	17.56	6.583	4.92	9.58	2.72
0.667	2.42	3.667	17.56	6.667	4.92	9.67	2.72
0.750	2.52	3.750	39.89	6.750	4.69	9.75	2.66
0.833	2.52	3.833	39.89	6.833	4.69	9.83	2.66
0.917	2.62	3.917	163.17	6.917	4.48	9.92	2.60
1.000	2.62	4.000	163.18	7.000	4.48	10.00	2.60
1.083	2.75	4.083	51.71	7.083	4.29	10.08	2.54
1.167	2.75	4.167	51.70	7.167	4.29	10.17	2.54
1.250	2.88	4.250	28.13	7.250	4.12	10.25	2.49
1.333	2.88	4.333	28.13	7.333	4.12	10.33	2.49
1.417	3.03	4.417	19.74	7.417	3.96	10.42	2.44
1.500	3.03	4.500	19.74	7.500	3.96	10.50	2.44
1.583	3.20	4.583	15.41	7.583	3.82	10.58	2.39
1.667	3.20	4.667	15.41	7.667	3.82	10.67	2.39
1.750	3.40	4.750	12.75	7.750	3.69	10.75	2.35
1.833	3.40	4.833	12.75	7.833	3.69	10.83	2.35

1.917	3.63	4.917	10.94	7.917	3.57	10.92	2.31
2.000	3.63	5.000	10.94	8.000	3.57	11.00	2.31
2.083	3.89	5.083	9.62	8.083	3.46	11.08	2.26
2.167	3.89	5.167	9.62	8.167	3.46	11.17	2.26
2.250	4.20	5.250	8.62	8.250	3.35	11.25	2.22
2.333	4.20	5.333	8.62	8.333	3.35	11.33	2.22
2.417	4.58	5.417	7.83	8.417	3.25	11.42	2.19
2.500	4.58	5.500	7.83	8.500	3.25	11.50	2.19
2.583	5.04	5.583	7.18	8.583	3.16	11.58	2.15
2.667	5.04	5.667	7.18	8.667	3.16	11.67	2.15
2.750	5.63	5.750	6.65	8.750	3.08	11.75	2.11
2.833	5.63	5.833	6.65	8.833	3.08	11.83	2.11
2.917	6.41	5.917	6.20	8.917	3.00	11.92	2.08
3.000	6.41	6.000	6.20	9.000	3.00	12.00	2.08

Max.Eff.Inten.(mm/hr)=	163.18	73.55	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.67 (ii)	2.60 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.29	
			TOTALS
PEAK FLOW (cms)=	0.32	0.00	0.317 (iii)
TIME TO PEAK (hrs)=	4.00	4.00	4.00
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0013)	Area (ha)= 0.18
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	34.83	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.16	3.083	7.49	6.083	5.81	9.08	2.92
0.167	2.16	3.167	7.49	6.167	5.81	9.17	2.92
0.250	2.24	3.250	9.11	6.250	5.47	9.25	2.85
0.333	2.24	3.333	9.11	6.333	5.47	9.33	2.85
0.417	2.32	3.417	11.83	6.417	5.18	9.42	2.78
0.500	2.32	3.500	11.83	6.500	5.18	9.50	2.78
0.583	2.42	3.583	17.56	6.583	4.92	9.58	2.72
0.667	2.42	3.667	17.56	6.667	4.92	9.67	2.72
0.750	2.52	3.750	39.89	6.750	4.69	9.75	2.66
0.833	2.52	3.833	39.89	6.833	4.69	9.83	2.66
0.917	2.62	3.917	163.17	6.917	4.48	9.92	2.60
1.000	2.62	4.000	163.18	7.000	4.48	10.00	2.60
1.083	2.75	4.083	51.71	7.083	4.29	10.08	2.54
1.167	2.75	4.167	51.70	7.167	4.29	10.17	2.54
1.250	2.88	4.250	28.13	7.250	4.12	10.25	2.49
1.333	2.88	4.333	28.13	7.333	4.12	10.33	2.49
1.417	3.03	4.417	19.74	7.417	3.96	10.42	2.44
1.500	3.03	4.500	19.74	7.500	3.96	10.50	2.44
1.583	3.20	4.583	15.41	7.583	3.82	10.58	2.39
1.667	3.20	4.667	15.41	7.667	3.82	10.67	2.39
1.750	3.40	4.750	12.75	7.750	3.69	10.75	2.35
1.833	3.40	4.833	12.75	7.833	3.69	10.83	2.35

1.917	3.63	4.917	10.94	7.917	3.57	10.92	2.31
2.000	3.63	5.000	10.94	8.000	3.57	11.00	2.31
2.083	3.89	5.083	9.62	8.083	3.46	11.08	2.26
2.167	3.89	5.167	9.62	8.167	3.46	11.17	2.26
2.250	4.20	5.250	8.62	8.250	3.35	11.25	2.22
2.333	4.20	5.333	8.62	8.333	3.35	11.33	2.22
2.417	4.58	5.417	7.83	8.417	3.25	11.42	2.19
2.500	4.58	5.500	7.83	8.500	3.25	11.50	2.19
2.583	5.04	5.583	7.18	8.583	3.16	11.58	2.15
2.667	5.04	5.667	7.18	8.667	3.16	11.67	2.15
2.750	5.63	5.750	6.65	8.750	3.08	11.75	2.11
2.833	5.63	5.833	6.65	8.833	3.08	11.83	2.11
2.917	6.41	5.917	6.20	8.917	3.00	11.92	2.08
3.000	6.41	6.000	6.20	9.000	3.00	12.00	2.08

Max.Eff.Inten.(mm/hr)=	163.18	73.55	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.12 (ii)	2.04 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	
			TOTALS
PEAK FLOW (cms)=	0.08	0.00	0.082 (iii)
TIME TO PEAK (hrs)=	4.00	4.00	4.00
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0038)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	OUTFLOW (cms) STORAGE (ha.m.) | OUTFLOW (cms) STORAGE (ha.m.)
	0.0000 0.0000 | 0.0270 0.0073

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0013)	0.182	0.082	4.00	100.84
OUTFLOW: ID= 1 (0038)	0.182	0.023	4.17	100.48

PEAK FLOW REDUCTION [Qout/Qin](%)= 28.11
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0063

CALIB	
STANDHYD (0019)	Area (ha)= 0.10
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.34	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.16	3.083	7.49	6.083	5.81	9.08	2.92
0.167	2.16	3.167	7.49	6.167	5.81	9.17	2.92
0.250	2.24	3.250	9.11	6.250	5.47	9.25	2.85
0.333	2.24	3.333	9.11	6.333	5.47	9.33	2.85
0.417	2.32	3.417	11.83	6.417	5.18	9.42	2.78

0.500	2.32	3.500	11.83	6.500	5.18	9.50	2.78
0.583	2.42	3.583	17.56	6.583	4.92	9.58	2.72
0.667	2.42	3.667	17.56	6.667	4.92	9.67	2.72
0.750	2.52	3.750	39.89	6.750	4.69	9.75	2.66
0.833	2.52	3.833	39.89	6.833	4.69	9.83	2.66
0.917	2.62	3.917	163.17	6.917	4.48	9.92	2.60
1.000	2.62	4.000	163.18	7.000	4.48	10.00	2.60
1.083	2.75	4.083	51.71	7.083	4.29	10.08	2.54
1.167	2.75	4.167	51.70	7.167	4.29	10.17	2.54
1.250	2.88	4.250	28.13	7.250	4.12	10.25	2.49
1.333	2.88	4.333	28.13	7.333	4.12	10.33	2.49
1.417	3.03	4.417	19.74	7.417	3.96	10.42	2.44
1.500	3.03	4.500	19.74	7.500	3.96	10.50	2.44
1.583	3.20	4.583	15.41	7.583	3.82	10.58	2.39
1.667	3.20	4.667	15.41	7.667	3.82	10.67	2.39
1.750	3.40	4.750	12.75	7.750	3.69	10.75	2.35
1.833	3.40	4.833	12.75	7.833	3.69	10.83	2.35
1.917	3.63	4.917	10.94	7.917	3.57	10.92	2.31
2.000	3.63	5.000	10.94	8.000	3.57	11.00	2.31
2.083	3.89	5.083	9.62	8.083	3.46	11.08	2.26
2.167	3.89	5.167	9.62	8.167	3.46	11.17	2.26
2.250	4.20	5.250	8.62	8.250	3.35	11.25	2.22
2.333	4.20	5.333	8.62	8.333	3.35	11.33	2.22
2.417	4.58	5.417	7.83	8.417	3.25	11.42	2.19
2.500	4.58	5.500	7.83	8.500	3.25	11.50	2.19
2.583	5.04	5.583	7.18	8.583	3.16	11.58	2.15
2.667	5.04	5.667	7.18	8.667	3.16	11.67	2.15
2.750	5.63	5.750	6.65	8.750	3.08	11.75	2.11
2.833	5.63	5.833	6.65	8.833	3.08	11.83	2.11
2.917	6.41	5.917	6.20	8.917	3.00	11.92	2.08
3.000	6.41	6.000	6.20	9.000	3.00	12.00	2.08

Max.Eff.Inten.(mm/hr)=	163.18	73.55	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.92 (ii)	1.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.32	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.043 (iii)
TIME TO PEAK (hrs)=	4.00	4.00	4.00
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0037)	OVERFLOW IS OFF				
IN= 2---> OUT= 1					
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
	0.0000	0.0000	0.0150	0.0039	

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0019)	0.096	0.043	4.00	100.84
OUTFLOW: ID= 1 (0037)	0.096	0.013	4.17	100.22

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.00
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0033

ADD HYD (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	0.07	0.032	4.00	100.84
+ ID2= 2 (0036):	0.10	0.012	4.17	100.21
ID = 3 (0010):	0.17	0.041	4.00	100.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.17	0.041	4.00	100.48
+ ID2= 2 (0037):	0.10	0.013	4.17	100.22
ID = 1 (0010):	0.26	0.052	4.00	100.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	0.26	0.052	4.00	100.38
+ ID2= 2 (0038):	0.18	0.023	4.17	100.48
ID = 3 (0010):	0.44	0.071	4.00	100.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.44	0.071	4.00	100.42
+ ID2= 2 (0009):	0.71	0.317	4.00	100.84
ID = 1 (0010):	1.15	0.388	4.00	100.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0012)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1250	0.0360
	0.1240	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	1.149	0.388	4.00	100.68
OUTFLOW: ID= 1 (0012)	1.149	0.124	4.25	100.68

PEAK FLOW REDUCTION [Qout/Qin](%)= 32.06
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.0188

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      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I      SS   U   U  AAAAA  L
       V  V    I       SS  U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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CROZIER CONSULTING ENGINEERS

***** D E T A I L E D O U T P U T *****

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Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-b6f920a4c6d7\5c708030-d662-42ac-a88c-2ae7abaf7b1c\sce
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DATE: 03-05-2024 TIME: 10:59:19

USER:

COMMENTS: _____

****
** SIMULATION : 100yr 24hr 10min Chicago **
****

| CHICAGO STORM |
| Ptotal=121.12 mm |

IDF curve parameters: A=1281.340
B= 5.000
C= 0.761
used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.24	6.00	3.89	12.00	3.46	18.00	1.73
0.17	1.26	6.17	4.20	12.17	3.35	18.17	1.71
0.33	1.28	6.33	4.58	12.33	3.25	18.33	1.68
0.50	1.31	6.50	5.04	12.50	3.16	18.50	1.66
0.67	1.33	6.67	5.63	12.67	3.08	18.67	1.64
0.83	1.35	6.83	6.41	12.83	3.00	18.83	1.63
1.00	1.38	7.00	7.49	13.00	2.92	19.00	1.61
1.17	1.41	7.17	9.11	13.17	2.85	19.17	1.59
1.33	1.43	7.33	11.83	13.33	2.78	19.33	1.57
1.50	1.46	7.50	17.56	13.50	2.72	19.50	1.55
1.67	1.49	7.67	39.89	13.67	2.66	19.67	1.54
1.83	1.53	7.83	163.18	13.83	2.60	19.83	1.52
2.00	1.56	8.00	51.70	14.00	2.54	20.00	1.50
2.17	1.60	8.17	28.13	14.17	2.49	20.17	1.49
2.33	1.63	8.33	19.74	14.33	2.44	20.33	1.47
2.50	1.67	8.50	15.41	14.50	2.39	20.50	1.46
2.67	1.71	8.67	12.75	14.67	2.35	20.67	1.44
2.83	1.76	8.83	10.94	14.83	2.31	20.83	1.43
3.00	1.81	9.00	9.62	15.00	2.26	21.00	1.42
3.17	1.86	9.17	8.62	15.17	2.22	21.17	1.40
3.33	1.91	9.33	7.83	15.33	2.19	21.33	1.39
3.50	1.97	9.50	7.18	15.50	2.15	21.50	1.38
3.67	2.03	9.67	6.65	15.67	2.11	21.67	1.36
3.83	2.09	9.83	6.20	15.83	2.08	21.83	1.35
4.00	2.16	10.00	5.81	16.00	2.05	22.00	1.34
4.17	2.24	10.17	5.47	16.17	2.01	22.17	1.33
4.33	2.32	10.33	5.18	16.33	1.98	22.33	1.31
4.50	2.42	10.50	4.92	16.50	1.95	22.50	1.30
4.67	2.52	10.67	4.69	16.67	1.93	22.67	1.29
4.83	2.62	10.83	4.48	16.83	1.90	22.83	1.28
5.00	2.75	11.00	4.29	17.00	1.87	23.00	1.27
5.17	2.88	11.17	4.12	17.17	1.85	23.17	1.26
5.33	3.03	11.33	3.96	17.33	1.82	23.33	1.25
5.50	3.20	11.50	3.82	17.50	1.80	23.50	1.24
5.67	3.40	11.67	3.69	17.67	1.77	23.67	1.23
5.83	3.63	11.83	3.57	17.83	1.75	23.83	1.22

| CALIB |
| STANDHYD (0011) | Area (ha)= 0.07
| ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	21.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.24	6.083	3.89	12.083	3.46	18.08	1.73
0.167	1.24	6.167	3.89	12.167	3.46	18.17	1.73
0.250	1.26	6.250	4.20	12.250	3.35	18.25	1.71
0.333	1.26	6.333	4.20	12.333	3.35	18.33	1.71
0.417	1.28	6.417	4.58	12.417	3.25	18.42	1.68
0.500	1.28	6.500	4.58	12.500	3.25	18.50	1.68
0.583	1.31	6.583	5.04	12.583	3.16	18.58	1.66
0.667	1.31	6.667	5.04	12.667	3.16	18.67	1.66
0.750	1.33	6.750	5.63	12.750	3.08	18.75	1.64
0.833	1.33	6.833	5.63	12.833	3.08	18.83	1.64
0.917	1.35	6.917	6.41	12.917	3.00	18.92	1.63
1.000	1.35	7.000	6.41	13.000	3.00	19.00	1.63
1.083	1.38	7.083	7.49	13.083	2.92	19.08	1.61
1.167	1.38	7.167	7.49	13.167	2.92	19.17	1.61
1.250	1.41	7.250	9.11	13.250	2.85	19.25	1.59
1.333	1.41	7.333	9.11	13.333	2.85	19.33	1.59
1.417	1.43	7.417	11.83	13.417	2.78	19.42	1.57
1.500	1.43	7.500	11.83	13.500	2.78	19.50	1.57
1.583	1.46	7.583	17.56	13.583	2.72	19.58	1.55
1.667	1.46	7.667	17.56	13.667	2.72	19.67	1.55
1.750	1.49	7.750	39.89	13.750	2.66	19.75	1.54
1.833	1.49	7.833	39.90	13.833	2.66	19.83	1.54
1.917	1.53	7.917	163.18	13.917	2.60	19.92	1.52
2.000	1.53	8.000	163.17	14.000	2.60	20.00	1.52
2.083	1.56	8.083	51.70	14.083	2.54	20.08	1.50
2.167	1.56	8.167	51.70	14.167	2.54	20.17	1.50
2.250	1.60	8.250	28.13	14.250	2.49	20.25	1.49
2.333	1.60	8.333	28.13	14.333	2.49	20.33	1.49
2.417	1.63	8.417	19.74	14.417	2.44	20.42	1.47
2.500	1.63	8.500	19.74	14.500	2.44	20.50	1.47
2.583	1.67	8.583	15.41	14.583	2.39	20.58	1.46
2.667	1.67	8.667	15.41	14.667	2.39	20.67	1.46
2.750	1.71	8.750	12.75	14.750	2.35	20.75	1.44
2.833	1.71	8.833	12.75	14.833	2.35	20.83	1.44
2.917	1.76	8.917	10.94	14.917	2.31	20.92	1.43
3.000	1.76	9.000	10.94	15.000	2.31	21.00	1.43
3.083	1.81	9.083	9.62	15.083	2.26	21.08	1.42
3.167	1.81	9.167	9.62	15.167	2.26	21.17	1.42
3.250	1.86	9.250	8.62	15.250	2.22	21.25	1.40
3.333	1.86	9.333	8.62	15.333	2.22	21.33	1.40
3.417	1.91	9.417	7.83	15.417	2.19	21.42	1.39
3.500	1.91	9.500	7.83	15.500	2.19	21.50	1.39
3.583	1.97	9.583	7.18	15.583	2.15	21.58	1.38
3.667	1.97	9.667	7.18	15.667	2.15	21.67	1.38
3.750	2.03	9.750	6.65	15.750	2.11	21.75	1.36
3.833	2.03	9.833	6.65	15.833	2.11	21.83	1.36
3.917	2.09	9.917	6.20	15.917	2.08	21.92	1.35
4.000	2.09	10.000	6.20	16.000	2.08	22.00	1.35
4.083	2.16	10.083	5.81	16.083	2.05	22.08	1.34
4.167	2.16	10.167	5.81	16.167	2.05	22.17	1.34
4.250	2.24	10.250	5.47	16.250	2.01	22.25	1.33
4.333	2.24	10.333	5.47	16.333	2.01	22.33	1.33
4.417	2.32	10.417	5.18	16.417	1.98	22.42	1.31
4.500	2.32	10.500	5.18	16.500	1.98	22.50	1.31
4.583	2.42	10.583	4.92	16.583	1.95	22.58	1.30
4.667	2.42	10.667	4.92	16.667	1.95	22.67	1.30

4.750	2.52	10.750	4.69	16.750	1.93	22.75	1.29
4.833	2.52	10.833	4.69	16.833	1.93	22.83	1.29
4.917	2.62	10.917	4.48	16.917	1.90	22.92	1.28
5.000	2.62	11.000	4.48	17.000	1.90	23.00	1.28
5.083	2.75	11.083	4.29	17.083	1.87	23.08	1.27
5.167	2.75	11.167	4.29	17.167	1.87	23.17	1.27
5.250	2.88	11.250	4.12	17.250	1.85	23.25	1.26
5.333	2.88	11.333	4.12	17.333	1.85	23.33	1.26
5.417	3.03	11.417	3.96	17.417	1.82	23.42	1.25
5.500	3.03	11.500	3.96	17.500	1.82	23.50	1.25
5.583	3.20	11.583	3.82	17.583	1.80	23.58	1.24
5.667	3.20	11.667	3.82	17.667	1.80	23.67	1.24
5.750	3.40	11.750	3.69	17.750	1.77	23.75	1.23
5.833	3.40	11.833	3.69	17.833	1.77	23.83	1.23
5.917	3.63	11.917	3.57	17.917	1.75	23.92	1.22
6.000	3.63	12.000	3.57	18.000	1.75	24.00	1.22

Max.Eff.Inten.(mm/hr)=	163.18	81.19	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.84 (ii)	1.76 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.32	
			TOTALS
PEAK FLOW (cms)=	0.03	0.00	0.032 (iii)
TIME TO PEAK (hrs)=	8.00	8.00	8.00
RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0016)	Area (ha)= 0.10
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.09	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.21	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.24	6.083	3.89	12.083	3.46	18.08	1.73
0.167	1.24	6.167	3.89	12.167	3.46	18.17	1.73
0.250	1.26	6.250	4.20	12.250	3.35	18.25	1.71
0.333	1.26	6.333	4.20	12.333	3.35	18.33	1.71
0.417	1.28	6.417	4.58	12.417	3.25	18.42	1.68
0.500	1.28	6.500	4.58	12.500	3.25	18.50	1.68
0.583	1.31	6.583	5.04	12.583	3.16	18.58	1.66
0.667	1.31	6.667	5.04	12.667	3.16	18.67	1.66
0.750	1.33	6.750	5.63	12.750	3.08	18.75	1.64
0.833	1.33	6.833	5.63	12.833	3.08	18.83	1.64
0.917	1.35	6.917	6.41	12.917	3.00	18.92	1.63
1.000	1.35	7.000	6.41	13.000	3.00	19.00	1.63
1.083	1.38	7.083	7.49	13.083	2.92	19.08	1.61
1.167	1.38	7.167	7.49	13.167	2.92	19.17	1.61
1.250	1.41	7.250	9.11	13.250	2.85	19.25	1.59
1.333	1.41	7.333	9.11	13.333	2.85	19.33	1.59
1.417	1.43	7.417	11.83	13.417	2.78	19.42	1.57
1.500	1.43	7.500	11.83	13.500	2.78	19.50	1.57
1.583	1.46	7.583	17.56	13.583	2.72	19.58	1.55
1.667	1.46	7.667	17.56	13.667	2.72	19.67	1.55
1.750	1.49	7.750	39.89	13.750	2.66	19.75	1.54
1.833	1.49	7.833	39.90	13.833	2.66	19.83	1.54
1.917	1.53	7.917	163.18	13.917	2.60	19.92	1.52
2.000	1.53	8.000	163.17	14.000	2.60	20.00	1.52
2.083	1.56	8.083	51.70	14.083	2.54	20.08	1.50
2.167	1.56	8.167	51.70	14.167	2.54	20.17	1.50
2.250	1.60	8.250	28.13	14.250	2.49	20.25	1.49
2.333	1.60	8.333	28.13	14.333	2.49	20.33	1.49
2.417	1.63	8.417	19.74	14.417	2.44	20.42	1.47
2.500	1.63	8.500	19.74	14.500	2.44	20.50	1.47
2.583	1.67	8.583	15.41	14.583	2.39	20.58	1.46
2.667	1.67	8.667	15.41	14.667	2.39	20.67	1.46
2.750	1.71	8.750	12.75	14.750	2.35	20.75	1.44
2.833	1.71	8.833	12.75	14.833	2.35	20.83	1.44
2.917	1.76	8.917	10.94	14.917	2.31	20.92	1.43
3.000	1.76	9.000	10.94	15.000	2.31	21.00	1.43
3.083	1.81	9.083	9.62	15.083	2.26	21.08	1.42
3.167	1.81	9.167	9.62	15.167	2.26	21.17	1.42
3.250	1.86	9.250	8.62	15.250	2.22	21.25	1.40
3.333	1.86	9.333	8.62	15.333	2.22	21.33	1.40
3.417	1.91	9.417	7.83	15.417	2.19	21.42	1.39
3.500	1.91	9.500	7.83	15.500	2.19	21.50	1.39
3.583	1.97	9.583	7.18	15.583	2.15	21.58	1.38
3.667	1.97	9.667	7.18	15.667	2.15	21.67	1.38
3.750	2.03	9.750	6.65	15.750	2.11	21.75	1.36
3.833	2.03	9.833	6.65	15.833	2.11	21.83	1.36
3.917	2.09	9.917	6.20	15.917	2.08	21.92	1.35
4.000	2.09	10.000	6.20	16.000	2.08	22.00	1.35
4.083	2.16	10.083	5.81	16.083	2.05	22.08	1.34
4.167	2.16	10.167	5.81	16.167	2.05	22.17	1.34
4.250	2.24	10.250	5.47	16.250	2.01	22.25	1.33
4.333	2.24	10.333	5.47	16.333	2.01	22.33	1.33
4.417	2.32	10.417	5.18	16.417	1.98	22.42	1.31
4.500	2.32	10.500	5.18	16.500	1.98	22.50	1.31
4.583	2.42	10.583	4.92	16.583	1.95	22.58	1.30
4.667	2.42	10.667	4.92	16.667	1.95	22.67	1.30
4.750	2.52	10.750	4.69	16.750	1.93	22.75	1.29
4.833	2.52	10.833	4.69	16.833	1.93	22.83	1.29
4.917	2.62	10.917	4.48	16.917	1.90	22.92	1.28
5.000	2.62	11.000	4.48	17.000	1.90	23.00	1.28
5.083	2.75	11.083	4.29	17.083	1.87	23.08	1.27
5.167	2.75	11.167	4.29	17.167	1.87	23.17	1.27
5.250	2.88	11.250	4.12	17.250	1.85	23.25	1.26
5.333	2.88	11.333	4.12	17.333	1.85	23.33	1.26
5.417	3.03	11.417	3.96	17.417	1.82	23.42	1.25
5.500	3.03	11.500	3.96	17.500	1.82	23.50	1.25
5.583	3.20	11.583	3.82	17.583	1.80	23.58	1.24
5.667	3.20	11.667	3.82	17.667	1.80	23.67	1.24
5.750	3.40	11.750	3.69	17.750	1.77	23.75	1.23
5.833	3.40	11.833	3.69	17.833	1.77	23.83	1.23
5.917	3.63	11.917	3.57	17.917	1.75	23.92	1.22
6.000	3.63	12.000	3.57	18.000	1.75	24.00	1.22

Max.Eff.Inten.(mm/hr)=	163.18	81.19	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.92 (ii)	1.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.32	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.043 (iii)
TIME TO PEAK (hrs)=	8.00	8.00	8.00
RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0036)	OVERFLOW IS OFF

| IN= 2---> OUT= 1 |
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0140	0.0038

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0016)	0.095	0.043	8.00	119.56
OUTFLOW: ID= 1 (0036)	0.095	0.012	8.17	118.87

PEAK FLOW REDUCTION [Qout/Qin](%)= 27.96
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0033

CALIB	STANDHYD (0009)	ID= 1 DT= 5.0 min	Area (ha)= 0.71	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.24	6.083	3.89	12.083	3.46	18.08	1.73
0.167	1.24	6.167	3.89	12.167	3.46	18.17	1.73
0.250	1.26	6.250	4.20	12.250	3.35	18.25	1.71
0.333	1.26	6.333	4.20	12.333	3.35	18.33	1.71
0.417	1.28	6.417	4.58	12.417	3.25	18.42	1.68
0.500	1.28	6.500	4.58	12.500	3.25	18.50	1.68
0.583	1.31	6.583	5.04	12.583	3.16	18.58	1.66
0.667	1.31	6.667	5.04	12.667	3.16	18.67	1.66
0.750	1.33	6.750	5.63	12.750	3.08	18.75	1.64
0.833	1.33	6.833	5.63	12.833	3.08	18.83	1.64
0.917	1.35	6.917	6.41	12.917	3.00	18.92	1.63
1.000	1.35	7.000	6.41	13.000	3.00	19.00	1.63
1.083	1.38	7.083	7.49	13.083	2.92	19.08	1.61
1.167	1.38	7.167	7.49	13.167	2.92	19.17	1.61
1.250	1.41	7.250	9.11	13.250	2.85	19.25	1.59
1.333	1.41	7.333	9.11	13.333	2.85	19.33	1.59
1.417	1.43	7.417	11.83	13.417	2.78	19.42	1.57
1.500	1.43	7.500	11.83	13.500	2.78	19.50	1.57
1.583	1.46	7.583	17.56	13.583	2.72	19.58	1.55
1.667	1.46	7.667	17.56	13.667	2.72	19.67	1.55
1.750	1.49	7.750	39.89	13.750	2.66	19.75	1.54
1.833	1.49	7.833	39.90	13.833	2.66	19.83	1.54
1.917	1.53	7.917	163.18	13.917	2.60	19.92	1.52
2.000	1.53	8.000	163.17	14.000	2.60	20.00	1.52
2.083	1.56	8.083	51.70	14.083	2.54	20.08	1.50
2.167	1.56	8.167	51.70	14.167	2.54	20.17	1.50
2.250	1.60	8.250	28.13	14.250	2.49	20.25	1.49
2.333	1.60	8.333	28.13	14.333	2.49	20.33	1.49
2.417	1.63	8.417	19.74	14.417	2.44	20.42	1.47
2.500	1.63	8.500	19.74	14.500	2.44	20.50	1.47
2.583	1.67	8.583	15.41	14.583	2.39	20.58	1.46
2.667	1.67	8.667	15.41	14.667	2.39	20.67	1.46
2.750	1.71	8.750	12.75	14.750	2.35	20.75	1.44
2.833	1.71	8.833	12.75	14.833	2.35	20.83	1.44
2.917	1.76	8.917	10.94	14.917	2.31	20.92	1.43
3.000	1.76	9.000	10.94	15.000	2.31	21.00	1.43
3.083	1.81	9.083	9.62	15.083	2.26	21.08	1.42
3.167	1.81	9.167	9.62	15.167	2.26	21.17	1.42
3.250	1.86	9.250	8.62	15.250	2.22	21.25	1.40
3.333	1.86	9.333	8.62	15.333	2.22	21.33	1.40
3.417	1.91	9.417	7.83	15.417	2.19	21.42	1.39
3.500	1.91	9.500	7.83	15.500	2.19	21.50	1.39
3.583	1.97	9.583	7.18	15.583	2.15	21.58	1.38
3.667	1.97	9.667	7.18	15.667	2.15	21.67	1.38
3.750	2.03	9.750	6.65	15.750	2.11	21.75	1.36
3.833	2.03	9.833	6.65	15.833	2.11	21.83	1.36
3.917	2.09	9.917	6.20	15.917	2.08	21.92	1.35
4.000	2.09	10.000	6.20	16.000	2.08	22.00	1.35
4.083	2.16	10.083	5.81	16.083	2.05	22.08	1.34
4.167	2.16	10.167	5.81	16.167	2.05	22.17	1.34
4.250	2.24	10.250	5.47	16.250	2.01	22.25	1.33
4.333	2.24	10.333	5.47	16.333	2.01	22.33	1.33
4.417	2.32	10.417	5.18	16.417	1.98	22.42	1.31
4.500	2.32	10.500	5.18	16.500	1.98	22.50	1.31
4.583	2.42	10.583	4.92	16.583	1.95	22.58	1.30
4.667	2.42	10.667	4.92	16.667	1.95	22.67	1.30
4.750	2.52	10.750	4.69	16.750	1.93	22.75	1.29
4.833	2.52	10.833	4.69	16.833	1.93	22.83	1.29
4.917	2.62	10.917	4.48	16.917	1.90	22.92	1.28
5.000	2.62	11.000	4.48	17.000	1.90	23.00	1.28
5.083	2.75	11.083	4.29	17.083	1.87	23.08	1.27
5.167	2.75	11.167	4.29	17.167	1.87	23.17	1.27
5.250	2.88	11.250	4.12	17.250	1.85	23.25	1.26
5.333	2.88	11.333	4.12	17.333	1.85	23.33	1.26
5.417	3.03	11.417	3.96	17.417	1.82	23.42	1.25
5.500	3.03	11.500	3.96	17.500	1.82	23.50	1.25
5.583	3.20	11.583	3.82	17.583	1.80	23.58	1.24
5.667	3.20	11.667	3.82	17.667	1.80	23.67	1.24
5.750	3.40	11.750	3.69	17.750	1.77	23.75	1.23
5.833	3.40	11.833	3.69	17.833	1.77	23.83	1.23
5.917	3.63	11.917	3.57	17.917	1.75	23.92	1.22
6.000	3.63	12.000	3.57	18.000	1.75	24.00	1.22

				TOTALS
Max.Eff.Inten.(mm/hr)=		163.18	81.19	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.67 (ii)	2.60 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.32	0.29	
PEAK FLOW	(cms)=	0.32	0.00	0.318 (iii)
TIME TO PEAK	(hrs)=	8.00	8.00	8.00
RUNOFF VOLUME	(mm)=	120.12	64.06	119.56
TOTAL RAINFALL	(mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT	=	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0013)	ID= 1 DT= 5.0 min	Area (ha)= 0.18	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	34.83	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.24	6.083	3.89	12.083	3.46	18.08	1.73
0.167	1.24	6.167	3.89	12.167	3.46	18.17	1.73
0.250	1.26	6.250	4.20	12.250	3.35	18.25	1.71
0.333	1.26	6.333	4.20	12.333	3.35	18.33	1.71
0.417	1.28	6.417	4.58	12.417	3.25	18.42	1.68
0.500	1.28	6.500	4.58	12.500	3.25	18.50	1.68
0.583	1.31	6.583	5.04	12.583	3.16	18.58	1.66

0.667	1.31	6.667	5.04	12.667	3.16	18.67	1.66
0.750	1.33	6.750	5.63	12.750	3.08	18.75	1.64
0.833	1.33	6.833	5.63	12.833	3.08	18.83	1.64
0.917	1.35	6.917	6.41	12.917	3.00	18.92	1.63
1.000	1.35	7.000	6.41	13.000	3.00	19.00	1.63
1.083	1.38	7.083	7.49	13.083	2.92	19.08	1.61
1.167	1.38	7.167	7.49	13.167	2.92	19.17	1.61
1.250	1.41	7.250	9.11	13.250	2.85	19.25	1.59
1.333	1.41	7.333	9.11	13.333	2.85	19.33	1.59
1.417	1.43	7.417	11.83	13.417	2.78	19.42	1.57
1.500	1.43	7.500	11.83	13.500	2.78	19.50	1.57
1.583	1.46	7.583	17.56	13.583	2.72	19.58	1.55
1.667	1.46	7.667	17.56	13.667	2.72	19.67	1.55
1.750	1.49	7.750	39.89	13.750	2.66	19.75	1.54
1.833	1.49	7.833	39.90	13.833	2.66	19.83	1.54
1.917	1.53	7.917	163.18	13.917	2.60	19.92	1.52
2.000	1.53	8.000	163.17	14.000	2.60	20.00	1.52
2.083	1.56	8.083	51.70	14.083	2.54	20.08	1.50
2.167	1.56	8.167	51.70	14.167	2.54	20.17	1.50
2.250	1.60	8.250	28.13	14.250	2.49	20.25	1.49
2.333	1.60	8.333	28.13	14.333	2.49	20.33	1.49
2.417	1.63	8.417	19.74	14.417	2.44	20.42	1.47
2.500	1.63	8.500	19.74	14.500	2.44	20.50	1.47
2.583	1.67	8.583	15.41	14.583	2.39	20.58	1.46
2.667	1.67	8.667	15.41	14.667	2.39	20.67	1.46
2.750	1.71	8.750	12.75	14.750	2.35	20.75	1.44
2.833	1.71	8.833	12.75	14.833	2.35	20.83	1.44
2.917	1.76	8.917	10.94	14.917	2.31	20.92	1.43
3.000	1.76	9.000	10.94	15.000	2.31	21.00	1.43
3.083	1.81	9.083	9.62	15.083	2.26	21.08	1.42
3.167	1.81	9.167	9.62	15.167	2.26	21.17	1.42
3.250	1.86	9.250	8.62	15.250	2.22	21.25	1.40
3.333	1.86	9.333	8.62	15.333	2.22	21.33	1.40
3.417	1.91	9.417	7.83	15.417	2.19	21.42	1.39
3.500	1.91	9.500	7.83	15.500	2.19	21.50	1.39
3.583	1.97	9.583	7.18	15.583	2.15	21.58	1.38
3.667	1.97	9.667	7.18	15.667	2.15	21.67	1.38
3.750	2.03	9.750	6.65	15.750	2.11	21.75	1.36
3.833	2.03	9.833	6.65	15.833	2.11	21.83	1.36
3.917	2.09	9.917	6.20	15.917	2.08	21.92	1.35
4.000	2.09	10.000	6.20	16.000	2.08	22.00	1.35
4.083	2.16	10.083	5.81	16.083	2.05	22.08	1.34
4.167	2.16	10.167	5.81	16.167	2.05	22.17	1.34
4.250	2.24	10.250	5.47	16.250	2.01	22.25	1.33
4.333	2.24	10.333	5.47	16.333	2.01	22.33	1.33
4.417	2.32	10.417	5.18	16.417	1.98	22.42	1.31
4.500	2.32	10.500	5.18	16.500	1.98	22.50	1.31
4.583	2.42	10.583	4.92	16.583	1.95	22.58	1.30
4.667	2.42	10.667	4.92	16.667	1.95	22.67	1.30
4.750	2.52	10.750	4.69	16.750	1.93	22.75	1.29
4.833	2.52	10.833	4.69	16.833	1.93	22.83	1.29
4.917	2.62	10.917	4.48	16.917	1.90	22.92	1.28
5.000	2.62	11.000	4.48	17.000	1.90	23.00	1.28
5.083	2.75	11.083	4.29	17.083	1.87	23.08	1.27
5.167	2.75	11.167	4.29	17.167	1.87	23.17	1.27
5.250	2.88	11.250	4.12	17.250	1.85	23.25	1.26
5.333	2.88	11.333	4.12	17.333	1.85	23.33	1.26
5.417	3.03	11.417	3.96	17.417	1.82	23.42	1.25
5.500	3.03	11.500	3.96	17.500	1.82	23.50	1.25
5.583	3.20	11.583	3.82	17.583	1.80	23.58	1.24
5.667	3.20	11.667	3.82	17.667	1.80	23.67	1.24
5.750	3.40	11.750	3.69	17.750	1.77	23.75	1.23
5.833	3.40	11.833	3.69	17.833	1.77	23.83	1.23
5.917	3.63	11.917	3.57	17.917	1.75	23.92	1.22
6.000	3.63	12.000	3.57	18.000	1.75	24.00	1.22

Max.Eff.Inten.(mm/hr)=	163.18	81.19		
over (min)	5.00	5.00		
Storage Coeff. (min)=	1.12 (ii)	2.04 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.34	0.31		
			TOTALS	
PEAK FLOW (cms)=	0.08	0.00	0.082 (iii)	
TIME TO PEAK (hrs)=	8.00	8.00	8.00	
RUNOFF VOLUME (mm)=	120.12	64.06	119.56	
TOTAL RAINFALL (mm)=	121.12	121.12	121.12	

RUNOFF COEFFICIENT = 0.99 0.53 0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0038)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0270	0.0073

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0013)	0.182	0.082	8.00	119.56
OUTFLOW: ID= 1 (0038)	0.182	0.023	8.17	119.21

PEAK FLOW REDUCTION [Qout/Qin](%)= 28.13
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0063

CALIB			
STANDHYD (0019)	Area (ha)= 0.10		
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.34	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.24	6.083	3.89	12.083	3.46	18.08	1.73
0.167	1.24	6.167	3.89	12.167	3.46	18.17	1.73
0.250	1.26	6.250	4.20	12.250	3.35	18.25	1.71
0.333	1.26	6.333	4.20	12.333	3.35	18.33	1.71
0.417	1.28	6.417	4.58	12.417	3.25	18.42	1.68
0.500	1.28	6.500	4.58	12.500	3.25	18.50	1.68
0.583	1.31	6.583	5.04	12.583	3.16	18.58	1.66
0.667	1.31	6.667	5.04	12.667	3.16	18.67	1.66
0.750	1.33	6.750	5.63	12.750	3.08	18.75	1.64
0.833	1.33	6.833	5.63	12.833	3.08	18.83	1.64
0.917	1.35	6.917	6.41	12.917	3.00	18.92	1.63
1.000	1.35	7.000	6.41	13.000	3.00	19.00	1.63
1.083	1.38	7.083	7.49	13.083	2.92	19.08	1.61
1.167	1.38	7.167	7.49	13.167	2.92	19.17	1.61
1.250	1.41	7.250	9.11	13.250	2.85	19.25	1.59
1.333	1.41	7.333	9.11	13.333	2.85	19.33	1.59
1.417	1.43	7.417	11.83	13.417	2.78	19.42	1.57
1.500	1.43	7.500	11.83	13.500	2.78	19.50	1.57
1.583	1.46	7.583	17.56	13.583	2.72	19.58	1.55
1.667	1.46	7.667	17.56	13.667	2.72	19.67	1.55
1.750	1.49	7.750	39.89	13.750	2.66	19.75	1.54
1.833	1.49	7.833	39.90	13.833	2.66	19.83	1.54
1.917	1.53	7.917	163.18	13.917	2.60	19.92	1.52
2.000	1.53	8.000	163.17	14.000	2.60	20.00	1.52
2.083	1.56	8.083	51.70	14.083	2.54	20.08	1.50
2.167	1.56	8.167	51.70	14.167	2.54	20.17	1.50
2.250	1.60	8.250	28.13	14.250	2.49	20.25	1.49
2.333	1.60	8.333	28.13	14.333	2.49	20.33	1.49
2.417	1.63	8.417	19.74	14.417	2.44	20.42	1.47
2.500	1.63	8.500	19.74	14.500	2.44	20.50	1.47

2.583	1.67	8.583	15.41	14.583	2.39	20.58	1.46
2.667	1.67	8.667	15.41	14.667	2.39	20.67	1.46
2.750	1.71	8.750	12.75	14.750	2.35	20.75	1.44
2.833	1.71	8.833	12.75	14.833	2.35	20.83	1.44
2.917	1.76	8.917	10.94	14.917	2.31	20.92	1.43
3.000	1.76	9.000	10.94	15.000	2.31	21.00	1.43
3.083	1.81	9.083	9.62	15.083	2.26	21.08	1.42
3.167	1.81	9.167	9.62	15.167	2.26	21.17	1.42
3.250	1.86	9.250	8.62	15.250	2.22	21.25	1.40
3.333	1.86	9.333	8.62	15.333	2.22	21.33	1.40
3.417	1.91	9.417	7.83	15.417	2.19	21.42	1.39
3.500	1.91	9.500	7.83	15.500	2.19	21.50	1.39
3.583	1.97	9.583	7.18	15.583	2.15	21.58	1.38
3.667	1.97	9.667	7.18	15.667	2.15	21.67	1.38
3.750	2.03	9.750	6.65	15.750	2.11	21.75	1.36
3.833	2.03	9.833	6.65	15.833	2.11	21.83	1.36
3.917	2.09	9.917	6.20	15.917	2.08	21.92	1.35
4.000	2.09	10.000	6.20	16.000	2.08	22.00	1.35
4.083	2.16	10.083	5.81	16.083	2.05	22.08	1.34
4.167	2.16	10.167	5.81	16.167	2.05	22.17	1.34
4.250	2.24	10.250	5.47	16.250	2.01	22.25	1.33
4.333	2.24	10.333	5.47	16.333	2.01	22.33	1.33
4.417	2.32	10.417	5.18	16.417	1.98	22.42	1.31
4.500	2.32	10.500	5.18	16.500	1.98	22.50	1.31
4.583	2.42	10.583	4.92	16.583	1.95	22.58	1.30
4.667	2.42	10.667	4.92	16.667	1.95	22.67	1.30
4.750	2.52	10.750	4.69	16.750	1.93	22.75	1.29
4.833	2.52	10.833	4.69	16.833	1.93	22.83	1.29
4.917	2.62	10.917	4.48	16.917	1.90	22.92	1.28
5.000	2.62	11.000	4.48	17.000	1.90	23.00	1.28
5.083	2.75	11.083	4.29	17.083	1.87	23.08	1.27
5.167	2.75	11.167	4.29	17.167	1.87	23.17	1.27
5.250	2.88	11.250	4.12	17.250	1.85	23.25	1.26
5.333	2.88	11.333	4.12	17.333	1.85	23.33	1.26
5.417	3.03	11.417	3.96	17.417	1.82	23.42	1.25
5.500	3.03	11.500	3.96	17.500	1.82	23.50	1.25
5.583	3.20	11.583	3.82	17.583	1.80	23.58	1.24
5.667	3.20	11.667	3.82	17.667	1.80	23.67	1.24
5.750	3.40	11.750	3.69	17.750	1.77	23.75	1.23
5.833	3.40	11.833	3.69	17.833	1.77	23.83	1.23
5.917	3.63	11.917	3.57	17.917	1.75	23.92	1.22
6.000	3.63	12.000	3.57	18.000	1.75	24.00	1.22

Max.Eff.Inten.(mm/hr)=	163.18	81.19	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.92 (ii)	1.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.32	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.043 (iii)
TIME TO PEAK (hrs)=	8.00	8.00	8.00
RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0037)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0150	0.0039

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0019)	0.096	0.043	8.00	119.56
OUTFLOW: ID= 1 (0037)	0.096	0.013	8.17	118.93

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.01
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0033

ADD HYD (0010)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0011):	0.07	0.032	8.00	119.56
	+ ID2= 2 (0036):	0.10	0.012	8.17	118.87
	ID = 3 (0010):	0.17	0.041	8.00	119.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1	ID1= 3 (0010):	0.17	0.041	8.00	119.16
	+ ID2= 2 (0037):	0.10	0.013	8.17	118.93
	ID = 1 (0010):	0.26	0.052	8.00	119.08

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0010):	0.26	0.052	8.00	119.08
	+ ID2= 2 (0038):	0.18	0.023	8.17	119.21
	ID = 3 (0010):	0.44	0.071	8.00	119.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1	ID1= 3 (0010):	0.44	0.071	8.00	119.13
	+ ID2= 2 (0009):	0.71	0.318	8.00	119.56
	ID = 1 (0010):	1.15	0.388	8.00	119.39

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0012)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1250	0.0360
	0.1240	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	1.149	0.388	8.00	119.39
OUTFLOW: ID= 1 (0012)	1.149	0.124	8.25	119.39

PEAK FLOW REDUCTION [Qout/Qin](%)= 32.05
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.0189

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L

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       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-
b6f920a4c6d7\c832cd96-d403-4336-80b7-b4ef8755e67c\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-
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DATE: 03-05-2024                          TIME: 10:59:20

USER:


COMMENTS: _____

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  ************************************************
  ** SIMULATION : 100yr 6hr 10min SCS Type II ( **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e70a9db-deb7-462b-ac52-a15dfa699d36\b2b0f662
| Ptotal= 86.28 mm |    Comments: 100yr 6hr 10min SCS Type II (MTO)
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  1.67    8.63 |  3.33   18.98 |  5.00    5.18
                0.17    3.45 |  1.83    8.63 |  3.50   18.98 |  5.17    3.45
                0.33    3.45 |  2.00    8.63 |  3.67    8.63 |  5.33    3.45
                0.50    3.45 |  2.17   10.35 |  3.83    8.63 |  5.50    3.45
                0.67    5.18 |  2.33   10.35 |  4.00    8.63 |  5.67    3.45
                0.83    5.18 |  2.50   10.35 |  4.17    6.90 |  5.83    3.45
                1.00    5.18 |  2.67   51.77 |  4.33    6.90 |  6.00    3.45
                1.17    5.18 |  2.83   93.18 |  4.50    6.90 |
                1.33    5.18 |  3.00  134.60 |  4.67    5.18 |
                1.50    5.18 |  3.17   18.98 |  4.83    5.18 |

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| CALIB            |
| STANDHYD (  0011)|   Area     (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    5.18 | 3.250   18.98 |  4.83    5.18
               0.167    0.00 | 1.750    8.63 | 3.333   18.98 |  4.92    5.18
               0.250    3.45 | 1.833    8.63 | 3.417   18.98 |  5.00    5.18
               0.333    3.45 | 1.917    8.63 | 3.500   18.98 |  5.08    5.18
               0.417    3.45 | 2.000    8.63 | 3.583   18.98 |  5.17    5.18
               0.500    3.45 | 2.083    8.63 | 3.667   18.98 |  5.25    3.45
               0.583    3.45 | 2.167    8.63 | 3.750    8.63 |  5.33    3.45
               0.667    3.45 | 2.250   10.35 | 3.833    8.63 |  5.42    3.45
               0.750    5.18 | 2.333   10.35 | 3.917    8.63 |  5.50    3.45
               0.833    5.18 | 2.417   10.35 | 4.000    8.63 |  5.58    3.45
               0.917    5.18 | 2.500   10.35 | 4.083    8.63 |  5.67    3.45
               1.000    5.18 | 2.583   10.35 | 4.167    8.63 |  5.75    3.45
               1.083    5.18 | 2.667   10.35 | 4.250    6.90 |  5.83    3.45
               1.167    5.18 | 2.750   51.77 | 4.333    6.90 |  5.92    3.45
               1.250    5.18 | 2.833   51.77 | 4.417    6.90 |  6.00    3.45
               1.333    5.18 | 2.917   93.18 | 4.500    6.90 |  6.08    3.45
               1.417    5.18 | 3.000   93.18 | 4.583    6.90 |  6.17    3.45
               1.500    5.18 | 3.083  134.60 | 4.667    6.90 |
               1.583    5.18 | 3.167  134.60 | 4.750    5.18 |

     Max.Eff.Inten.(mm/hr)=     134.60        73.20
               over (min)          5.00         5.00
     Storage Coeff.  (min)=        0.90 (ii)    1.90 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.34         0.32
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.03         0.00      0.026 (iii)
     TIME TO PEAK    (hrs)=        3.17         3.17       3.17
     RUNOFF VOLUME    (mm)=       85.28        38.13      84.81
     TOTAL RAINFALL   (mm)=       86.28        86.28      86.28
     RUNOFF COEFFICIENT   =        0.99         0.44       0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0016)|   Area     (ha)=   0.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.09         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      25.21        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    5.18 | 3.250   18.98 |  4.83    5.18
               0.167    0.00 | 1.750    8.63 | 3.333   18.98 |  4.92    5.18
               0.250    3.45 | 1.833    8.63 | 3.417   18.98 |  5.00    5.18
               0.333    3.45 | 1.917    8.63 | 3.500   18.98 |  5.08    5.18
               0.417    3.45 | 2.000    8.63 | 3.583   18.98 |  5.17    5.18
               0.500    3.45 | 2.083    8.63 | 3.667   18.98 |  5.25    3.45
               0.583    3.45 | 2.167    8.63 | 3.750    8.63 |  5.33    3.45
               0.667    3.45 | 2.250   10.35 | 3.833    8.63 |  5.42    3.45
               0.750    5.18 | 2.333   10.35 | 3.917    8.63 |  5.50    3.45
               0.833    5.18 | 2.417   10.35 | 4.000    8.63 |  5.58    3.45
               0.917    5.18 | 2.500   10.35 | 4.083    8.63 |  5.67    3.45
               1.000    5.18 | 2.583   10.35 | 4.167    8.63 |  5.75    3.45
               1.083    5.18 | 2.667   10.35 | 4.250    6.90 |  5.83    3.45
               1.167    5.18 | 2.750   51.77 | 4.333    6.90 |  5.92    3.45
               1.250    5.18 | 2.833   51.77 | 4.417    6.90 |  6.00    3.45
```

1.333	5.18	2.917	93.18	4.500	6.90	6.08	3.45
1.417	5.18	3.000	93.18	4.583	6.90	6.17	3.45
1.500	5.18	3.083	134.60	4.667	6.90		
1.583	5.18	3.167	134.60	4.750	5.18		

Max.Eff.Inten.(mm/hr)=	134.60	73.20	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.99 (ii)	1.99 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.035 (iii)
TIME TO PEAK (hrs)=	3.17	3.17	3.17
RUNOFF VOLUME (mm)=	85.28	38.13	84.81
TOTAL RAINFALL (mm)=	86.28	86.28	86.28
RUNOFF COEFFICIENT =	0.99	0.44	0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0036)	OVERFLOW IS OFF	
IN= 2---> OUT= 1		
DT= 5.0 min	OUTFLOW	STORAGE
	(cms)	(ha.m.)
	0.0000	0.0000
	OUTFLOW	STORAGE
	(cms)	(ha.m.)
	0.0140	0.0038

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0016)	0.095	0.035	3.17	84.81
OUTFLOW: ID= 1 (0036)	0.095	0.013	3.25	84.13

PEAK FLOW REDUCTION [Qout/Qin](%)= 37.50
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0037

CALIB		
STANDHYD (0009)	Area (ha)=	0.71
ID= 1 DT= 5.0 min	Total Imp(%)=	99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.18	3.250	18.98	4.83	5.18
0.167	0.00	1.750	8.63	3.333	18.98	4.92	5.18
0.250	3.45	1.833	8.63	3.417	18.98	5.00	5.18
0.333	3.45	1.917	8.63	3.500	18.98	5.08	5.18
0.417	3.45	2.000	8.63	3.583	18.98	5.17	5.18
0.500	3.45	2.083	8.63	3.667	18.98	5.25	3.45
0.583	3.45	2.167	8.63	3.750	8.63	5.33	3.45
0.667	3.45	2.250	10.35	3.833	8.63	5.42	3.45
0.750	5.18	2.333	10.35	3.917	8.63	5.50	3.45
0.833	5.18	2.417	10.35	4.000	8.63	5.58	3.45
0.917	5.18	2.500	10.35	4.083	8.63	5.67	3.45
1.000	5.18	2.583	10.35	4.167	8.63	5.75	3.45
1.083	5.18	2.667	10.35	4.250	6.90	5.83	3.45
1.167	5.18	2.750	51.77	4.333	6.90	5.92	3.45
1.250	5.18	2.833	51.77	4.417	6.90	6.00	3.45

1.333	5.18	2.917	93.18	4.500	6.90	6.08	3.45
1.417	5.18	3.000	93.18	4.583	6.90	6.17	3.45
1.500	5.18	3.083	134.60	4.667	6.90		
1.583	5.18	3.167	134.60	4.750	5.18		

Max.Eff.Inten.(mm/hr)=	134.60	73.20	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.81 (ii)	2.81 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.28	
			TOTALS
PEAK FLOW (cms)=	0.26	0.00	0.262 (iii)
TIME TO PEAK (hrs)=	3.17	3.17	3.17
RUNOFF VOLUME (mm)=	85.28	38.13	84.81
TOTAL RAINFALL (mm)=	86.28	86.28	86.28
RUNOFF COEFFICIENT =	0.99	0.44	0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (0013)	Area (ha)=	0.18
ID= 1 DT= 5.0 min	Total Imp(%)=	99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	34.83	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	5.18	3.250	18.98	4.83	5.18
0.167	0.00	1.750	8.63	3.333	18.98	4.92	5.18
0.250	3.45	1.833	8.63	3.417	18.98	5.00	5.18
0.333	3.45	1.917	8.63	3.500	18.98	5.08	5.18
0.417	3.45	2.000	8.63	3.583	18.98	5.17	5.18
0.500	3.45	2.083	8.63	3.667	18.98	5.25	3.45
0.583	3.45	2.167	8.63	3.750	8.63	5.33	3.45
0.667	3.45	2.250	10.35	3.833	8.63	5.42	3.45
0.750	5.18	2.333	10.35	3.917	8.63	5.50	3.45
0.833	5.18	2.417	10.35	4.000	8.63	5.58	3.45
0.917	5.18	2.500	10.35	4.083	8.63	5.67	3.45
1.000	5.18	2.583	10.35	4.167	8.63	5.75	3.45
1.083	5.18	2.667	10.35	4.250	6.90	5.83	3.45
1.167	5.18	2.750	51.77	4.333	6.90	5.92	3.45
1.250	5.18	2.833	51.77	4.417	6.90	6.00	3.45
1.333	5.18	2.917	93.18	4.500	6.90	6.08	3.45
1.417	5.18	3.000	93.18	4.583	6.90	6.17	3.45
1.500	5.18	3.083	134.60	4.667	6.90		
1.583	5.18	3.167	134.60	4.750	5.18		

Max.Eff.Inten.(mm/hr)=	134.60	73.20	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.20 (ii)	2.20 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.30	
			TOTALS
PEAK FLOW (cms)=	0.07	0.00	0.068 (iii)
TIME TO PEAK (hrs)=	3.17	3.17	3.17
RUNOFF VOLUME (mm)=	85.28	38.13	84.80
TOTAL RAINFALL (mm)=	86.28	86.28	86.28
RUNOFF COEFFICIENT =	0.99	0.44	0.98

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0038)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0270     0.0073

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0013)    0.182     0.068      3.17      84.80
   OUTFLOW: ID= 1 (  0038)    0.182     0.026      3.25      84.47

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.70
                  TIME SHIFT OF PEAK FLOW          (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0071

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   0.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.10         0.00
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     25.34        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667    5.18 | 3.250   18.98 |  4.83    5.18
               0.167    0.00 | 1.750    8.63 | 3.333   18.98 |  4.92    5.18
               0.250    3.45 | 1.833    8.63 | 3.417   18.98 |  5.00    5.18
               0.333    3.45 | 1.917    8.63 | 3.500   18.98 |  5.08    5.18
               0.417    3.45 | 2.000    8.63 | 3.583   18.98 |  5.17    5.18
               0.500    3.45 | 2.083    8.63 | 3.667   18.98 |  5.25    3.45
               0.583    3.45 | 2.167    8.63 | 3.750    8.63 |  5.33    3.45
               0.667    3.45 | 2.250   10.35 | 3.833    8.63 |  5.42    3.45
               0.750    5.18 | 2.333   10.35 | 3.917    8.63 |  5.50    3.45
               0.833    5.18 | 2.417   10.35 | 4.000    8.63 |  5.58    3.45
               0.917    5.18 | 2.500   10.35 | 4.083    8.63 |  5.67    3.45
               1.000    5.18 | 2.583   10.35 | 4.167    8.63 |  5.75    3.45
               1.083    5.18 | 2.667   10.35 | 4.250    6.90 |  5.83    3.45
               1.167    5.18 | 2.750   51.77 | 4.333    6.90 |  5.92    3.45
               1.250    5.18 | 2.833   51.77 | 4.417    6.90 |  6.00    3.45
               1.333    5.18 | 2.917   93.18 | 4.500    6.90 |  6.08    3.45
               1.417    5.18 | 3.000   93.18 | 4.583    6.90 |  6.17    3.45
               1.500    5.18 | 3.083  134.60 | 4.667    6.90 |
               1.583    5.18 | 3.167  134.60 | 4.750    5.18 |

     Max.Eff.Inten.(mm/hr)=    134.60       73.20
               over (min)        5.00        5.00
     Storage Coeff.  (min)=      1.00 (ii)   1.99 (ii)
     Unit Hyd. Tpeak (min)=      5.00        5.00
     Unit Hyd. peak  (cms)=      0.34        0.31
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.04        0.00        0.036 (iii)
     TIME TO PEAK    (hrs)=      3.17        3.17         3.17
     RUNOFF VOLUME    (mm)=     85.28       38.13        84.81
     TOTAL RAINFALL   (mm)=     86.28       86.28        86.28
     RUNOFF COEFFICIENT   =      0.99        0.44         0.98
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0150     0.0039

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0019)    0.096     0.036      3.17      84.81
   OUTFLOW: ID= 1 (  0037)    0.096     0.014      3.25      84.19

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 38.90
                  TIME SHIFT OF PEAK FLOW          (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0037

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):     0.07   0.026     3.17    84.81
      + ID2= 2 (  0036):     0.10   0.013     3.25    84.13
        ==================================================
        ID = 3 (  0010):     0.17   0.039     3.17    84.41

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

-------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     0.17   0.039     3.17    84.41
      + ID2= 2 (  0037):     0.10   0.014     3.25    84.19
        ==================================================
        ID = 1 (  0010):     0.26   0.052     3.17    84.33

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

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     0.26   0.052     3.17    84.33
      + ID2= 2 (  0038):     0.18   0.026     3.25    84.47
        ==================================================
        ID = 3 (  0010):     0.44   0.076     3.17    84.39

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

-------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     0.44   0.076     3.17    84.39
      + ID2= 2 (  0009):     0.71   0.262     3.17    84.81
        ==================================================
        ID = 1 (  0010):     1.15   0.338     3.17    84.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0012)|     OVERFLOW IS OFF
```

| IN= 2---> OUT= 1 |
| DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE
---|---|---|---|---
| | (cms) (ha.m.) | (cms) (ha.m.)
| | 0.0000 0.0000 | 0.1250 0.0360
| | 0.1240 0.0018 | 0.0000 0.0000

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0010)	1.149	0.338	3.17	84.65
OUTFLOW: ID= 1 (0012)	1.149	0.125	3.25	84.65

PEAK FLOW REDUCTION [Qout/Qin](%)= 36.86
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0201

```
V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

OOO TTTTT TTTTT H H Y Y M M OOO TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
OOO T T H H Y M M OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-b6f920a4c6d7\4bd95081-ccbf-4bea-b8f3-1da822a0f477\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-b6f920a4c6d7\4bd95081-ccbf-4bea-b8f3-1da822a0f477\sce

DATE: 03-05-2024 TIME: 10:59:19

USER:

COMMENTS: _____

** SIMULATION : 100yr 12hr 10min SCS Type II **

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e70a9db-deb7-462b-ac52-a15dfa699d36\7538c4f4
Ptotal=102.36 mm | Comments: 100yr 12hr 10min SCS Type II (MTO)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.17	4.09	6.33	18.42	9.50	3.58
0.17	2.56	3.33	4.09	6.50	18.42	9.67	3.58
0.33	2.56	3.50	4.09	6.67	8.19	9.83	3.58
0.50	2.56	3.67	4.09	6.83	8.19	10.00	3.58
0.67	2.56	3.83	4.09	7.00	8.19	10.17	2.05
0.83	2.56	4.00	4.09	7.17	6.14	10.33	2.05
1.00	2.56	4.17	6.14	7.33	6.14	10.50	2.05
1.17	2.56	4.33	6.14	7.50	6.14	10.67	2.05
1.33	2.56	4.50	6.14	7.67	6.14	10.83	2.05
1.50	2.56	4.67	8.19	7.83	6.14	11.00	2.05
1.67	2.56	4.83	8.19	8.00	6.14	11.17	2.05
1.83	2.56	5.00	8.19	8.17	3.58	11.33	2.05
2.00	2.56	5.17	12.28	8.33	3.58	11.50	2.05
2.17	3.07	5.33	12.28	8.50	3.58	11.67	2.05
2.33	3.07	5.50	12.28	8.67	3.58	11.83	2.05
2.50	3.07	5.67	49.13	8.83	3.58	12.00	2.05
2.67	3.07	5.83	92.12	9.00	3.58		
2.83	3.07	6.00	135.12	9.17	3.58		
3.00	3.07	6.17	18.42	9.33	3.58		

CALIB
STANDHYD (0011) | Area (ha)= 0.07
ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	21.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.07	6.250	18.42	9.33	3.58
0.167	0.00	3.250	4.09	6.333	18.42	9.42	3.58
0.250	2.56	3.333	4.09	6.417	18.42	9.50	3.58
0.333	2.56	3.417	4.09	6.500	18.42	9.58	3.58
0.417	2.56	3.500	4.09	6.583	18.42	9.67	3.58
0.500	2.56	3.583	4.09	6.667	18.42	9.75	3.58
0.583	2.56	3.667	4.09	6.750	8.19	9.83	3.58
0.667	2.56	3.750	4.09	6.833	8.19	9.92	3.58
0.750	2.56	3.833	4.09	6.917	8.19	10.00	3.58
0.833	2.56	3.917	4.09	7.000	8.19	10.08	3.58
0.917	2.56	4.000	4.09	7.083	8.19	10.17	3.58
1.000	2.56	4.083	4.09	7.167	8.19	10.25	2.05
1.083	2.56	4.167	4.09	7.250	6.14	10.33	2.05
1.167	2.56	4.250	6.14	7.333	6.14	10.42	2.05
1.250	2.56	4.333	6.14	7.417	6.14	10.50	2.05
1.333	2.56	4.417	6.14	7.500	6.14	10.58	2.05
1.417	2.56	4.500	6.14	7.583	6.14	10.67	2.05
1.500	2.56	4.583	6.14	7.667	6.14	10.75	2.05
1.583	2.56	4.667	6.14	7.750	6.14	10.83	2.05
1.667	2.56	4.750	8.19	7.833	6.14	10.92	2.05
1.750	2.56	4.833	8.19	7.917	6.14	11.00	2.05
1.833	2.56	4.917	8.19	8.000	6.14	11.08	2.05
1.917	2.56	5.000	8.19	8.083	6.14	11.17	2.05
2.000	2.56	5.083	8.19	8.167	6.14	11.25	2.05
2.083	2.56	5.167	8.19	8.250	3.58	11.33	2.05
2.167	2.56	5.250	12.28	8.333	3.58	11.42	2.05
2.250	3.07	5.333	12.28	8.417	3.58	11.50	2.05
2.333	3.07	5.417	12.28	8.500	3.58	11.58	2.05
2.417	3.07	5.500	12.28	8.583	3.58	11.67	2.05
2.500	3.07	5.583	12.28	8.667	3.58	11.75	2.05
2.583	3.07	5.667	12.28	8.750	3.58	11.83	2.05
2.667	3.07	5.750	49.13	8.833	3.58	11.92	2.05
2.750	3.07	5.833	49.13	8.917	3.58	12.00	2.05
2.833	3.07	5.917	92.12	9.000	3.58	12.08	2.05
2.917	3.07	6.000	92.13	9.083	3.58	12.17	2.05
3.000	3.07	6.083	135.12	9.167	3.58		
3.083	3.07	6.167	135.11	9.250	3.58		

			TOTALS
Max.Eff.Inten.(mm/hr)=		135.12	79.87
over (min)		5.00	5.00
Storage Coeff. (min)=		0.90 (ii)	1.90 (ii)
Unit Hyd. Tpeak (min)=		5.00	5.00
Unit Hyd. peak (cms)=		0.34	0.32

PEAK FLOW (cms)=	0.03	0.00	0.026 (iii)
TIME TO PEAK (hrs)=	6.17	6.17	6.17
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0016) | Area (ha)= 0.10
ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.09	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.21	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.07	6.250	18.42	9.33	3.58
0.167	0.00	3.250	4.09	6.333	18.42	9.42	3.58
0.250	2.56	3.333	4.09	6.417	18.42	9.50	3.58
0.333	2.56	3.417	4.09	6.500	18.42	9.58	3.58
0.417	2.56	3.500	4.09	6.583	18.42	9.67	3.58
0.500	2.56	3.583	4.09	6.667	18.42	9.75	3.58
0.583	2.56	3.667	4.09	6.750	8.19	9.83	3.58
0.667	2.56	3.750	4.09	6.833	8.19	9.92	3.58
0.750	2.56	3.833	4.09	6.917	8.19	10.00	3.58
0.833	2.56	3.917	4.09	7.000	8.19	10.08	3.58
0.917	2.56	4.000	4.09	7.083	8.19	10.17	3.58
1.000	2.56	4.083	4.09	7.167	8.19	10.25	2.05
1.083	2.56	4.167	4.09	7.250	6.14	10.33	2.05
1.167	2.56	4.250	6.14	7.333	6.14	10.42	2.05
1.250	2.56	4.333	6.14	7.417	6.14	10.50	2.05
1.333	2.56	4.417	6.14	7.500	6.14	10.58	2.05
1.417	2.56	4.500	6.14	7.583	6.14	10.67	2.05
1.500	2.56	4.583	6.14	7.667	6.14	10.75	2.05
1.583	2.56	4.667	6.14	7.750	6.14	10.83	2.05
1.667	2.56	4.750	8.19	7.833	6.14	10.92	2.05
1.750	2.56	4.833	8.19	7.917	6.14	11.00	2.05
1.833	2.56	4.917	8.19	8.000	6.14	11.08	2.05
1.917	2.56	5.000	8.19	8.083	6.14	11.17	2.05
2.000	2.56	5.083	8.19	8.167	6.14	11.25	2.05
2.083	2.56	5.167	8.19	8.250	3.58	11.33	2.05
2.167	2.56	5.250	12.28	8.333	3.58	11.42	2.05
2.250	3.07	5.333	12.28	8.417	3.58	11.50	2.05
2.333	3.07	5.417	12.28	8.500	3.58	11.58	2.05
2.417	3.07	5.500	12.28	8.583	3.58	11.67	2.05
2.500	3.07	5.583	12.28	8.667	3.58	11.75	2.05
2.583	3.07	5.667	12.28	8.750	3.58	11.83	2.05
2.667	3.07	5.750	49.13	8.833	3.58	11.92	2.05
2.750	3.07	5.833	49.13	8.917	3.58	12.00	2.05
2.833	3.07	5.917	92.12	9.000	3.58	12.08	2.05
2.917	3.07	6.000	92.13	9.083	3.58	12.17	2.05
3.000	3.07	6.083	135.12	9.167	3.58		
3.083	3.07	6.167	135.11	9.250	3.58		

Max.Eff.Inten.(mm/hr)=	135.12	79.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.99 (ii)	1.99 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	

			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.036 (iii)
TIME TO PEAK (hrs)=	6.17	6.17	6.17
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0036) | OVERFLOW IS OFF
IN= 2---> OUT= 1 |
DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0140	0.0038

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0016)	0.095	0.036	6.17	100.84
OUTFLOW: ID= 1 (0036)	0.095	0.013	6.25	100.16

PEAK FLOW REDUCTION [Qout/Qin](%)= 37.44
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0038

CALIB
STANDHYD (0009) | Area (ha)= 0.71
ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.07	6.250	18.42	9.33	3.58
0.167	0.00	3.250	4.09	6.333	18.42	9.42	3.58
0.250	2.56	3.333	4.09	6.417	18.42	9.50	3.58
0.333	2.56	3.417	4.09	6.500	18.42	9.58	3.58
0.417	2.56	3.500	4.09	6.583	18.42	9.67	3.58
0.500	2.56	3.583	4.09	6.667	18.42	9.75	3.58
0.583	2.56	3.667	4.09	6.750	8.19	9.83	3.58
0.667	2.56	3.750	4.09	6.833	8.19	9.92	3.58
0.750	2.56	3.833	4.09	6.917	8.19	10.00	3.58
0.833	2.56	3.917	4.09	7.000	8.19	10.08	3.58
0.917	2.56	4.000	4.09	7.083	8.19	10.17	3.58
1.000	2.56	4.083	4.09	7.167	8.19	10.25	2.05
1.083	2.56	4.167	4.09	7.250	6.14	10.33	2.05
1.167	2.56	4.250	6.14	7.333	6.14	10.42	2.05
1.250	2.56	4.333	6.14	7.417	6.14	10.50	2.05
1.333	2.56	4.417	6.14	7.500	6.14	10.58	2.05
1.417	2.56	4.500	6.14	7.583	6.14	10.67	2.05
1.500	2.56	4.583	6.14	7.667	6.14	10.75	2.05
1.583	2.56	4.667	6.14	7.750	6.14	10.83	2.05
1.667	2.56	4.750	8.19	7.833	6.14	10.92	2.05
1.750	2.56	4.833	8.19	7.917	6.14	11.00	2.05
1.833	2.56	4.917	8.19	8.000	6.14	11.08	2.05
1.917	2.56	5.000	8.19	8.083	6.14	11.17	2.05
2.000	2.56	5.083	8.19	8.167	6.14	11.25	2.05
2.083	2.56	5.167	8.19	8.250	3.58	11.33	2.05

2.167	2.56	5.250	12.28	8.333	3.58	11.42	2.05
2.250	3.07	5.333	12.28	8.417	3.58	11.50	2.05
2.333	3.07	5.417	12.28	8.500	3.58	11.58	2.05
2.417	3.07	5.500	12.28	8.583	3.58	11.67	2.05
2.500	3.07	5.583	12.28	8.667	3.58	11.75	2.05
2.583	3.07	5.667	12.28	8.750	3.58	11.83	2.05
2.667	3.07	5.750	49.13	8.833	3.58	11.92	2.05
2.750	3.07	5.833	49.13	8.917	3.58	12.00	2.05
2.833	3.07	5.917	92.12	9.000	3.58	12.08	2.05
2.917	3.07	6.000	92.13	9.083	3.58	12.17	2.05
3.000	3.07	6.083	135.12	9.167	3.58		
3.083	3.07	6.167	135.11	9.250	3.58		

Max.Eff.Inten.(mm/hr)=	135.12	79.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.81 (ii)	2.80 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.28	
			TOTALS
PEAK FLOW (cms)=	0.26	0.00	0.263 (iii)
TIME TO PEAK (hrs)=	6.17	6.17	6.17
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0013) | Area (ha)= 0.18
ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	34.83	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.07	6.250	18.42	9.33	3.58
0.167	0.00	3.250	4.09	6.333	18.42	9.42	3.58
0.250	2.56	3.333	4.09	6.417	18.42	9.50	3.58
0.333	2.56	3.417	4.09	6.500	18.42	9.58	3.58
0.417	2.56	3.500	4.09	6.583	18.42	9.67	3.58
0.500	2.56	3.583	4.09	6.667	18.42	9.75	3.58
0.583	2.56	3.667	4.09	6.750	8.19	9.83	3.58
0.667	2.56	3.750	4.09	6.833	8.19	9.92	3.58
0.750	2.56	3.833	4.09	6.917	8.19	10.00	3.58
0.833	2.56	3.917	4.09	7.000	8.19	10.08	3.58
0.917	2.56	4.000	4.09	7.083	8.19	10.17	3.58
1.000	2.56	4.083	4.09	7.167	8.19	10.25	2.05
1.083	2.56	4.167	4.09	7.250	6.14	10.33	2.05
1.167	2.56	4.250	6.14	7.333	6.14	10.42	2.05
1.250	2.56	4.333	6.14	7.417	6.14	10.50	2.05
1.333	2.56	4.417	6.14	7.500	6.14	10.58	2.05
1.417	2.56	4.500	6.14	7.583	6.14	10.67	2.05
1.500	2.56	4.583	6.14	7.667	6.14	10.75	2.05
1.583	2.56	4.667	6.14	7.750	6.14	10.83	2.05
1.667	2.56	4.750	8.19	7.833	6.14	10.92	2.05
1.750	2.56	4.833	8.19	7.917	6.14	11.00	2.05
1.833	2.56	4.917	8.19	8.000	6.14	11.08	2.05
1.917	2.56	5.000	8.19	8.083	6.14	11.17	2.05
2.000	2.56	5.083	8.19	8.167	6.14	11.25	2.05
2.083	2.56	5.167	8.19	8.250	3.58	11.33	2.05
2.167	2.56	5.250	12.28	8.333	3.58	11.42	2.05
2.250	3.07	5.333	12.28	8.417	3.58	11.50	2.05
2.333	3.07	5.417	12.28	8.500	3.58	11.58	2.05
2.417	3.07	5.500	12.28	8.583	3.58	11.67	2.05
2.500	3.07	5.583	12.28	8.667	3.58	11.75	2.05
2.583	3.07	5.667	12.28	8.750	3.58	11.83	2.05
2.667	3.07	5.750	49.13	8.833	3.58	11.92	2.05
2.750	3.07	5.833	49.13	8.917	3.58	12.00	2.05
2.833	3.07	5.917	92.12	9.000	3.58	12.08	2.05
2.917	3.07	6.000	92.13	9.083	3.58	12.17	2.05
3.000	3.07	6.083	135.12	9.167	3.58		
3.083	3.07	6.167	135.11	9.250	3.58		

Max.Eff.Inten.(mm/hr)=	135.12	79.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.20 (ii)	2.20 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.30	
			TOTALS
PEAK FLOW (cms)=	0.07	0.00	0.068 (iii)
TIME TO PEAK (hrs)=	6.17	6.17	6.17
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0038) | OVERFLOW IS OFF
IN= 2---> OUT= 1 |
DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE
(cms) (ha.m.) | (cms) (ha.m.)
0.0000 0.0000 | 0.0270 0.0073

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0013)	0.182	0.068	6.17	100.84
OUTFLOW: ID= 1 (0038)	0.182	0.026	6.25	100.50

PEAK FLOW REDUCTION [Qout/Qin](%)= 37.64
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0071

CALIB
STANDHYD (0019) | Area (ha)= 0.10
ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.34	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.07	6.250	18.42	9.33	3.58
0.167	0.00	3.250	4.09	6.333	18.42	9.42	3.58
0.250	2.56	3.333	4.09	6.417	18.42	9.50	3.58
0.333	2.56	3.417	4.09	6.500	18.42	9.58	3.58
0.417	2.56	3.500	4.09	6.583	18.42	9.67	3.58
0.500	2.56	3.583	4.09	6.667	18.42	9.75	3.58

0.583	2.56	3.667	4.09	6.750	8.19	9.83	3.58
0.667	2.56	3.750	4.09	6.833	8.19	9.92	3.58
0.750	2.56	3.833	4.09	6.917	8.19	10.00	3.58
0.833	2.56	3.917	4.09	7.000	8.19	10.08	3.58
0.917	2.56	4.000	4.09	7.083	8.19	10.17	3.58
1.000	2.56	4.083	4.09	7.167	8.19	10.25	2.05
1.083	2.56	4.167	4.09	7.250	6.14	10.33	2.05
1.167	2.56	4.250	6.14	7.333	6.14	10.42	2.05
1.250	2.56	4.333	6.14	7.417	6.14	10.50	2.05
1.333	2.56	4.417	6.14	7.500	6.14	10.58	2.05
1.417	2.56	4.500	6.14	7.583	6.14	10.67	2.05
1.500	2.56	4.583	6.14	7.667	6.14	10.75	2.05
1.583	2.56	4.667	6.14	7.750	6.14	10.83	2.05
1.667	2.56	4.750	8.19	7.833	6.14	10.92	2.05
1.750	2.56	4.833	8.19	7.917	6.14	11.00	2.05
1.833	2.56	4.917	8.19	8.000	6.14	11.08	2.05
1.917	2.56	5.000	8.19	8.083	6.14	11.17	2.05
2.000	2.56	5.083	8.19	8.167	6.14	11.25	2.05
2.083	2.56	5.167	8.19	8.250	3.58	11.33	2.05
2.167	2.56	5.250	12.28	8.333	3.58	11.42	2.05
2.250	3.07	5.333	12.28	8.417	3.58	11.50	2.05
2.333	3.07	5.417	12.28	8.500	3.58	11.58	2.05
2.417	3.07	5.500	12.28	8.583	3.58	11.67	2.05
2.500	3.07	5.583	12.28	8.667	3.58	11.75	2.05
2.583	3.07	5.667	12.28	8.750	3.58	11.83	2.05
2.667	3.07	5.750	49.13	8.833	3.58	11.92	2.05
2.750	3.07	5.833	49.13	8.917	3.58	12.00	2.05
2.833	3.07	5.917	92.12	9.000	3.58	12.08	2.05
2.917	3.07	6.000	92.13	9.083	3.58	12.17	2.05
3.000	3.07	6.083	135.12	9.167	3.58		
3.083	3.07	6.167	135.11	9.250	3.58		

Max.Eff.Inten.(mm/hr)=	135.12	79.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.99 (ii)	1.99 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.036 (iii)
TIME TO PEAK (hrs)=	6.17	6.17	6.17
RUNOFF VOLUME (mm)=	101.36	49.72	100.84
TOTAL RAINFALL (mm)=	102.36	102.36	102.36
RUNOFF COEFFICIENT =	0.99	0.49	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0037)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0150	0.0039

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0019)	0.096	0.036	6.17	100.84
OUTFLOW: ID= 1 (0037)	0.096	0.014	6.25	100.24

PEAK FLOW REDUCTION [Qout/Qin](%)= 38.82
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0037

ADD HYD (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	0.07	0.026	6.17	100.84
+ ID2= 2 (0036):	0.10	0.013	6.25	100.16
ID = 3 (0010):	0.17	0.039	6.17	100.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.17	0.039	6.17	100.45
+ ID2= 2 (0037):	0.10	0.014	6.25	100.24
ID = 1 (0010):	0.26	0.052	6.17	100.37

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	0.26	0.052	6.17	100.37
+ ID2= 2 (0038):	0.18	0.026	6.25	100.50
ID = 3 (0010):	0.44	0.076	6.17	100.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.44	0.076	6.17	100.42
+ ID2= 2 (0009):	0.71	0.263	6.17	100.84
ID = 1 (0010):	1.15	0.339	6.17	100.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0012)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1250	0.0360
	0.1240	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	1.149	0.339	6.17	100.68
OUTFLOW: ID= 1 (0012)	1.149	0.125	6.25	100.68

PEAK FLOW REDUCTION [Qout/Qin](%)= 36.71
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0199

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
```

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CROZIER CONSULTING ENGINEERS

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-b6f920a4c6d7\e988b1f2-bb8f-46bf-98d8-265bb3ce2c4b\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-b6f920a4c6d7\e988b1f2-bb8f-46bf-98d8-265bb3ce2c4b\sce

DATE: 03-05-2024 TIME: 10:59:20

USER:

COMMENTS: _____

** SIMULATION : 100yr 24hr 10min SCS Type II **

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e70a9db-deb7-462b-ac52-a15dfa699d36\fbd2dcae
Ptotal=121.12 mm	Comments: 100yr 24hr 10min SCS Type II (MTO)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.17	2.18	12.33	17.44	18.50	2.18
0.17	1.33	6.33	2.18	12.50	17.44	18.67	2.18
0.33	1.33	6.50	2.18	12.67	8.96	18.83	2.18
0.50	1.33	6.67	2.18	12.83	8.96	19.00	2.18
0.67	1.33	6.83	2.18	13.00	8.96	19.17	2.18
0.83	1.33	7.00	2.18	13.17	6.54	19.33	2.18
1.00	1.33	7.17	2.66	13.33	6.54	19.50	2.18
1.17	1.33	7.33	2.66	13.50	6.54	19.67	2.18
1.33	1.33	7.50	2.66	13.67	5.09	19.83	2.18
1.50	1.33	7.67	2.66	13.83	5.09	20.00	2.18
1.67	1.33	7.83	2.66	14.00	5.09	20.17	1.45
1.83	1.33	8.00	2.66	14.17	3.63	20.33	1.45
2.00	1.33	8.17	3.15	14.33	3.63	20.50	1.45
2.17	1.57	8.33	3.15	14.50	3.63	20.67	1.45
2.33	1.57	8.50	3.15	14.67	3.63	20.83	1.45
2.50	1.57	8.67	3.39	14.83	3.63	21.00	1.45
2.67	1.57	8.83	3.39	15.00	3.63	21.17	1.45
2.83	1.57	9.00	3.39	15.17	3.63	21.33	1.45
3.00	1.57	9.17	3.88	15.33	3.63	21.50	1.45
3.17	1.57	9.33	3.88	15.50	3.63	21.67	1.45
3.33	1.57	9.50	3.88	15.67	3.63	21.83	1.45
3.50	1.57	9.67	4.36	15.83	3.63	22.00	1.45
3.67	1.57	9.83	4.36	16.00	3.63	22.17	1.45
3.83	1.57	10.00	4.36	16.17	2.18	22.33	1.45
4.00	1.57	10.17	5.57	16.33	2.18	22.50	1.45
4.17	1.94	10.33	5.57	16.50	2.18	22.67	1.45
4.33	1.94	10.50	5.57	16.67	2.18	22.83	1.45
4.50	1.94	10.67	7.51	16.83	2.18	23.00	1.45
4.67	1.94	10.83	7.51	17.00	2.18	23.17	1.45
4.83	1.94	11.00	7.51	17.17	2.18	23.33	1.45
5.00	1.94	11.17	11.63	17.33	2.18	23.50	1.45
5.17	1.94	11.33	11.63	17.50	2.18	23.67	1.45
5.33	1.94	11.50	11.63	17.67	2.18	23.83	1.45
5.50	1.94	11.67	35.85	17.83	2.18	24.00	1.45
5.67	1.94	11.83	92.05	18.00	2.18		
5.83	1.94	12.00	148.25	18.17	2.18		
6.00	1.94	12.17	17.44	18.33	2.18		

CALIB	
STANDHYD (0011)	Area (ha)= 0.07
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	21.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.94	12.250	17.46	18.33	2.18
0.167	0.00	6.250	2.18	12.333	17.44	18.42	2.18
0.250	1.33	6.333	2.18	12.417	17.44	18.50	2.18
0.333	1.33	6.417	2.18	12.500	17.44	18.58	2.18
0.417	1.33	6.500	2.18	12.583	17.44	18.67	2.18
0.500	1.33	6.583	2.18	12.667	17.44	18.75	2.18
0.583	1.33	6.667	2.18	12.750	8.96	18.83	2.18
0.667	1.33	6.750	2.18	12.833	8.96	18.92	2.18
0.750	1.33	6.833	2.18	12.917	8.96	19.00	2.18
0.833	1.33	6.917	2.18	13.000	8.96	19.08	2.18
0.917	1.33	7.000	2.18	13.083	8.96	19.17	2.18
1.000	1.33	7.083	2.18	13.167	8.96	19.25	2.18
1.083	1.33	7.167	2.18	13.250	6.54	19.33	2.18
1.167	1.33	7.250	2.66	13.333	6.54	19.42	2.18
1.250	1.33	7.333	2.66	13.417	6.54	19.50	2.18
1.333	1.33	7.417	2.66	13.500	6.54	19.58	2.18
1.417	1.33	7.500	2.66	13.583	6.54	19.67	2.18
1.500	1.33	7.583	2.66	13.667	6.54	19.75	2.18
1.583	1.33	7.667	2.66	13.750	5.09	19.83	2.18
1.667	1.33	7.750	2.66	13.833	5.09	19.92	2.18
1.750	1.33	7.833	2.66	13.917	5.09	20.00	2.18
1.833	1.33	7.917	2.66	14.000	5.09	20.08	2.18
1.917	1.33	8.000	2.66	14.083	5.09	20.17	2.18
2.000	1.33	8.083	2.66	14.167	5.09	20.25	1.45
2.083	1.33	8.167	2.66	14.250	3.63	20.33	1.45
2.167	1.33	8.250	3.15	14.333	3.63	20.42	1.45
2.250	1.57	8.333	3.15	14.417	3.63	20.50	1.45
2.333	1.57	8.417	3.15	14.500	3.63	20.58	1.45
2.417	1.57	8.500	3.15	14.583	3.63	20.67	1.45
2.500	1.57	8.583	3.15	14.667	3.63	20.75	1.45
2.583	1.57	8.667	3.15	14.750	3.63	20.83	1.45
2.667	1.57	8.750	3.39	14.833	3.63	20.92	1.45
2.750	1.57	8.833	3.39	14.917	3.63	21.00	1.45
2.833	1.57	8.917	3.39	15.000	3.63	21.08	1.45
2.917	1.57	9.000	3.39	15.083	3.63	21.17	1.45
3.000	1.57	9.083	3.39	15.167	3.63	21.25	1.45
3.083	1.57	9.167	3.39	15.250	3.63	21.33	1.45
3.167	1.57	9.250	3.88	15.333	3.63	21.42	1.45
3.250	1.57	9.333	3.88	15.417	3.63	21.50	1.45
3.333	1.57	9.417	3.88	15.500	3.63	21.58	1.45
3.417	1.57	9.500	3.88	15.583	3.63	21.67	1.45
3.500	1.57	9.583	3.88	15.667	3.63	21.75	1.45
3.583	1.57	9.667	3.88	15.750	3.63	21.83	1.45
3.667	1.57	9.750	4.36	15.833	3.63	21.92	1.45
3.750	1.57	9.833	4.36	15.917	3.63	22.00	1.45
3.833	1.57	9.917	4.36	16.000	3.63	22.08	1.45
3.917	1.57	10.000	4.36	16.083	3.63	22.17	1.45
4.000	1.57	10.083	4.36	16.167	3.63	22.25	1.45
4.083	1.57	10.167	4.36	16.250	2.18	22.33	1.45
4.167	1.57	10.250	5.57	16.333	2.18	22.42	1.45
4.250	1.94	10.333	5.57	16.417	2.18	22.50	1.45
4.333	1.94	10.417	5.57	16.500	2.18	22.58	1.45
4.417	1.94	10.500	5.57	16.583	2.18	22.67	1.45
4.500	1.94	10.583	5.57	16.667	2.18	22.75	1.45
4.583	1.94	10.667	5.57	16.750	2.18	22.83	1.45
4.667	1.94	10.750	7.51	16.833	2.18	22.92	1.45
4.750	1.94	10.833	7.51	16.917	2.18	23.00	1.45
4.833	1.94	10.917	7.51	17.000	2.18	23.08	1.45

4.917	1.94	11.000	7.51	17.083	2.18	23.17	1.45
5.000	1.94	11.083	7.51	17.167	2.18	23.25	1.45
5.083	1.94	11.167	7.51	17.250	2.18	23.33	1.45
5.167	1.94	11.250	11.63	17.333	2.18	23.42	1.45
5.250	1.94	11.333	11.63	17.417	2.18	23.50	1.45
5.333	1.94	11.417	11.63	17.500	2.18	23.58	1.45
5.417	1.94	11.500	11.63	17.583	2.18	23.67	1.45
5.500	1.94	11.583	11.63	17.667	2.18	23.75	1.45
5.583	1.94	11.667	11.63	17.750	2.18	23.83	1.45
5.667	1.94	11.750	35.85	17.833	2.18	23.92	1.45
5.750	1.94	11.833	35.85	17.917	2.18	24.00	1.45
5.833	1.94	11.917	92.04	18.000	2.18	24.08	1.45
5.917	1.94	12.000	92.05	18.083	2.18	24.17	1.45
6.000	1.94	12.083	148.24	18.167	2.18		
6.083	1.94	12.167	148.25	18.250	2.18		

Max.Eff.Inten.(mm/hr)=	148.25	92.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.87 (ii)	1.83 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.32	
			TOTALS
PEAK FLOW (cms)=	0.03	0.00	0.029 (iii)
TIME TO PEAK (hrs)=	12.17	12.17	12.17
RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
STANDHYD (0016)	Area (ha)=	0.10			
ID= 1 DT= 5.0 min	Total Imp(%)=	99.00	Dir. Conn.(%)=	99.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.09	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.21	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.94	12.250	17.46	18.33	2.18
0.167	0.00	6.250	2.18	12.333	17.44	18.42	2.18
0.250	1.33	6.333	2.18	12.417	17.44	18.50	2.18
0.333	1.33	6.417	2.18	12.500	17.44	18.58	2.18
0.417	1.33	6.500	2.18	12.583	17.44	18.67	2.18
0.500	1.33	6.583	2.18	12.667	17.44	18.75	2.18
0.583	1.33	6.667	2.18	12.750	8.96	18.83	2.18
0.667	1.33	6.750	2.18	12.833	8.96	18.92	2.18
0.750	1.33	6.833	2.18	12.917	8.96	19.00	2.18
0.833	1.33	6.917	2.18	13.000	8.96	19.08	2.18
0.917	1.33	7.000	2.18	13.083	8.96	19.17	2.18
1.000	1.33	7.083	2.18	13.167	8.96	19.25	2.18
1.083	1.33	7.167	2.18	13.250	6.54	19.33	2.18
1.167	1.33	7.250	2.66	13.333	6.54	19.42	2.18
1.250	1.33	7.333	2.66	13.417	6.54	19.50	2.18
1.333	1.33	7.417	2.66	13.500	6.54	19.58	2.18
1.417	1.33	7.500	2.66	13.583	6.54	19.67	2.18
1.500	1.33	7.583	2.66	13.667	6.54	19.75	2.18
1.583	1.33	7.667	2.66	13.750	5.09	19.83	2.18
1.667	1.33	7.750	2.66	13.833	5.09	19.92	2.18
1.750	1.33	7.833	2.66	13.917	5.09	20.00	2.18
1.833	1.33	7.917	2.66	14.000	5.09	20.08	2.18
1.917	1.33	8.000	2.66	14.083	5.09	20.17	2.18
2.000	1.33	8.083	2.66	14.167	5.09	20.25	1.45
2.083	1.33	8.167	2.66	14.250	3.63	20.33	1.45
2.167	1.33	8.250	3.15	14.333	3.63	20.42	1.45
2.250	1.57	8.333	3.15	14.417	3.63	20.50	1.45
2.333	1.57	8.417	3.15	14.500	3.63	20.58	1.45
2.417	1.57	8.500	3.15	14.583	3.63	20.67	1.45
2.500	1.57	8.583	3.15	14.667	3.63	20.75	1.45
2.583	1.57	8.667	3.15	14.750	3.63	20.83	1.45
2.667	1.57	8.750	3.39	14.833	3.63	20.92	1.45
2.750	1.57	8.833	3.39	14.917	3.63	21.00	1.45
2.833	1.57	8.917	3.39	15.000	3.63	21.08	1.45
2.917	1.57	9.000	3.39	15.083	3.63	21.17	1.45
3.000	1.57	9.083	3.39	15.167	3.63	21.25	1.45
3.083	1.57	9.167	3.39	15.250	3.63	21.33	1.45
3.167	1.57	9.250	3.88	15.333	3.63	21.42	1.45
3.250	1.57	9.333	3.88	15.417	3.63	21.50	1.45
3.333	1.57	9.417	3.88	15.500	3.63	21.58	1.45
3.417	1.57	9.500	3.88	15.583	3.63	21.67	1.45
3.500	1.57	9.583	3.88	15.667	3.63	21.75	1.45
3.583	1.57	9.667	3.88	15.750	3.63	21.83	1.45
3.667	1.57	9.750	4.36	15.833	3.63	21.92	1.45
3.750	1.57	9.833	4.36	15.917	3.63	22.00	1.45
3.833	1.57	9.917	4.36	16.000	3.63	22.08	1.45
3.917	1.57	10.000	4.36	16.083	3.63	22.17	1.45
4.000	1.57	10.083	4.36	16.167	3.63	22.25	1.45
4.083	1.57	10.167	4.36	16.250	2.18	22.33	1.45
4.167	1.57	10.250	5.57	16.333	2.18	22.42	1.45
4.250	1.94	10.333	5.57	16.417	2.18	22.50	1.45
4.333	1.94	10.417	5.57	16.500	2.18	22.58	1.45
4.417	1.94	10.500	5.57	16.583	2.18	22.67	1.45
4.500	1.94	10.583	5.57	16.667	2.18	22.75	1.45
4.583	1.94	10.667	5.57	16.750	2.18	22.83	1.45
4.667	1.94	10.750	7.51	16.833	2.18	22.92	1.45
4.750	1.94	10.833	7.51	16.917	2.18	23.00	1.45
4.833	1.94	10.917	7.51	17.000	2.18	23.08	1.45
4.917	1.94	11.000	7.51	17.083	2.18	23.17	1.45
5.000	1.94	11.083	7.51	17.167	2.18	23.25	1.45
5.083	1.94	11.167	7.51	17.250	2.18	23.33	1.45
5.167	1.94	11.250	11.63	17.333	2.18	23.42	1.45
5.250	1.94	11.333	11.63	17.417	2.18	23.50	1.45
5.333	1.94	11.417	11.63	17.500	2.18	23.58	1.45
5.417	1.94	11.500	11.63	17.583	2.18	23.67	1.45
5.500	1.94	11.583	11.63	17.667	2.18	23.75	1.45
5.583	1.94	11.667	11.63	17.750	2.18	23.83	1.45
5.667	1.94	11.750	35.85	17.833	2.18	23.92	1.45
5.750	1.94	11.833	35.85	17.917	2.18	24.00	1.45
5.833	1.94	11.917	92.04	18.000	2.18	24.08	1.45
5.917	1.94	12.000	92.05	18.083	2.18	24.17	1.45
6.000	1.94	12.083	148.24	18.167	2.18		
6.083	1.94	12.167	148.25	18.250	2.18		

Max.Eff.Inten.(mm/hr)=	148.25	92.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.95 (ii)	1.91 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.039 (iii)
TIME TO PEAK (hrs)=	12.17	12.17	12.17
RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0036)	OVERFLOW IS OFF

| IN= 2---> OUT= 1 |
DT= 5.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE
	(cms)	(ha.m.)	(cms)	(ha.m.)
	0.0000	0.0000	0.0140	0.0038

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0016)	0.095	0.039	12.17	119.56
OUTFLOW: ID= 1 (0036)	0.095	0.013	12.25	118.93

PEAK FLOW REDUCTION [Qout/Qin](%)= 34.49
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0038

CALIB	
STANDHYD (0009)	Area (ha)= 0.71
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.94	12.250	17.46	18.33	2.18
0.167	0.00	6.250	2.18	12.333	17.44	18.42	2.18
0.250	1.33	6.333	2.18	12.417	17.44	18.50	2.18
0.333	1.33	6.417	2.18	12.500	17.44	18.58	2.18
0.417	1.33	6.500	2.18	12.583	17.44	18.67	2.18
0.500	1.33	6.583	2.18	12.667	17.44	18.75	2.18
0.583	1.33	6.667	2.18	12.750	8.96	18.83	2.18
0.667	1.33	6.750	2.18	12.833	8.96	18.92	2.18
0.750	1.33	6.833	2.18	12.917	8.96	19.00	2.18
0.833	1.33	6.917	2.18	13.000	8.96	19.08	2.18
0.917	1.33	7.000	2.18	13.083	8.96	19.17	2.18
1.000	1.33	7.083	2.18	13.167	8.96	19.25	2.18
1.083	1.33	7.167	2.18	13.250	6.54	19.33	2.18
1.167	1.33	7.250	2.66	13.333	6.54	19.42	2.18
1.250	1.33	7.333	2.66	13.417	6.54	19.50	2.18
1.333	1.33	7.417	2.66	13.500	6.54	19.58	2.18
1.417	1.33	7.500	2.66	13.583	6.54	19.67	2.18
1.500	1.33	7.583	2.66	13.667	6.54	19.75	2.18
1.583	1.33	7.667	2.66	13.750	5.09	19.83	2.18
1.667	1.33	7.750	2.66	13.833	5.09	19.92	2.18
1.750	1.33	7.833	2.66	13.917	5.09	20.00	2.18
1.833	1.33	7.917	2.66	14.000	5.09	20.08	2.18
1.917	1.33	8.000	2.66	14.083	5.09	20.17	2.18
2.000	1.33	8.083	2.66	14.167	5.09	20.25	1.45
2.083	1.33	8.167	2.66	14.250	3.63	20.33	1.45
2.167	1.33	8.250	3.15	14.333	3.63	20.42	1.45
2.250	1.57	8.333	3.15	14.417	3.63	20.50	1.45
2.333	1.57	8.417	3.15	14.500	3.63	20.58	1.45
2.417	1.57	8.500	3.15	14.583	3.63	20.67	1.45
2.500	1.57	8.583	3.15	14.667	3.63	20.75	1.45
2.583	1.57	8.667	3.15	14.750	3.63	20.83	1.45
2.667	1.57	8.750	3.39	14.833	3.63	20.92	1.45
2.750	1.57	8.833	3.39	14.917	3.63	21.00	1.45
2.833	1.57	8.917	3.39	15.000	3.63	21.08	1.45
2.917	1.57	9.000	3.39	15.083	3.63	21.17	1.45
3.000	1.57	9.083	3.39	15.167	3.63	21.25	1.45
3.083	1.57	9.167	3.39	15.250	3.63	21.33	1.45
3.167	1.57	9.250	3.88	15.333	3.63	21.42	1.45
3.250	1.57	9.333	3.88	15.417	3.63	21.50	1.45
3.333	1.57	9.417	3.88	15.500	3.63	21.58	1.45
3.417	1.57	9.500	3.88	15.583	3.63	21.67	1.45
3.500	1.57	9.583	3.88	15.667	3.63	21.75	1.45
3.583	1.57	9.667	3.88	15.750	3.63	21.83	1.45
3.667	1.57	9.750	4.36	15.833	3.63	21.92	1.45
3.750	1.57	9.833	4.36	15.917	3.63	22.00	1.45
3.833	1.57	9.917	4.36	16.000	3.63	22.08	1.45
3.917	1.57	10.000	4.36	16.083	3.63	22.17	1.45
4.000	1.57	10.083	4.36	16.167	3.63	22.25	1.45
4.083	1.57	10.167	4.36	16.250	2.18	22.33	1.45
4.167	1.57	10.250	5.57	16.333	2.18	22.42	1.45
4.250	1.94	10.333	5.57	16.417	2.18	22.50	1.45
4.333	1.94	10.417	5.57	16.500	2.18	22.58	1.45
4.417	1.94	10.500	5.57	16.583	2.18	22.67	1.45
4.500	1.94	10.583	5.57	16.667	2.18	22.75	1.45
4.583	1.94	10.667	5.57	16.750	2.18	22.83	1.45
4.667	1.94	10.750	7.51	16.833	2.18	22.92	1.45
4.750	1.94	10.833	7.51	16.917	2.18	23.00	1.45
4.833	1.94	10.917	7.51	17.000	2.18	23.08	1.45
4.917	1.94	11.000	7.51	17.083	2.18	23.17	1.45
5.000	1.94	11.083	7.51	17.167	2.18	23.25	1.45
5.083	1.94	11.167	7.51	17.250	2.18	23.33	1.45
5.167	1.94	11.250	11.63	17.333	2.18	23.42	1.45
5.250	1.94	11.333	11.63	17.417	2.18	23.50	1.45
5.333	1.94	11.417	11.63	17.500	2.18	23.58	1.45
5.417	1.94	11.500	11.63	17.583	2.18	23.67	1.45
5.500	1.94	11.583	11.63	17.667	2.18	23.75	1.45
5.583	1.94	11.667	11.63	17.750	2.18	23.83	1.45
5.667	1.94	11.750	35.85	17.833	2.18	23.92	1.45
5.750	1.94	11.833	35.85	17.917	2.18	24.00	1.45
5.833	1.94	11.917	92.04	18.000	2.18	24.08	1.45
5.917	1.94	12.000	92.05	18.083	2.18	24.17	1.45
6.000	1.94	12.083	148.24	18.167	2.18		
6.083	1.94	12.167	148.25	18.250	2.18		

			TOTALS
Max.Eff.Inten.(mm/hr)=	148.25	92.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.74 (ii)	2.70 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.29	
PEAK FLOW (cms)=	0.29	0.00	0.289 (iii)
TIME TO PEAK (hrs)=	12.17	12.17	12.17
RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0013)	Area (ha)= 0.18
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	34.83	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.94	12.250	17.46	18.33	2.18
0.167	0.00	6.250	2.18	12.333	17.44	18.42	2.18
0.250	1.33	6.333	2.18	12.417	17.44	18.50	2.18
0.333	1.33	6.417	2.18	12.500	17.44	18.58	2.18
0.417	1.33	6.500	2.18	12.583	17.44	18.67	2.18
0.500	1.33	6.583	2.18	12.667	17.44	18.75	2.18

0.583	1.33	6.667	2.18	12.750	8.96	18.83	2.18	
0.667	1.33	6.750	2.18	12.833	8.96	18.92	2.18	
0.750	1.33	6.833	2.18	12.917	8.96	19.00	2.18	
0.833	1.33	6.917	2.18	13.000	8.96	19.08	2.18	
0.917	1.33	7.000	2.18	13.083	8.96	19.17	2.18	
1.000	1.33	7.083	2.18	13.167	8.96	19.25	2.18	
1.083	1.33	7.167	2.18	13.250	6.54	19.33	2.18	
1.167	1.33	7.250	2.66	13.333	6.54	19.42	2.18	
1.250	1.33	7.333	2.66	13.417	6.54	19.50	2.18	
1.333	1.33	7.417	2.66	13.500	6.54	19.58	2.18	
1.417	1.33	7.500	2.66	13.583	6.54	19.67	2.18	
1.500	1.33	7.583	2.66	13.667	6.54	19.75	2.18	
1.583	1.33	7.667	2.66	13.750	5.09	19.83	2.18	
1.667	1.33	7.750	2.66	13.833	5.09	19.92	2.18	
1.750	1.33	7.833	2.66	13.917	5.09	20.00	2.18	
1.833	1.33	7.917	2.66	14.000	5.09	20.08	2.18	
1.917	1.33	8.000	2.66	14.083	5.09	20.17	2.18	
2.000	1.33	8.083	2.66	14.167	5.09	20.25	1.45	
2.083	1.33	8.167	2.66	14.250	3.63	20.33	1.45	
2.167	1.33	8.250	3.15	14.333	3.63	20.42	1.45	
2.250	1.57	8.333	3.15	14.417	3.63	20.50	1.45	
2.333	1.57	8.417	3.15	14.500	3.63	20.58	1.45	
2.417	1.57	8.500	3.15	14.583	3.63	20.67	1.45	
2.500	1.57	8.583	3.15	14.667	3.63	20.75	1.45	
2.583	1.57	8.667	3.15	14.750	3.63	20.83	1.45	
2.667	1.57	8.750	3.39	14.833	3.63	20.92	1.45	
2.750	1.57	8.833	3.39	14.917	3.63	21.00	1.45	
2.833	1.57	8.917	3.39	15.000	3.63	21.08	1.45	
2.917	1.57	9.000	3.39	15.083	3.63	21.17	1.45	
3.000	1.57	9.083	3.39	15.167	3.63	21.25	1.45	
3.083	1.57	9.167	3.39	15.250	3.63	21.33	1.45	
3.167	1.57	9.250	3.88	15.333	3.63	21.42	1.45	
3.250	1.57	9.333	3.88	15.417	3.63	21.50	1.45	
3.333	1.57	9.417	3.88	15.500	3.63	21.58	1.45	
3.417	1.57	9.500	3.88	15.583	3.63	21.67	1.45	
3.500	1.57	9.583	3.88	15.667	3.63	21.75	1.45	
3.583	1.57	9.667	3.88	15.750	3.63	21.83	1.45	
3.667	1.57	9.750	4.36	15.833	3.63	21.92	1.45	
3.750	1.57	9.833	4.36	15.917	3.63	22.00	1.45	
3.833	1.57	9.917	4.36	16.000	3.63	22.08	1.45	
3.917	1.57	10.000	4.36	16.083	3.63	22.17	1.45	
4.000	1.57	10.083	4.36	16.167	3.63	22.25	1.45	
4.083	1.57	10.167	4.36	16.250	2.18	22.33	1.45	
4.167	1.57	10.250	5.57	16.333	2.18	22.42	1.45	
4.250	1.94	10.333	5.57	16.417	2.18	22.50	1.45	
4.333	1.94	10.417	5.57	16.500	2.18	22.58	1.45	
4.417	1.94	10.500	5.57	16.583	2.18	22.67	1.45	
4.500	1.94	10.583	5.57	16.667	2.18	22.75	1.45	
4.583	1.94	10.667	5.57	16.750	2.18	22.83	1.45	
4.667	1.94	10.750	7.51	16.833	2.18	22.92	1.45	
4.750	1.94	10.833	7.51	16.917	2.18	23.00	1.45	
4.833	1.94	10.917	7.51	17.000	2.18	23.08	1.45	
4.917	1.94	11.000	7.51	17.083	2.18	23.17	1.45	
5.000	1.94	11.083	7.51	17.167	2.18	23.25	1.45	
5.083	1.94	11.167	7.51	17.250	2.18	23.33	1.45	
5.167	1.94	11.250	11.63	17.333	2.18	23.42	1.45	
5.250	1.94	11.333	11.63	17.417	2.18	23.50	1.45	
5.333	1.94	11.417	11.63	17.500	2.18	23.58	1.45	
5.417	1.94	11.500	11.63	17.583	2.18	23.67	1.45	
5.500	1.94	11.583	11.63	17.667	2.18	23.75	1.45	
5.583	1.94	11.667	11.63	17.750	2.18	23.83	1.45	
5.667	1.94	11.750	35.85	17.833	2.18	23.92	1.45	
5.750	1.94	11.833	35.85	17.917	2.18	24.00	1.45	
5.833	1.94	11.917	92.04	18.000	2.18	24.08	1.45	
5.917	1.94	12.000	92.05	18.083	2.18	24.17	1.45	
6.000	1.94	12.083	148.24	18.167	2.18			
6.083	1.94	12.167	148.25	18.250	2.18			

Max.Eff.Inten.(mm/hr)=	148.25	92.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.16 (ii)	2.12 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	
			TOTALS
PEAK FLOW (cms)=	0.07	0.00	0.075 (iii)
TIME TO PEAK (hrs)=	12.17	12.17	12.17

RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0038)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0270	0.0073

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0013)	0.182	0.075	12.17	119.56
OUTFLOW: ID= 1 (0038)	0.182	0.026	12.25	119.24

PEAK FLOW REDUCTION [Qout/Qin](%)= 34.68
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0072

CALIB	
STANDHYD (0019)	Area (ha)= 0.10
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.34	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.94	12.250	17.46	18.33	2.18
0.167	0.00	6.250	2.18	12.333	17.44	18.42	2.18
0.250	1.33	6.333	2.18	12.417	17.44	18.50	2.18
0.333	1.33	6.417	2.18	12.500	17.44	18.58	2.18
0.417	1.33	6.500	2.18	12.583	17.44	18.67	2.18
0.500	1.33	6.583	2.18	12.667	17.44	18.75	2.18
0.583	1.33	6.667	2.18	12.750	8.96	18.83	2.18
0.667	1.33	6.750	2.18	12.833	8.96	18.92	2.18
0.750	1.33	6.833	2.18	12.917	8.96	19.00	2.18
0.833	1.33	6.917	2.18	13.000	8.96	19.08	2.18
0.917	1.33	7.000	2.18	13.083	8.96	19.17	2.18
1.000	1.33	7.083	2.18	13.167	8.96	19.25	2.18
1.083	1.33	7.167	2.18	13.250	6.54	19.33	2.18
1.167	1.33	7.250	2.66	13.333	6.54	19.42	2.18
1.250	1.33	7.333	2.66	13.417	6.54	19.50	2.18
1.333	1.33	7.417	2.66	13.500	6.54	19.58	2.18
1.417	1.33	7.500	2.66	13.583	6.54	19.67	2.18
1.500	1.33	7.583	2.66	13.667	6.54	19.75	2.18
1.583	1.33	7.667	2.66	13.750	5.09	19.83	2.18
1.667	1.33	7.750	2.66	13.833	5.09	19.92	2.18
1.750	1.33	7.833	2.66	13.917	5.09	20.00	2.18
1.833	1.33	7.917	2.66	14.000	5.09	20.08	2.18
1.917	1.33	8.000	2.66	14.083	5.09	20.17	2.18
2.000	1.33	8.083	2.66	14.167	5.09	20.25	1.45
2.083	1.33	8.167	2.66	14.250	3.63	20.33	1.45
2.167	1.33	8.250	3.15	14.333	3.63	20.42	1.45
2.250	1.57	8.333	3.15	14.417	3.63	20.50	1.45
2.333	1.57	8.417	3.15	14.500	3.63	20.58	1.45

2.417	1.57	8.500	3.15	14.583	3.63	20.67	1.45
2.500	1.57	8.583	3.15	14.667	3.63	20.75	1.45
2.583	1.57	8.667	3.15	14.750	3.63	20.83	1.45
2.667	1.57	8.750	3.39	14.833	3.63	20.92	1.45
2.750	1.57	8.833	3.39	14.917	3.63	21.00	1.45
2.833	1.57	8.917	3.39	15.000	3.63	21.08	1.45
2.917	1.57	9.000	3.39	15.083	3.63	21.17	1.45
3.000	1.57	9.083	3.39	15.167	3.63	21.25	1.45
3.083	1.57	9.167	3.39	15.250	3.63	21.33	1.45
3.167	1.57	9.250	3.88	15.333	3.63	21.42	1.45
3.250	1.57	9.333	3.88	15.417	3.63	21.50	1.45
3.333	1.57	9.417	3.88	15.500	3.63	21.58	1.45
3.417	1.57	9.500	3.88	15.583	3.63	21.67	1.45
3.500	1.57	9.583	3.88	15.667	3.63	21.75	1.45
3.583	1.57	9.667	3.88	15.750	3.63	21.83	1.45
3.667	1.57	9.750	4.36	15.833	3.63	21.92	1.45
3.750	1.57	9.833	4.36	15.917	3.63	22.00	1.45
3.833	1.57	9.917	4.36	16.000	3.63	22.08	1.45
3.917	1.57	10.000	4.36	16.083	3.63	22.17	1.45
4.000	1.57	10.083	4.36	16.167	3.63	22.25	1.45
4.083	1.57	10.167	4.36	16.250	2.18	22.33	1.45
4.167	1.57	10.250	5.57	16.333	2.18	22.42	1.45
4.250	1.94	10.333	5.57	16.417	2.18	22.50	1.45
4.333	1.94	10.417	5.57	16.500	2.18	22.58	1.45
4.417	1.94	10.500	5.57	16.583	2.18	22.67	1.45
4.500	1.94	10.583	5.57	16.667	2.18	22.75	1.45
4.583	1.94	10.667	5.57	16.750	2.18	22.83	1.45
4.667	1.94	10.750	7.51	16.833	2.18	22.92	1.45
4.750	1.94	10.833	7.51	16.917	2.18	23.00	1.45
4.833	1.94	10.917	7.51	17.000	2.18	23.08	1.45
4.917	1.94	11.000	7.51	17.083	2.18	23.17	1.45
5.000	1.94	11.083	7.51	17.167	2.18	23.25	1.45
5.083	1.94	11.167	7.51	17.250	2.18	23.33	1.45
5.167	1.94	11.250	11.63	17.333	2.18	23.42	1.45
5.250	1.94	11.333	11.63	17.417	2.18	23.50	1.45
5.333	1.94	11.417	11.63	17.500	2.18	23.58	1.45
5.417	1.94	11.500	11.63	17.583	2.18	23.67	1.45
5.500	1.94	11.583	11.63	17.667	2.18	23.75	1.45
5.583	1.94	11.667	11.63	17.750	2.18	23.83	1.45
5.667	1.94	11.750	35.85	17.833	2.18	23.92	1.45
5.750	1.94	11.833	35.85	17.917	2.18	24.00	1.45
5.833	1.94	11.917	92.04	18.000	2.18	24.08	1.45
5.917	1.94	12.000	92.05	18.083	2.18	24.17	1.45
6.000	1.94	12.083	148.24	18.167	2.18		
6.083	1.94	12.167	148.25	18.250	2.18		

Max.Eff.Inten.(mm/hr)=	148.25	92.87	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.96 (ii)	1.92 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.31	
			TOTALS
PEAK FLOW (cms)=	0.04	0.00	0.040 (iii)
TIME TO PEAK (hrs)=	12.17	12.17	12.17
RUNOFF VOLUME (mm)=	120.12	64.06	119.56
TOTAL RAINFALL (mm)=	121.12	121.12	121.12
RUNOFF COEFFICIENT =	0.99	0.53	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0037)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0150	0.0039

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0019)	0.096	0.040	12.17	119.56
OUTFLOW: ID= 1 (0037)	0.096	0.014	12.25	118.98

PEAK FLOW REDUCTION [Qout/Qin](%)= 35.81
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0038

ADD HYD (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	0.07	0.029	12.17	119.56
+ ID2= 2 (0036):	0.10	0.013	12.25	118.93
ID = 3 (0010):	0.17	0.041	12.17	119.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.17	0.041	12.17	119.19
+ ID2= 2 (0037):	0.10	0.014	12.25	118.98
ID = 1 (0010):	0.26	0.054	12.17	119.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	0.26	0.054	12.17	119.12
+ ID2= 2 (0038):	0.18	0.026	12.25	119.24
ID = 3 (0010):	0.44	0.078	12.17	119.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.44	0.078	12.17	119.17
+ ID2= 2 (0009):	0.71	0.289	12.17	119.56
ID = 1 (0010):	1.15	0.367	12.17	119.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0012)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1250	0.0360
	0.1240	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	1.149	0.367	12.17	119.41
OUTFLOW: ID= 1 (0012)	1.149	0.125	12.25	119.41

PEAK FLOW REDUCTION [Qout/Qin](%)= 33.90
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0209

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\361fc111-237a-4e27-afc2-
b6f920a4c6d7\a75866ed-8bfb-4a1f-8170-635860594205\sce
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b6f920a4c6d7\a75866ed-8bfb-4a1f-8170-635860594205\sce

DATE: 03-05-2024                          TIME: 11:01:26

USER:


COMMENTS: _____

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  ************************************************
  ** SIMULATION : Run 01                        **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              77621e87-3962-4a5a-9359-0c1bd91603b2\38a08517
| Ptotal=212.00 mm |    Comments: Hazel
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.00 |  3.00   13.00 |  6.00   23.00 |  9.00   53.00
                1.00    4.00 |  4.00   17.00 |  7.00   13.00 | 10.00   38.00
                2.00    6.00 |  5.00   13.00 |  8.00   13.00 | 11.00   13.00

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| CALIB            |
| STANDHYD (  0025)|   Area     (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        50.33
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      1.31 (ii)    2.76 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.33         0.28
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.00        0.010 (iii)
     TIME TO PEAK    (hrs)=      9.33        10.00       10.00
     RUNOFF VOLUME    (mm)=    211.00       173.55      210.60
     TOTAL RAINFALL   (mm)=    212.00       212.00      212.00
     RUNOFF COEFFICIENT   =      1.00         0.82        0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  0027)|   Area     (ha)=   0.71
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.70         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      68.58        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
```

0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=	53.00	50.33	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.63 (ii)	4.07 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.29	0.24	
			TOTALS
PEAK FLOW (cms)=	0.10	0.00	0.104 (iii)
TIME TO PEAK (hrs)=	9.67	10.00	10.00
RUNOFF VOLUME (mm)=	211.00	173.55	210.62
TOTAL RAINFALL (mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT =	1.00	0.82	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0023)	Area (ha)= 0.10		
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.09	0.00	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	25.21	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00

0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=	53.00	50.33	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.44 (ii)	2.89 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.28	
			TOTALS
PEAK FLOW (cms)=	0.01	0.00	0.014 (iii)
TIME TO PEAK (hrs)=	9.42	10.00	10.00
RUNOFF VOLUME (mm)=	211.00	173.55	210.62
TOTAL RAINFALL (mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT =	1.00	0.82	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0036)	OVERFLOW IS OFF				
IN= 2---> OUT= 1					
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
	0.0000	0.0000	0.0140	0.0038	

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0023)	0.095	0.014	10.00	210.62
OUTFLOW: ID= 1 (0036)	0.095	0.011	10.08	210.01

PEAK FLOW REDUCTION [Qout/Qin](%)= 79.71
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0031

CALIB	
STANDHYD (0030)	Area (ha)= 0.10

|ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.34	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

				TOTALS
Max.Eff.Inten.(mm/hr)=		53.00	50.33	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.45 (ii)	2.89 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.33	0.28	
PEAK FLOW	(cms)=	0.01	0.00	0.014 (iii)
TIME TO PEAK	(hrs)=	9.42	10.00	10.00
RUNOFF VOLUME	(mm)=	211.00	173.55	210.62
TOTAL RAINFALL	(mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT	=	1.00	0.82	0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0037)| IN= 2---> OUT= 1

OVERFLOW IS OFF

DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0150	0.0039

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0030)	0.096	0.014	10.00	210.62
OUTFLOW: ID= 1 (0037)	0.096	0.011	10.08	210.03

PEAK FLOW REDUCTION [Qout/Qin](%)= 81.10
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0030

CALIB
STANDHYD (0024)| Area (ha)= 0.18
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	34.83	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

				TOTALS
Max.Eff.Inten.(mm/hr)=		53.00	50.33	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.75 (ii)	3.20 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.32	0.27	
PEAK FLOW	(cms)=	0.03	0.00	0.027 (iii)

```
     TIME TO PEAK     (hrs)=       9.50        10.00          10.00
     RUNOFF VOLUME     (mm)=     211.00       173.55         210.62
     TOTAL RAINFALL    (mm)=     212.00       212.00         212.00
     RUNOFF COEFFICIENT   =       1.00         0.82           0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0038)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0270     0.0073

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)      0.182     0.027     10.00     210.62
   OUTFLOW: ID= 1 (  0038)      0.182     0.021     10.08     210.28

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 79.91
                    TIME SHIFT OF PEAK FLOW          (min)=  5.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.0058

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0031)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     0.07   0.010    10.00   210.60
      + ID2= 2 (  0027):     0.71   0.104    10.00   210.62
        ==========================================================
        ID = 3 (  0031):     0.78   0.114    10.00   210.62

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

-------------------
| ADD HYD  (  0031)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
        ID1= 3 (  0031):     0.78   0.114    10.00   210.62
      + ID2= 2 (  0036):     0.10   0.011    10.08   210.01
        ==========================================================
        ID = 1 (  0031):     0.87   0.125    10.00   210.55

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

-------------------
| ADD HYD  (  0031)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
        ID1= 1 (  0031):     0.87   0.125    10.00   210.55
      + ID2= 2 (  0037):     0.10   0.011    10.08   210.03
        ==========================================================
        ID = 3 (  0031):     0.97   0.137    10.00   210.50

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

-------------------
| ADD HYD  (  0031)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
        ID1= 3 (  0031):     0.97   0.137    10.00   210.50
      + ID2= 2 (  0038):     0.18   0.021    10.08   210.28
        ==========================================================
        ID = 1 (  0031):     1.15   0.158    10.00   210.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1250     0.0205
                         0.1240     0.0010   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0031)      1.149     0.158     10.00     210.47
   OUTFLOW: ID= 1 (  0029)      1.149     0.124     10.33     210.47

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 78.87
                    TIME SHIFT OF PEAK FLOW          (min)= 20.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.0092

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 FINISH
================================================================================================
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Project:	1393 Graham's Lane
Project No.:	2548-6852
Date:	45344
Designed By:	JNL
Checked By:	

ROOFTOP PONDING CALCULATIONS

ROOFTOP PONDING VOLUME CALCULATIONS

Roof Name	**Roof Area** (ha)	**Rooftop Ponding Area** (Assumes 80% of Rooftop Area) (ha)	**Max. Allowable Rooftop Ponding Depth** (m)	**Max. Rooftop Ponding Volume Available** (m^3)
Building A	0.182	0.146	0.15	72.8
Building B	0.095	0.076	0.15	38.1
Building C	0.096	0.077	0.15	38.5

CROZIER & ASSOCIATES
Consulting Engineers

Project Name: 1393 Graham's Lane
Project Number: 2548-6852
Date: February 22, 2024
Prepared By: JNL
Checked by:

VO Model Results Summary - Control to 5-Year Pre

Pre-Development Peak Flow Summary (m^3/s)			
Storm Event	**Catchment 101**	**EXT1**	**Total**
5-Year 6-hour Chicago	0.119	0.008	0.127
5-Year 12-hour Chicago	0.126	0.008	0.134
5-Year 24-hour Chicago	0.129	0.009	0.138
5-Year 6-hour SCS Type II	0.118	0.008	0.125
5-Year 12-hour SCS Type II	0.123	0.008	0.131
5-Year 24-hour SCS Type II	0.138	0.009	0.147

Uncontrolled Post-Development Peak Flow Summary (m^3/s)			
Storm Event	**Catchment 201**	**EXT1**	**Total**
5-Year 6-hour Chicago	0.484	0.032	0.516
5-Year 12-hour Chicago	0.485	0.032	0.516
5-Year 24-hour Chicago	0.485	0.032	0.516
5-Year 6-hour SCS Type II	0.401	0.026	0.427
5-Year 12-hour SCS Type II	0.402	0.026	0.429
5-Year 24-hour SCS Type II	0.442	0.029	0.470
Hurricane Hazel	0.159	0.01	0.169

Controlled Post-Development Summary						
Storm Event	**Target Release Rate (m^3/s)**	**BLDG A Rooftop Storage Used (m^3)**	**BLDG B Rooftop Storage Used (m^3)**	**BLDG C Rooftop Storage Used (m^3)**	**Controlled SWM Vault Release Rate (m^3/s)**	**Required SWM Vault Storage Volume (m^3)**
100-Year 6-hour Chicago	0.127	62.3	32.7	32.3	0.124	188
100-Year 12-hour Chicago	0.134	62.7	32.9	32.5	0.124	189
100-Year 24-hour Chicago	0.138	62.7	33	32.5	0.124	189
100-Year 6-hour SCS Type II	0.125	71.1	37.4	37.1	0.125	201
100-Year 12-hour SCS Type II	0.131	71.4	37.5	37.2	0.125	200
100-Year 24-hour SCS Type II	0.147	72.3	38	37.7	0.125	209
Hurricane Hazel	N/A	58	30.6	29.7	0.124	92
					Max SWM Vault Volume Required =	**209.1**



LEGEND

- MOBILITY HUB STUDY AREA
- WATERCOURSE
- CONTOUR (1m)
- PARCEL FABRIC
- CULVERT LOCATION
- STORM SEWER SYSTEM
- STORM SEWER SYSTEM NOT SURCHARGED
- STORM SEWER SYSTEM SURCHARGED
- STORM SEWER SYSTEM FLOODED

SCALE VALID ONLY FOR 24"x36" VERSION

MOBILITY HUB PLANNING STUDY

CITY OF BURLINGTON

STORM SEWER CAPACITY 5 YEAR STORM (DOWNTOWN AREA)

wood.

Scale 1:5000 (0 50 100 200)

Consultant File No. TP178008S

Drawing No. 13

Path: P:\2017\Projects\TPB178008S - Mobility Hub Planning Consulting Services\06_DES-ENG\01_CAD\02_DWGS\05_WR\01_PRO\2018-11(Dtwn-Bur)\Dwg13 StormSewer5yrCap.dwg
Last Saved: 2018-12-05 Last Saved By: richard.bartolo Plotted: 2018-12-06 Plotted By: richard.bartolo

CROZIER & ASSOCIATES
Consulting Engineers

Project Name: 1393 Graham's Lane
Project Number: 2548-6852
Date: February 22, 2024
Prepared By: JNL
Checked by:

Water Quality Calculations

Surface	Method	Effective TSS Removal	Area (ha)	% Area of Site	Overall TSS Removal
Rooftop Areas	Treatment Train (Green Roof & Oil/Grit Separator)	90%	0.37	34.6%	31%
At-Grade Impervious Areas	Oil/Grit Separator	50%	0.42	38.8%	19%
Landscaped Areas	Inherent	100%	0.29	26.6%	27%
Total			**1.08**	**100.0%**	**77%**

Treatment Train Approach:

$$R = A + B - [(A \times B) / 100] \qquad \text{(Equation 4-1)}$$

Where:

R = Total TSS Removal Rate
A = TSS Removal Rate of the First or Upstream BMP
B = TSS Removal Rate of the Second or Downstream BMP

*As per 'New Jersey Stormwater Best Management Practices Manual' Equation 4-1 (February 2004) - see attached

Treatment Train:

TSS Removal:
Green Roof (Rate 1) = 80 %
Oil/Grit Separator (Rate 2) = 50 %

Removal at Infiltration:
$Rate_{\text{Treatment Train 1}}$ = Rate 1 + Rate 2 - [(Rate 1 x Rate 2)/100]
Treatment Train 1 Rate = 90.0 %

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

02/22/2024

Province:	Ontario
City:	Burlington
Nearest Rainfall Station:	HAMILTON RBG CS
Climate Station Id:	6153301
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	1.149
% Imperviousness:	100.00

Runoff Coefficient 'c': 0.90

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	32.37
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	125.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	983
Estimated Average Annual Sediment Volume (L/yr):	799

Project Name:	1393 Graham's Lane
Project Number:	2548-6852
Designer Name:	Jessica Lysecki
Designer Company:	CF Crozier & Associates
Designer Email:	jlysecki@cfcrozier.ca
Designer Phone:	905-952-3111
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	46
EFO6	55
EFO8	60
EFO10	64
EFO12	67

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 60

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

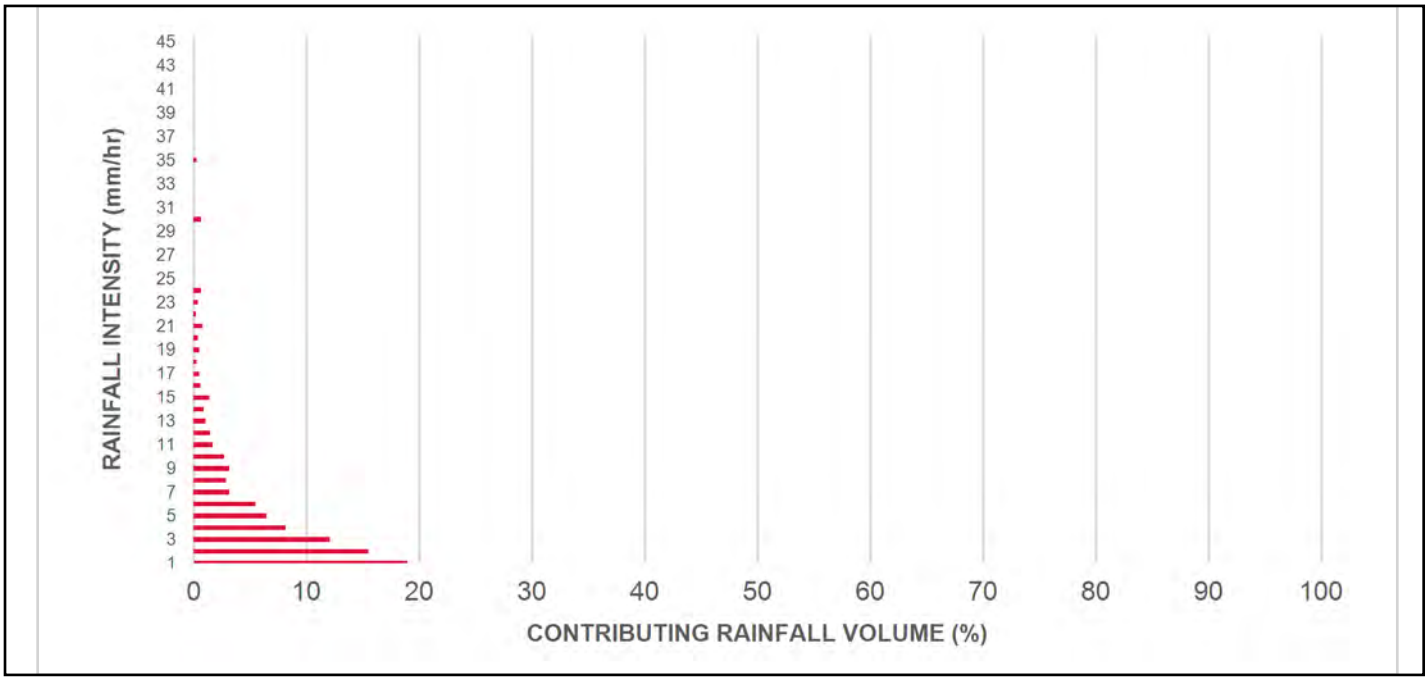
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Upstream Flow Controlled Results

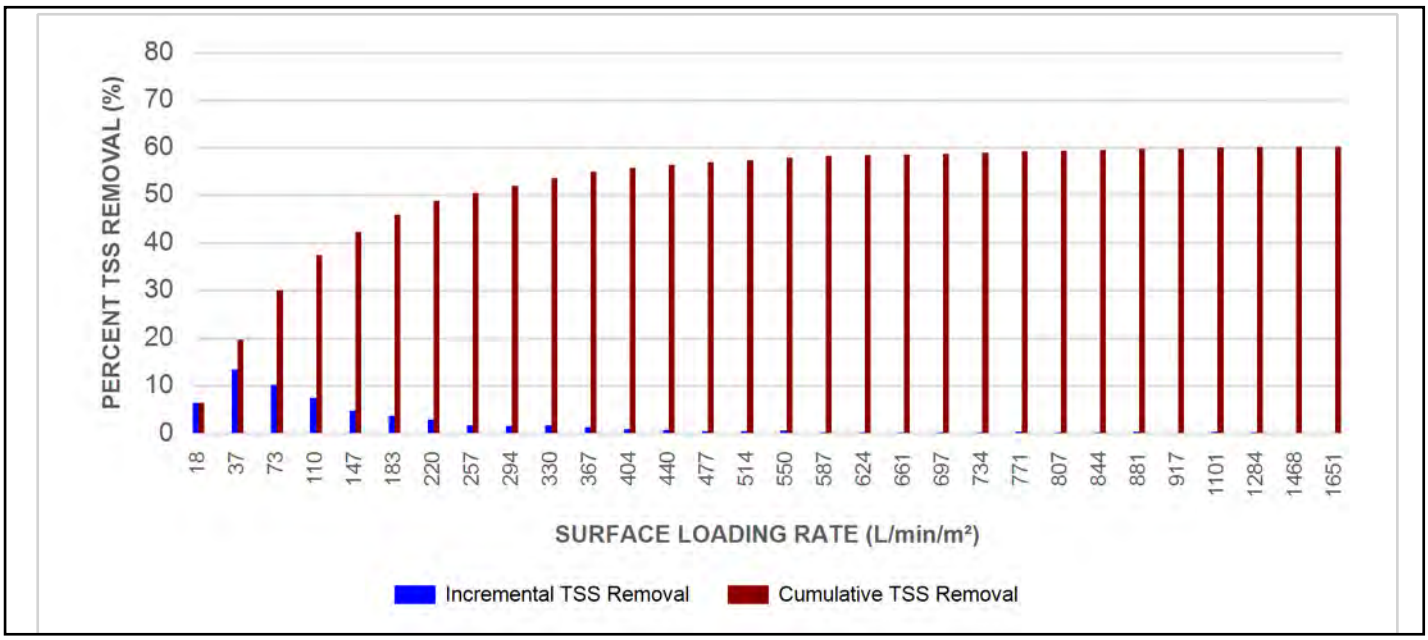
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	9.1	9.1	1.44	86.0	18.0	70	6.4	6.4
1.00	19.0	28.0	2.87	172.0	37.0	70	13.4	19.7
2.00	15.5	43.5	5.75	345.0	73.0	66	10.2	29.9
3.00	12.1	55.6	8.62	517.0	110.0	62	7.4	37.4
4.00	8.2	63.8	11.50	690.0	147.0	59	4.8	42.2
5.00	6.5	70.4	14.37	862.0	183.0	56	3.6	45.8
6.00	5.5	75.9	17.25	1035.0	220.0	53	2.9	48.8
7.00	3.2	79.0	20.12	1207.0	257.0	53	1.7	50.4
8.00	2.9	81.9	23.00	1380.0	294.0	51	1.5	51.9
9.00	3.2	85.2	25.87	1552.0	330.0	50	1.6	53.5
10.00	2.7	87.9	28.75	1725.0	367.0	49	1.3	54.9
11.00	1.7	89.6	31.62	1897.0	404.0	48	0.8	55.7
12.00	1.5	91.1	34.50	2070.0	440.0	47	0.7	56.4
13.00	1.1	92.2	37.37	2242.0	477.0	46	0.5	56.9
14.00	0.9	93.1	40.25	2415.0	514.0	45	0.4	57.3
15.00	1.4	94.5	43.12	2587.0	550.0	44	0.6	57.9
16.00	0.6	95.1	46.00	2760.0	587.0	43	0.3	58.2
17.00	0.5	95.6	48.87	2932.0	624.0	42	0.2	58.4
18.00	0.3	95.9	51.75	3105.0	661.0	42	0.1	58.5
19.00	0.5	96.4	54.62	3277.0	697.0	42	0.2	58.7
20.00	0.4	96.8	57.50	3450.0	734.0	41	0.2	58.9
21.00	0.8	97.6	60.37	3622.0	771.0	41	0.3	59.2
22.00	0.2	97.8	63.25	3795.0	807.0	41	0.1	59.3
23.00	0.4	98.2	66.12	3967.0	844.0	41	0.2	59.5
24.00	0.7	98.9	69.00	4140.0	881.0	41	0.3	59.7
25.00	1.1	100.0	71.87	4312.0	917.0	40	0.4	60.2
30.00	0.7	100.7	86.24	5175.0	1101.0	39	0.3	60.5
35.00	0.3	101.1	100.62	6037.0	1284.0	36	0.1	60.6
40.00	-1.1	100.0	114.99	6900.0	1468.0	33	N/A	60.2
45.00	0.0	100.0	125.00	7500.0	1596.0	30	0.0	60.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**60 %**

Climate Station ID: 6153301 *Years of Rainfall Data*: 20

RAINFALL DATA FROM HAMILTON RBG CS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

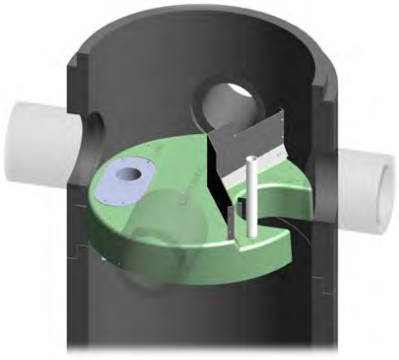
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

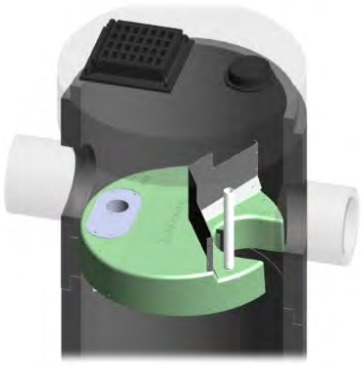
DESIGN FLEXIBILITY

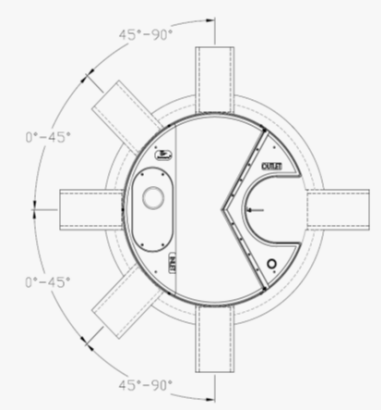
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

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Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Stormceptor® EF and EFO Oil-Grit Separators

Developed by Imbrium Systems, Inc.,
Whitby, Ontario, Canada

Registration: GPS-ETV_VR2023-11-15_Imbrium-SC

In accordance with

ISO 14034:2016

Environmental management —
Environmental technology verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

November 15, 2023
Vancouver, BC, Canada

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Technology description and application

The Stormceptor® EF and EFO are treatment devices designed to remove oil, sediment, trash, debris, and pollutants attached to particulates from Stormwater and snowmelt runoff. The device takes the place of a conventional manhole within a storm drain system and offers design flexibility that works with various site constraints. The EFO is designed with a shorter bypass weir height, which accepts lower surface loading rate into the sump, thereby reducing re-entrainment of captured free floating light liquids.

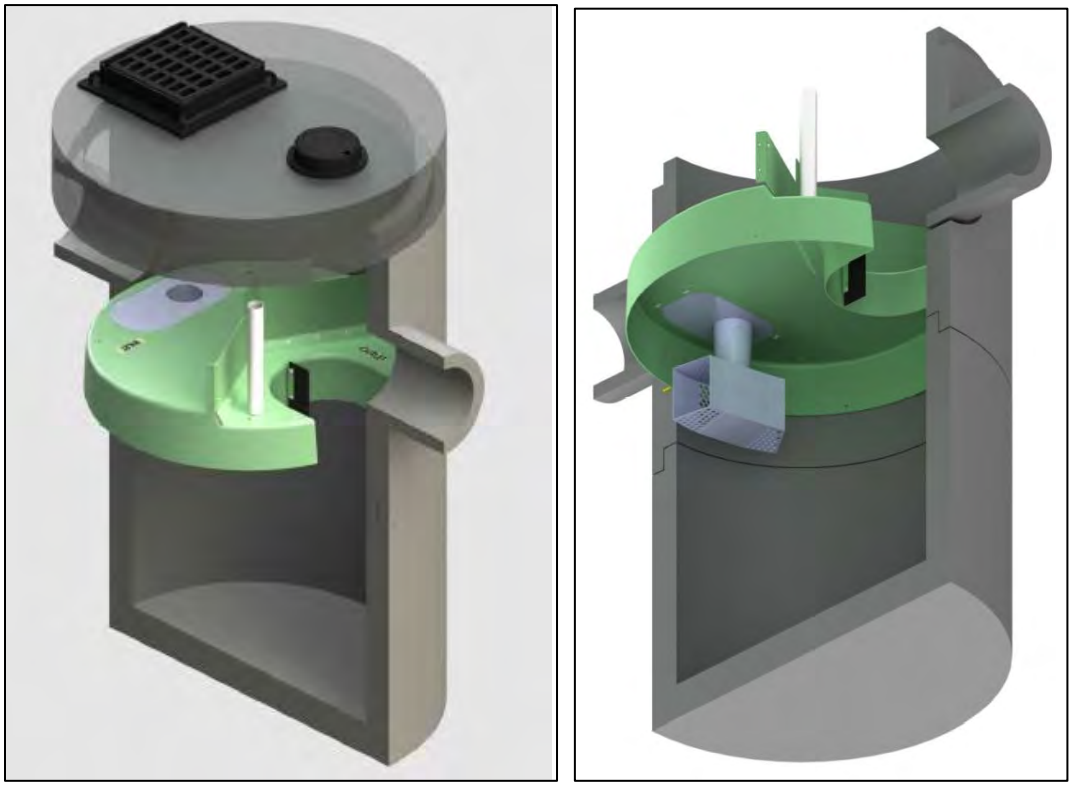


Figure 1. Graphic of typical inline Stormceptor® unit and core components.

Stormwater and snowmelt runoff enters the Stormceptor® EF/EFO's upper chamber through the inlet pipe(s) or a surface inlet grate. An insert divides the unit into lower and upper chambers and incorporates a weir to reduce influent velocity and separate influent (untreated) from effluent (treated) flows. Influent water ponds upstream of the insert's weir providing driving head for the water flowing downwards into the drop pipe where a vortex pulls the water into the lower chamber. The water diffuses at lower velocities in multiple directions through the drop pipe outlet openings. Oil and other floatables rise up and are trapped beneath the insert, while sediments undergo gravitational settling to the sump's bottom. Water from the sump can exit by flowing upward to the outlet riser onto the top side of the insert and downstream of the weir, where it discharges through the outlet pipe.

Maximum flow rate into the lower chamber is a function of weir height and drop pipe orifice diameter. The Stormceptor® EF and EFO are designed to allow a surface loading rate of 1135 L/min/m^2 (27.9 gal/min/ft^2) and 535 L/min/m^2 (13.1 gal/min/ft^2) into the lower chamber, respectively. When prescribed surface loading rates are exceeded, ponding water can overtop the weir height and bypass the lower treatment chamber, exiting directly through the outlet pipe. Hydraulic testing and scour testing demonstrate that the internal bypass effectively prevents scour at all bypass flow rates. Increasing the bypass flow rate does not increase the orifice-controlled flow rate into the lower treatment chamber where sediment is stored. This internal bypass feature allows for in-line installation, avoiding the cost of

additional bypass structures. During bypass, treatment continues in the lower chamber at the maximum flow rate. The Stormceptor® EFO's lower design surface loading rate is favorable for minimizing re-entrainment and washout of captured light liquids. Inspection of Stormceptor® EF and EFO devices is performed from grade by inserting a sediment probe through the outlet riser and an oil dipstick through the oil inspection pipe. The unit can be maintained by using a vacuum hose through the outlet riser.

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Imbrium Systems Inc.'s Stormceptor® EF4 and EFO4 Oil-Grit Separators, in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014). The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for Environment Canada's Environmental Technology Verification (ETV) Program. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test [a]:

During the capture test, the Stormceptor® EF4 OGS device, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 46, 44, and 49 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Stormceptor® EFO4, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 42, 40, and 34 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Scour test [a]:

During the scour test, the Stormceptor® EF4 and Stormceptor® EFO4 OGS devices, with 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment storage depth, generate corrected effluent concentrations of 4.6, 0.7, 0, 0.2, and 0.4 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Stormceptor® EFO4 OGS device with surrogate low-density polyethylene beads preloaded within the lower chamber oil collection zone, representing a floating light liquid volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.5, 99.8, 99.8, and 99.9 percent of loaded beads by mass during the 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2.

[a] The claim can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

Performance results

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition.

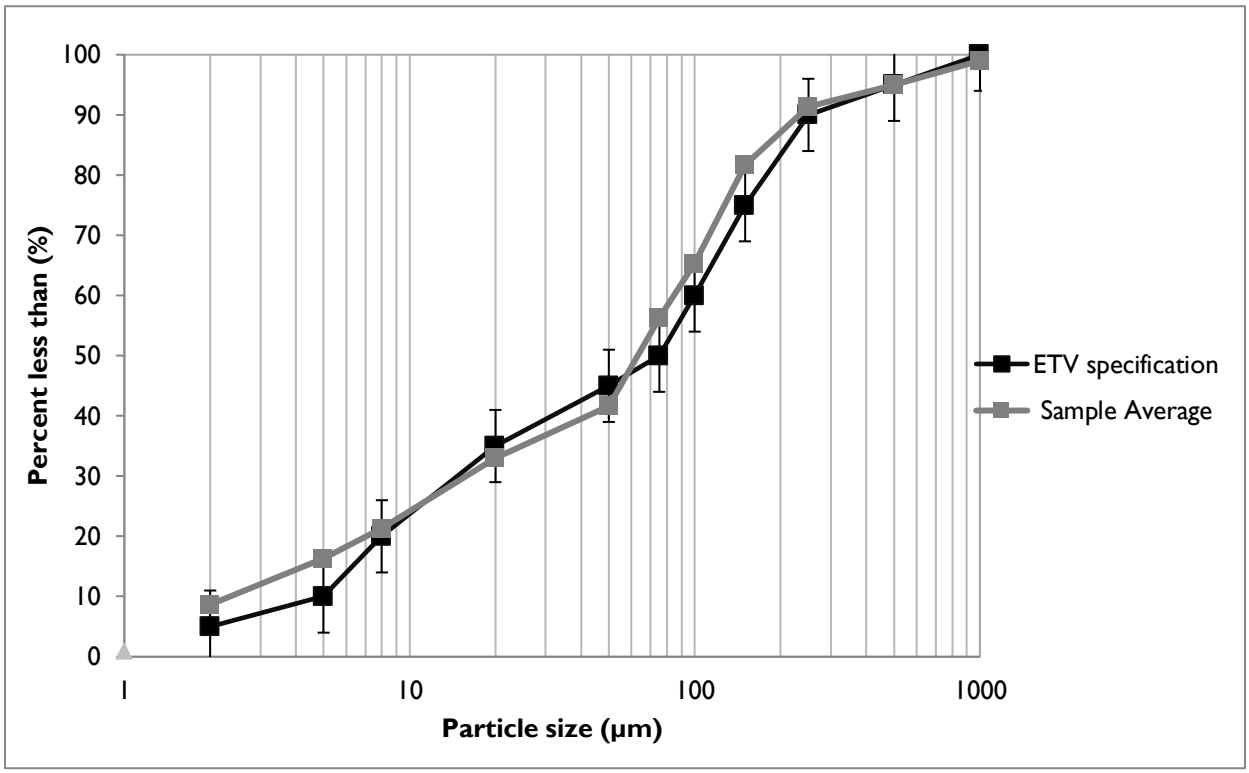


Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1). Since the EF and EFO models are identical except for the weir height, which bypasses flows from the EFO model at a surface loading rate of 535 L/min/m^2 (13.1 gpm/ft^2), sediment capture tests at surface loading rates from 40 to 400 L/min/m^2 were only performed on the EF unit. Surface loading rates of 600, 1000, and 1400 L/min/m^2 were tested on both units separately. Results for the EFO model at these higher flow rates are presented in Table 2.

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and may be attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory

analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for "all particle sizes by mass balance" (see Table 1 and 2) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1. Removal efficiencies (%) of the EF4 at specified surface loading rates

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**						
	40	80	200	400	600	1000	1400
>500	90	58	58	100*	86	72	100*
250 - 500	100*	100*	100	100*	100*	100*	100*
150 - 250	90	82	26	100*	100*	67	90
105 - 150	100*	100*	100*	100*	100*	100*	100
75 - 105	100*	92	74	82	77	68	76
53 - 75	Undefined [a]	56	100*	72	69	50	80
20 - 53	54	100*	54	33	36	40	31
8 - 20	67	52	25	21	17	20	20
5 – 8	33	29	11	12	9	7	19
<5	13	0	0	0	0	0	4
All particle sizes by mass balance	**70.4**	**63.8**	**53.9**	**47.5**	**46.0**	**43.7**	**49.0**

[a] An outlier in the feed sample sieve data resulted in a negative removal efficiency for this size fraction.
* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 101 and 171% (average 128%). See text and Bulletin # CETV 2016-11-0001 for more information.

Table 2. Removal efficiencies (%) of the EFO4 at surface loading rates above the bypass rate of 535 L/min/m²

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**		
	600	1000	1400
>500	89	83	100*
250 - 500	90	100*	92
150 - 250	90	67	100*
105 - 150	85	92	77
75 - 105	80	71	65
53 - 75	60	31	36
20 - 53	33	43	23
8 - 20	17	23	15
5 – 8	10	3	3
<5	0	0	0
All particle sizes by mass balance	**41.7**	**39.7**	**34.2**

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 103 and 111% (average 107%). See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the EF4 at each of the tested surface loading rates. Figure 4 shows the same graph for the EFO4 unit at surface loading rates above the bypass rate of 535 L/min/m².

As expected, the capture efficiency for fine particles in both units was generally found to decrease as surface loading rates increased.

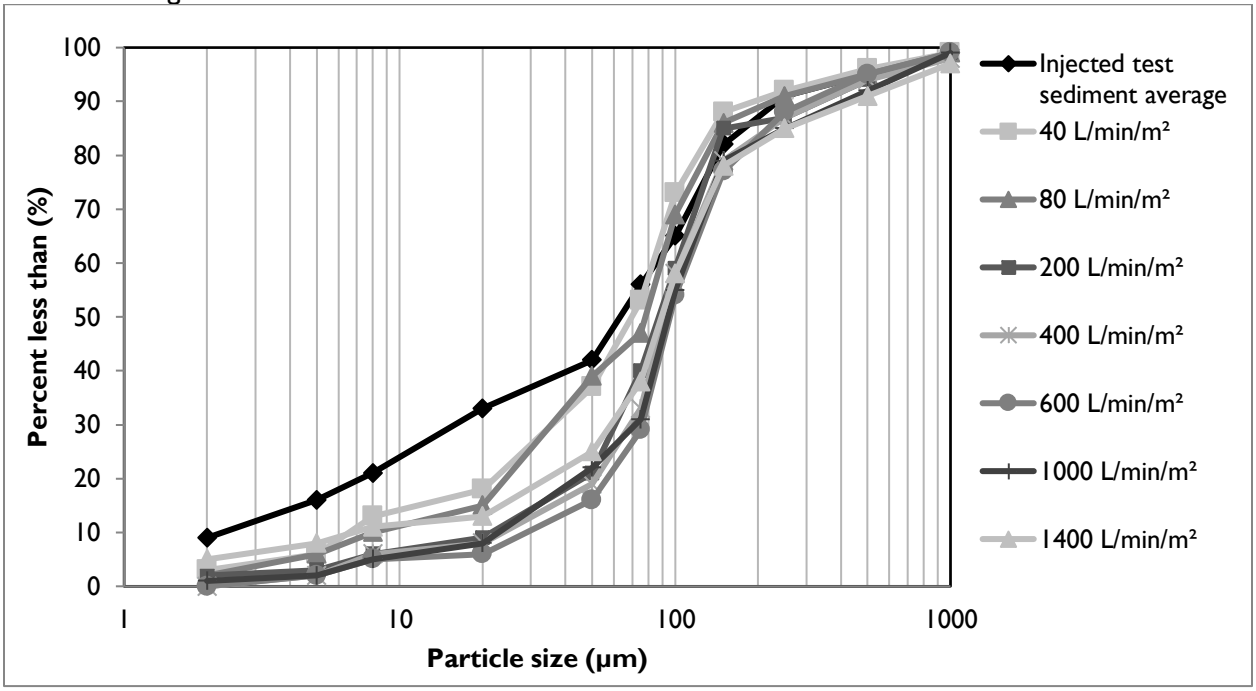


Figure 3. Particle size distribution of sediment retained in the EF4 in relation to the injected test sediment average.

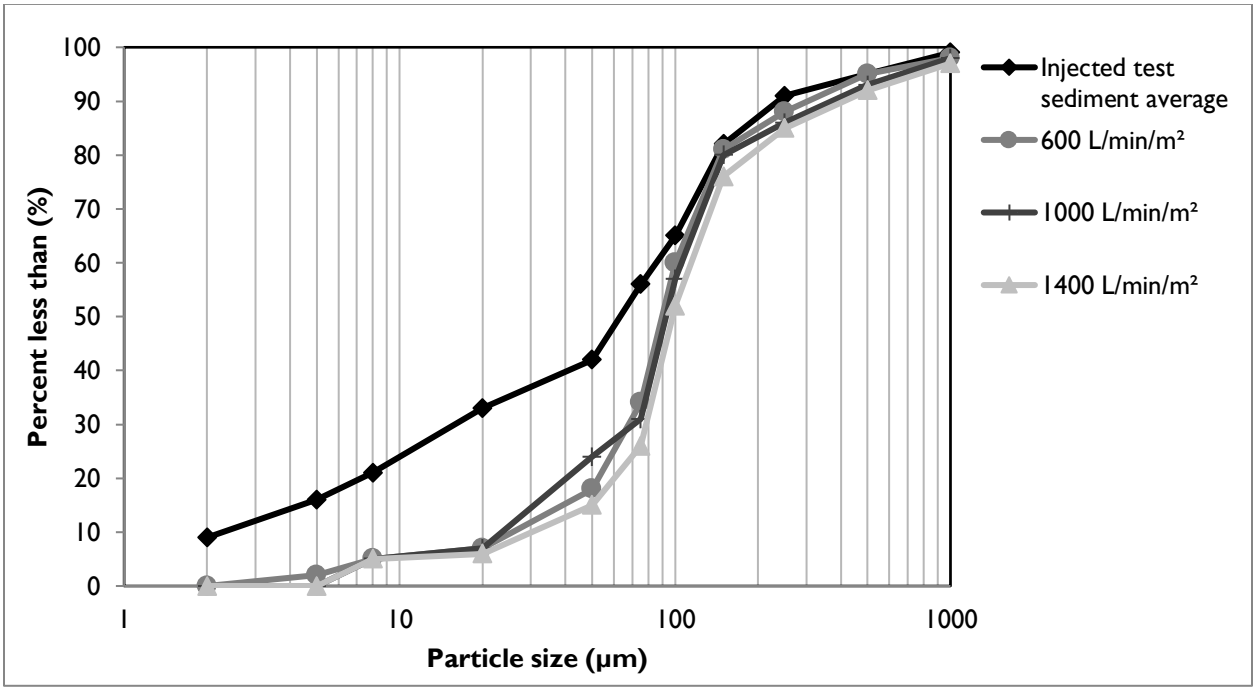


Figure 4. Particle size distribution of sediment retained in the EFO4 in relation to the injected test sediment average at surface loading rates above the bypass rate of 535 L/min/m²

Table 4 shows the results of the sediment scour and re-suspension test for the EF4 unit. The EFO4 was not tested as it was reasonably assumed that scour rates would be lower given that flow bypass occurs at a lower surface loading rate. The scour test involved preloading 10.2 cm of fresh test sediment into

the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Clean water was run through the device at five surface loading rates over a 30 minute period. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water. Typically, the smallest 5% of particles captured during the 40 L/min/m^2 sediment capture test is also used to adjust the concentration, as per the method described in Bulletin # CETV 2016-09-0001. However, since the composites of effluent concentrations were below the Reporting Detection Limit of the Laser Diffraction PSD methodology, this adjustment was not made. Results showed average adjusted effluent sediment concentrations below 5 mg/L at all tested surface loading rates.

It should be noted that the EF4 starts to internally bypass water at 1135 L/min/m^2, potentially resulting in the dilution of effluent concentrations, which would not normally occur under typical field conditions because the field influent concentration would contain a much higher sediment concentration than during the lab test. Recalculation of effluent concentrations to account for dilution at surface loading rates above the bypass rate showed sediment effluent concentrations to be below 1.6 mg/L.

Table 4. Scour test adjusted effluent sediment concentration.

Run	Surface loading rate (L/min/m^2)	Run time (min)	Background sample concentration (mg/L)	Adjusted effluent suspended sediment concentration (mg/L) [a]	Average (mg/L)
1	200	1:00	<RDL	11.9	4.6
		2:00		7.0	
		3:00		4.4	
		4:00		2.2	
		5:00		1.0	
		6:00		1.2	
2	800	7:00	<RDL	1.1	0.7
		8:00		0.9	
		9:00		0.6	
		10:00		1.4	
		11:00		0.1	
		12:00		0	
3	1400	13:00	<RDL	0	0
		14:00		0.1	
		15:00		0	
		16:00		0	
		17:00		0	
		18:00		0	
4	2000	19:00	1.2	0.2	0.2
		20:00		0	
		21:00		0	
		22:00		0.7	
		23:00		0	
		24:00		0.4	

5	2600	25:00	1.6	0.3	0.4
		26:00		0.4	
		27:00		0.7	
		28:00		0.4	
		29:00		0.2	
		30:00		0.4	

[a] The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the background concentration. For more information see Bulletin # CETV 2016-09-0001.

The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 5. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m^2) of surrogate low-density polyethylene beads within the oil collection skirt and running clean water through the device continuously at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m^2). Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates. The effluent flow was screened to capture all re-entrained pellets throughout the test.

Table 5. Light liquid re-entrainment test results for the EFO4.

Surface Loading Rate (L/min/m2)	Time Stamp	Amount of Beads Re-entrained			
		Mass (g)	Volume (L)[a]	% of Pre-loaded Mass Re-entrained	% of Pre-loaded Mass Retained
200	62	0	0	0.00	100
800	247	168.45	0.3	0.52	99.48
1400	432	51.88	0.09	0.16	99.83
2000	617	55.54	0.1	0.17	99.84
2600	802	19.73	0.035	0.06	99.94
Total Re-entrained		295.60	0.525	0.91	--
Total Retained		32403	57.78	--	99.09
Total Loaded		32699	58.3	--	--

[a] Determined from bead bulk density of 0.56074 g/cm^3

Variances from testing Procedure

The following minor deviations from the *Procedure for Laboratory Testing of Oil-Grit Separators* (Version 3.0, June 2014) have been noted:

1. During the capture test, the 40 L/min/m^2 and 80 L/min/m^2 surface loading rates were evaluated over 3 and 2 days respectively due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit at these lower flow rates. Pumps were shut down at the end of each intermediate day, and turned on again the following morning. The target flow rate was re-established within 30 seconds of switching on the pump. This procedure may have allowed sediments to be captured that otherwise may have exited the unit if the test was continuous. On the basis of practical considerations, this variance was approved by the verifier prior to testing.

2. During the scour test, the coefficient of variation (COV) for the lowest flow rate tested (200 L/min/m^2) was 0.07, which exceeded the specified limit of 0.04 target specified in the OGS Procedure. A pump capable of attaining the highest flow rate of 3036 L/min had difficulty maintaining the lowest flow of 234 L/min but still remained within +/- 10% of the target flow and is viewed as having very little impact on the observed results. Similarly, for the light liquid re-entrainment test the COV for the flow rate of the 200 L/min/m^2 run was 0.049, exceeding the limit of 0.04, but is believed to introduce negligible bias.

3. Due to pressure build up in the filters, the runs at 1000 L/min/m^2 for the Stormceptor® EF4 and 1000 and 1400 L/min/m^2 for the Stormceptor® EFO4 were slightly shorter than the target. The run times were 54, 59 and 43 minutes respectively, versus targets of 60 and 50 minutes. The final feed samples were timed to coincide with the end of the run. Since >25 lbs of sediment was fed, the shortened time did not invalidate the runs.

Verification

The verification was completed by the Verification Expert, Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***. Data and information provided by Imbrium Systems Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories, and dated September 8, 2017; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV), and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the Stormceptor® EF and EFO OGS please contact:

Imbrium Systems, Inc.
407 Fairview Drive
Whitby, ON
L1N 3A9, Canada
Tel: 416-960-9900
info@imbriumsystems.com

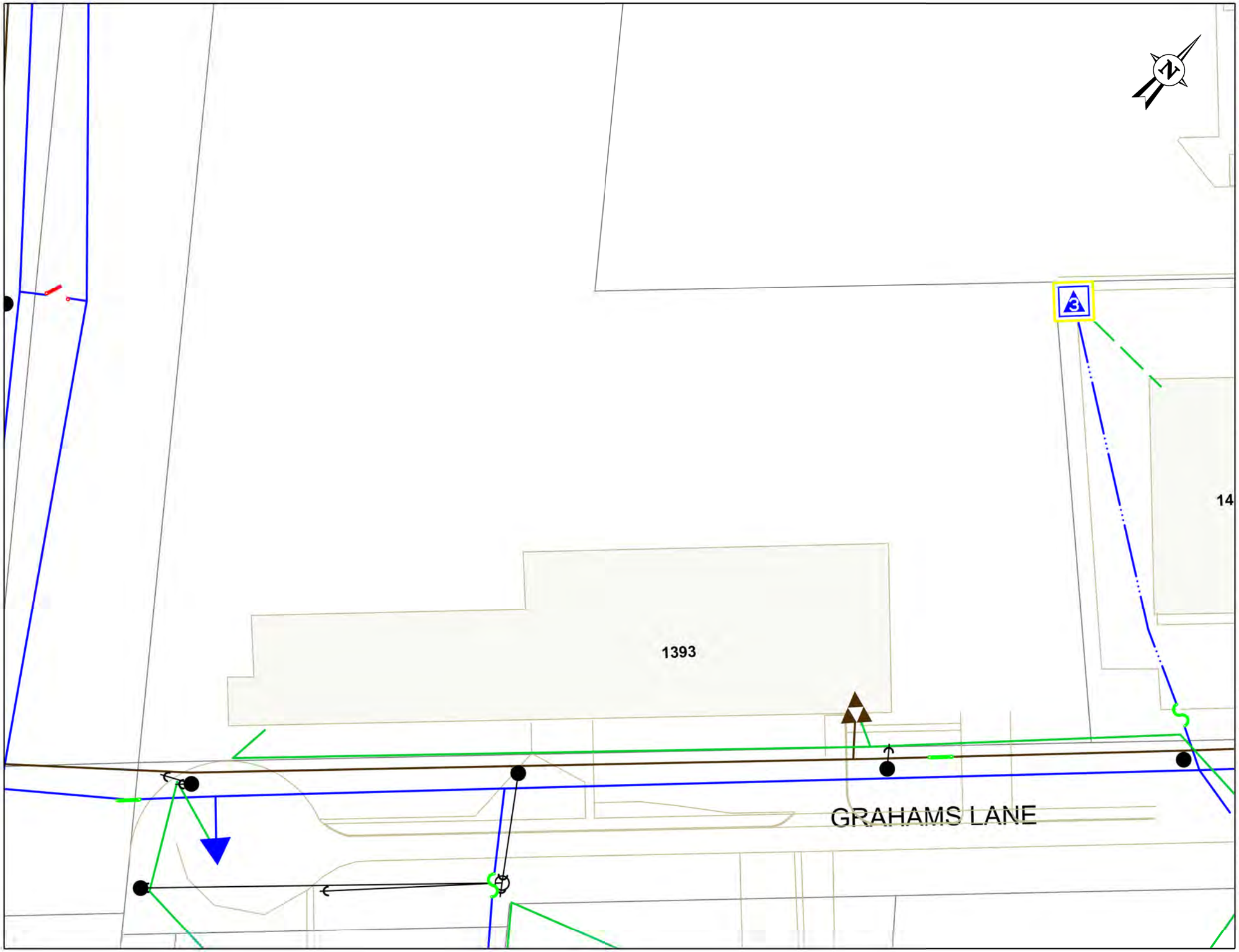
For more information on ISO 14034:2016 / ETV please contact:

GLOBE Performance Solutions
World Trade Centre
404 – 999 Canada Place
Vancouver, BC
V6C 3E2 Canada
Tel: 604-695-5018 / Toll Free: 1-855-695-5018
etv@globeperformance.com

Limitation of verification - Registration: GPS-ETV_VR2023-11-15_Imbrium-SC
GLOBE Performance Solutions and the Verification Expert provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

APPENDIX E

Preliminary Utility Study Supporting Markups



LEGEND

COLOUR CHART

27600-3PH/16000-1PH	BROWN
13800-3PH/8000-1PH	RED
4160-3PH/2400-1PH	BLUE
ALL SECONDARY VOLTAGES	GREEN
PROPOSED	MAGENTA
CUSTOMER OWNED	CYAN
DUCT	YELLOW
PROPOSED REMOVED	GREY

CONDUCTORS

- OH / UG — 3PH PRIMARY DISTRIBUTION
- R R OH / R R UG — 1PH PRIMARY DISTRIBUTION
- OH / UG — SECONDARY DISTRIBUTION

SYMBOLS

POLES
- POLE
- PROPOSED POLE
- SPAN GUY
- DOWN GUY/ANCHOR

TRANSFORMERS
- 1PH POLE MOUNTED TRANSFORMER
- 3PH POLE MOUNTED TRANSFORMER
- 1PH PADMOUNTED TRANSFORMER
- 3PH PADMOUNTED TRANSFORMER
- 3PH PADMOUNT VAULT TRANSFORMER
- SUBMERSIBLE TRANSFORMER

CIVIL
- MH — CONCRETE MANHOLE
- P — PEDESTAL
- SWITCHING CUBICLE
- CONCRETE ENCASED DUCT
- DIRECT BURIED DUCT

METERS
- SECONDARY METER
- PRIMARY METER BANK

SWITCHES

OPEN CLOSED
- FUSED SWITCH
- SOLID SWITCH
- ABS SWITCH
- INTELLIRUPTER SWITCH
- SCADAMATE SWITCH

Date	Revision	I.O.No.	By	Appr
	△			
	△			

BURLINGTON HYDRO INC.

Title:
1393 GRAHAMS LANE
BHI ASSET LOCATION
* PLANNING *

Design By: LC		Date: 02/01/2024	
Scale: 1:500		I.O.#:	
MC#:	W.O.#:		Project#:
Approved By:		Date:	

Drawing No.:
BHI-240201-01LC △

COGECO

FAIRVIEW STREET

LEGION ROAD

GRAHAMS LANE

GRAHAM'S LANE

GHENT AVE

831

814

1451

1439

1421

1393

1416

1392

1380

1345

1335

1440

1415

786

30.21

12.98

31.75

64.83

64.68

129.41

4.06

26.99

47.44

17.41

25.75

12.80

19.94

35.55

25.90

30.41

14.98

41.34

63.65

24.11

33.78

50.75

29.14

14.54

NODES 196/197

PR678

PR698

PR699

G-tel Engineering Inc.

1150 Frances St 2nd Floor
London, Ontario
N5W 5N5

Planning Request For: Enbridge Planning - Halton Region (ENPHAL),

---

Ticket #: 2024058694

Issued By: **G-tel Lookup Dept.**

Date: 02/03/2024

Time: 11:38:54

Requester: MIKE MAZZA

Requester's Email: mmazza@cfcrozier.ca

Requesting Company: C.F. CROZIER & ASSOCIATES INC.

Fax #:

Ticket Request Type: **Design And Planning**

Location: 1393 GRAHAMS LANE

Locate Details:

THIS IS A DESIGN AND PLANNING REQUEST FOR GRAHAMS LANE AND RAILROAD AND ELECTRICAL TRANSMISSION CORRIDOR. ADDITIONAL INFORMATION INCLUDING ANY SETBACKS FROM RAIL/TRANSMISSION LINE WOULD BE APPRECIATED FROM THE

Remarks:

THIS IS A DESIGN AND PLANNING REQUEST FOR GRAHAMS LANE AND RAILROAD AND ELECTRICAL TRANSMISSION CORRIDOR. ADDITIONAL INFORMATION INCLUDING ANY SETBACKS FROM RAIL/TRANSMISSION LINE WOULD BE APPRECIATED FROM THE UTILITY PROVIDERS.BU701

Comments To Excavator:

If you have any questions or concerns regarding your planning request, please call G-tel Engineering at 1-866-692-0208, dial 0 and request the lookup department.

CAUTION: The details provided are to be used solely for planning your design and not for excavation. You must call Ontario One Call at 1-800-400-2255 at least 1 week prior to excavation to obtain a physical locate.

See disclaimer document for further details.

Symbology Legend

Dist Segment Line - In-service

Trans Pipe Segment Line - In-service

High Pressure Segment Line - In-service

Dist Segment Line - Proposed

Srv Segment Line - In-service


End Fitting


Fitting - Reducer


Fitting - Transition


Fitting - Elbow

Branch Fitting - Tee



Fitting - Excess Flow Valve



Structure/Address

Tapping CVT


Emergency Valve - Activated


Valve- Deactivated


Valve - Activated


Service Connector



Test Box


Station


Chainage Start


Chainage End


Chainage Point

Planning Information Request Disclaimer

The drawing(s) that were forwarded to you are to assist you in reviewing your project and are not to be altered or used for any other purpose other than for reference only.

While all efforts have been made to construct the main/service as drawn, the exact location, configuration and/or materials used may have been altered prior to installation. Enbridge Gas Inc. affirms that the pipeline locations indicated for excavation should not be relied upon for construction purposes as being exact.

Should you feel that there may be a conflict with Enbridge Gas' gas main(s), please email the contact below for the area where work is to proceed. A field supervisor will contact you as soon as possible.

Windsor-Chatham *(ENPWIN, ENPCHT)*	**WindServ@uniongas.com**
London-Sarnia *(ENPLDN, ENPSAR)*	**SarnServ@uniongas.com**
Waterloo-Brantford *(ENPWAT, ENPBRA)*	**WateServ@uniongas.com**
Hamilton *(ENPHAM)*	**HamiServ@uniongas.com**
Halton *(ENPHAL)*	**HaltServ@uniongas.com**
Kingston *(ENPEST)*	**KingServ@uniongas.com**
Northeast (Sudbury, North Bay, Sault Ste. Marie, Orillia) *(ENPNTH)*	**SudbServ@uniongas.com**
Northwest (Thunder Bay, Timmins and Satellites)*(ENPWST)*	**ThunServ@uniongas.com**

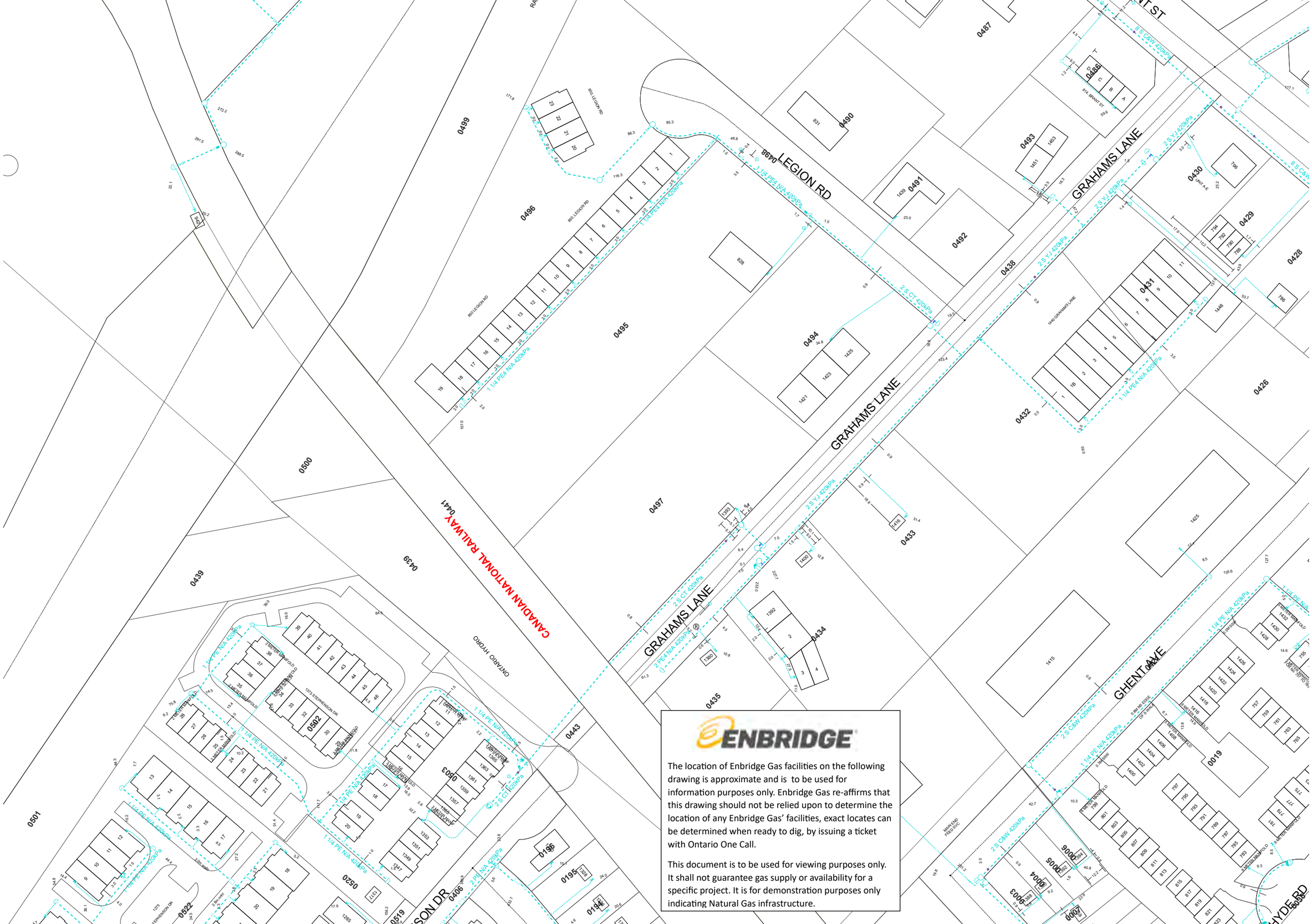
Enbridge Gas Inc. assumes no liability to third parties for the incorrect use of these maps.

Please note that the attached maps do not include Enbridge Gas Storage and Transmission line information. To obtain information regarding those lines, please contact Enbridge Gas Storage and Transmission directly at: Stacey Smith (**Stacey.Smith@enbridge.com**) and Janice Langstaff (**Janice.Langstaff@enbridge.com**)

By using this service it is understood that third party locates must be obtained through **Ontario One Call (OntarioOneCall.ca** or **1-800-400-2255)** to confirm all pipeline locations prior to excavation.

Plant Damage Prevention Department

Enbridge Gas Inc.



ENBRIDGE

The location of Enbridge Gas facilities on the following drawing is approximate and is to be used for information purposes only. Enbridge Gas re-affirms that this drawing should not be relied upon to determine the location of any Enbridge Gas' facilities, exact locates can be determined when ready to dig, by issuing a ticket with Ontario One Call.

This document is to be used for viewing purposes only. It shall not guarantee gas supply or availability for a specific project. It is for demonstration purposes only indicating Natural Gas infrastructure.

James Fletcher

From: Mike Bresolin <Mike.Bresolin@enbridge.com>
Sent: March 4, 2024 1:12 PM
To: Mike Mazza
Cc: Jason Larter; Brendan Walton; James Fletcher; HamCAC
Subject: RE: Do Not Reply: G-TEL Locate:2024058694 1393- GRAHAMS LANE,BURLINGTON-ID#:2743365:#ID

Categories: Filed to Sharepoint

Good Afternoon Mike, I have received confirmation that capacity is currently available in our system for this proposed development based on the 722 apartment/condo units indicated and an assumed a connection date in 2025.

No additional load was assumed for common areas or commercial/retail space.

The load analysis is subject to change and the loads have not been reserved in our model.

When available, please provide accurate gas loads and a site plan showing preferred gas meter locations.

Upon receipt, servicing options will be determined based on space and clearance requirements.

Regards

Mike Bresolin
Sr.Analyst, New Business Projects
Burlington & Milton

ENBRIDGE GAS INC.
905-335-7342 | mike.bresolin@enbridge.com
4475 Mainway Drive, Burlington, ON, L7L 7P2

From: Mike Mazza <mmazza@cfcrozier.ca>
Sent: Friday, February 23, 2024 2:58 PM
To: Mike Bresolin <Mike.Bresolin@enbridge.com>
Cc: Jason Larter <jlarter@cfcrozier.ca>; Brendan Walton <bwalton@cfcrozier.ca>; James Fletcher <jfletcher@cfcrozier.ca>
Subject: [External] FW: Do Not Reply: G-TEL Locate:2024058694 1393- GRAHAMS LANE,BURLINGTON-ID#:2743365:#ID

CAUTION! EXTERNAL SENDER
Were you expecting this email? TAKE A CLOSER LOOK. Is the sender legitimate?
DO NOT click links or open attachments unless you are 100% sure that the email is safe.

Hi Mike,

Our office received the enclosed markups for reference. Our office is currently in early stages of a development proposed for this location. Does Enbridge have any comment or concerns regarding 3 towers comprised of a total of 722 units including 2 level parking garage below ground.

Thanks,

Mike Mazza
Coordinator, Utility Infrastructure
Office: 705.446.3139
Collingwood | Milton | Toronto | Bradford | Guelph

Read about how our story began 20 years ago **here.**

CROZIER

This email was sent on behalf of C.F. Crozier & Associates Inc. and may contain confidential and/or privileged information for the sole use of the intended recipient. If you have received this email in error, please contact the sender and delete all copies. Any review or distribution by anyone other than the intended recipient is strictly prohibited.

-----Original Message-----
From: gtel10@utilocate.email <gtel10@utilocate.email>
Sent: Saturday, February 3, 2024 11:52 AM
To: Mike Mazza <mmazza@cfcrozier.ca>
Subject: Do Not Reply: G-TEL Locate:2024058694 1393- GRAHAMS LANE,BURLINGTON-ID#:2743365:#ID

Here is the locate you have requested, for RequestNumber:2024058694

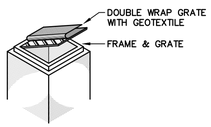
Please send all inquiries regarding your locate to: customerservice@gtel.ca (include your request number).

GTEL Engineering

DRAWINGS

CATCHBASIN SEDIMENT CONTROL DETAIL

SCALE: N.T.S.

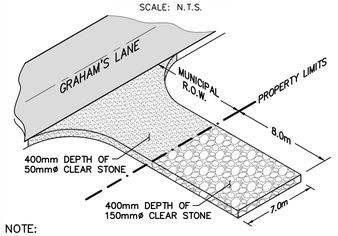


NOTES:

1. TO BE INSTALLED IN ALL AFFECTED EXISTING & PROPOSED CATCHBASIN & CATCHBASIN MANHOLES UNDER APPROPRIATE DRAINAGE CIRCUMSTANCES, BETWEEN APRIL AND DECEMBER.
2. WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm OR A NON-WOVEN GEOTEXTILE TO BE CONSIDERED BASED ON SOIL PARAMETERS AND SITE CONDITIONS.
3. GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERE WITH DRAINAGE, OR AS DIRECTED BY THE MUNICIPALITY.

MUD-MAT DETAIL

SCALE: N.T.S.

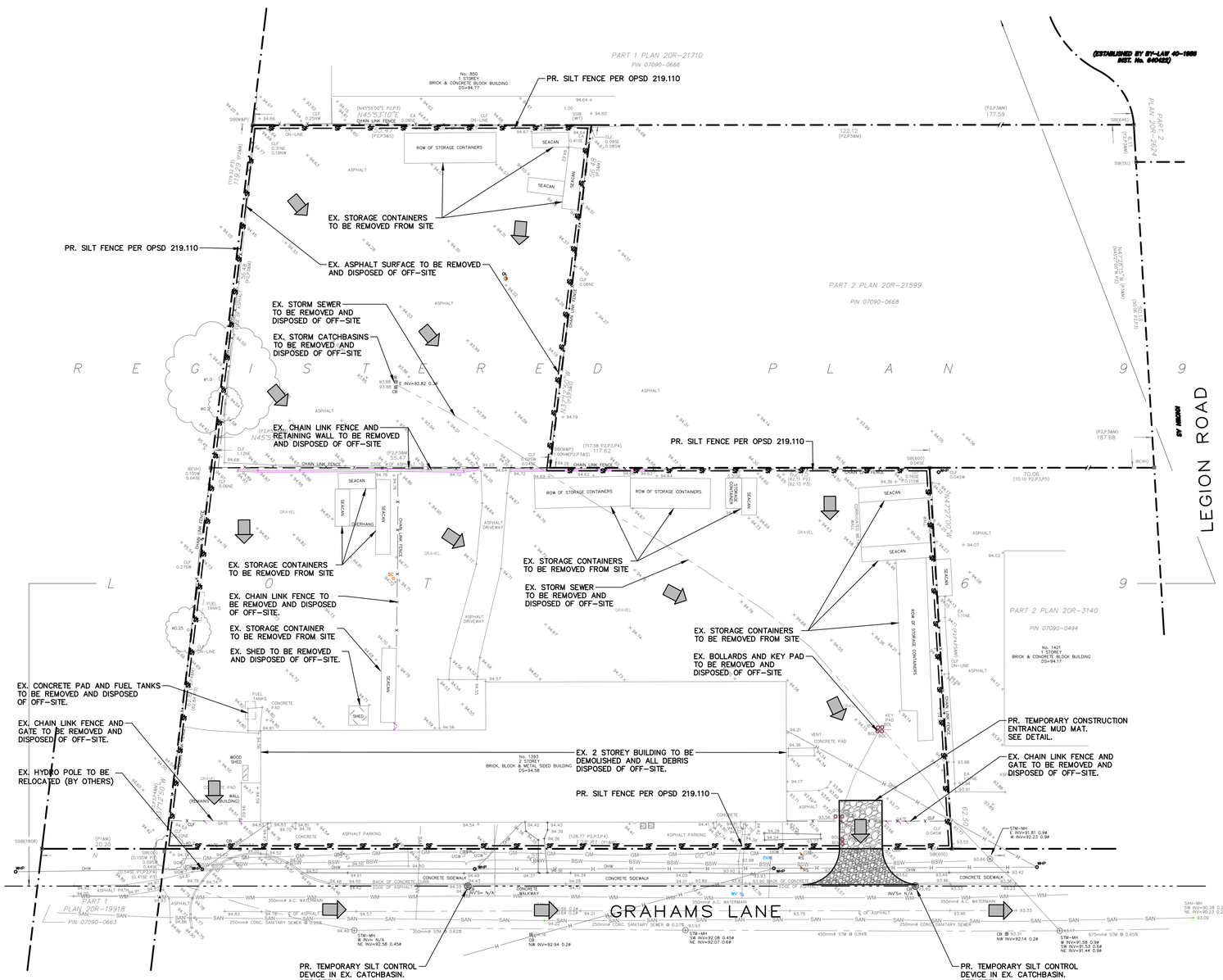


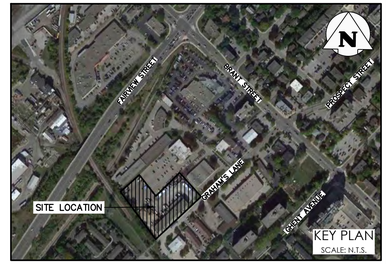
NOTE:

GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

EROSION & SEDIMENT CONTROL NOTES:

1. EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. EROSION & SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
3. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm OF 50mm STONE COVER DURING CONSTRUCTION.
4. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
5. MUD MAT, SILT FENCE, AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.





LEGEND

- PROPERTY LINE
- ×215.00 EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- MUD-MAT; SEE DETAIL
- SF SILT FENCE; SEE DETAIL
- TEMPORARY SILT CONTROL FOR EXISTING CATCHBASINS

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR ZBA AND OPA SUBMISSION	2024/MAR/11

BEARING NOTE:

BEARINGS ARE GRID AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF GRAHAM'S LANE AS SHOWN ON PLAN 20R-19918 HAVING A BEARING OF N45° 55' 00"E

BENCHMARK NOTE:

CITY OF BURLINGTON BENCHMARK No. 368.
ELEVATION = 89.578 (CGVD28:78 ADJUSTMENT)

LOCATION: BRASS PLAQUE ON THE NORTHEAST WING WALL OF THE CONCRETE HEADWALL OF A CULVERT ON THE NORTH SIDE OF BLAIRHOLM AVENUE, 50 METRES WEST OF COURTLAND AVENUE AND 150 METRES EAST OF BRANT STREET.

SURVEY NOTES:

SURVEY COMPLETED BY MacKAY, MacKAY & PETERS LIMITED ON DECEMBER 21, 2023.
PROJECT No.: 23-182-PS

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY KOHN PARTNERSHIP ARCHITECT INC. DATED: MARCH 8, 2024 - REV. 1)
PROJECT No. 22-111, DRAWING No. A1 00

DRAWING NOTES:

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Project

RESIDENTIAL TOWERS
1398 GRAHAMS LANE
BURLINGTON, ONTARIO

Drawing

REMOVALS, EROSION AND SEDIMENT CONTROL PLAN

NOT FOR CONSTRUCTION

Stamp

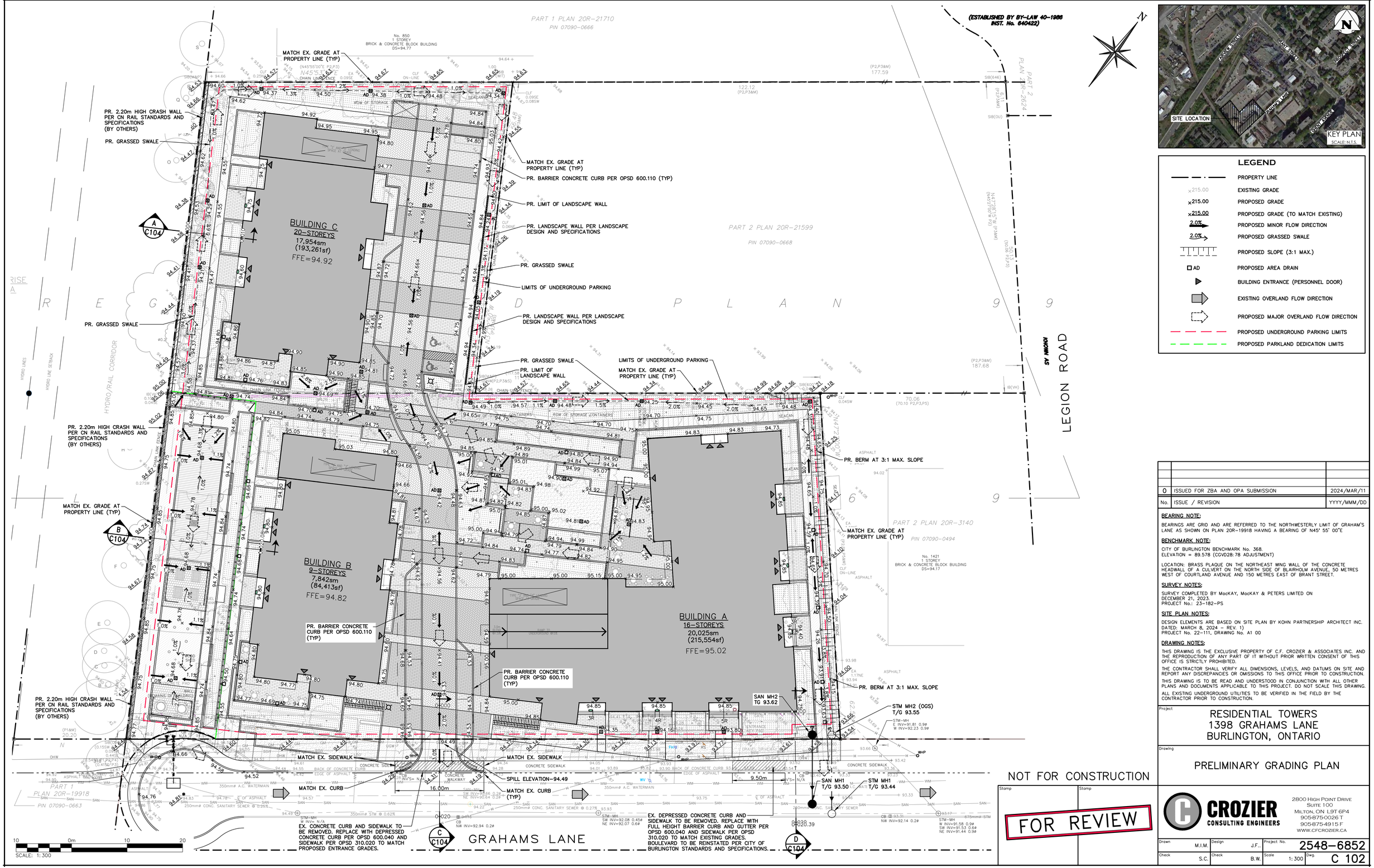
FOR REVIEW

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M.	J.F.	2548-6852	
Check	Check	Scale	Dwg.
S.C.	B.W.	1: 300	C 101

10 0m 10 20
SCALE: 1: 300



LEGEND

- PROPERTY LINE
- EXISTING GRADE
- PROPOSED GRADE
- PROPOSED GRADE (TO MATCH EXISTING)
- PROPOSED MINOR FLOW DIRECTION
- PROPOSED GRASSED SWALE
- PROPOSED SLOPE (3:1 MAX.)
- AD PROPOSED AREA DRAIN
- BUILDING ENTRANCE (PERSONNEL DOOR)
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- PROPOSED UNDERGROUND PARKING LIMITS
- PROPOSED PARKLAND DEDICATION LIMITS

No.	ISSUE / REVISION	YYYY/MMM/DD
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Project

RESIDENTIAL TOWERS
1398 GRAHAMS LANE
BURLINGTON, ONTARIO

Drawing

PRELIMINARY GRADING PLAN

NOT FOR CONSTRUCTION

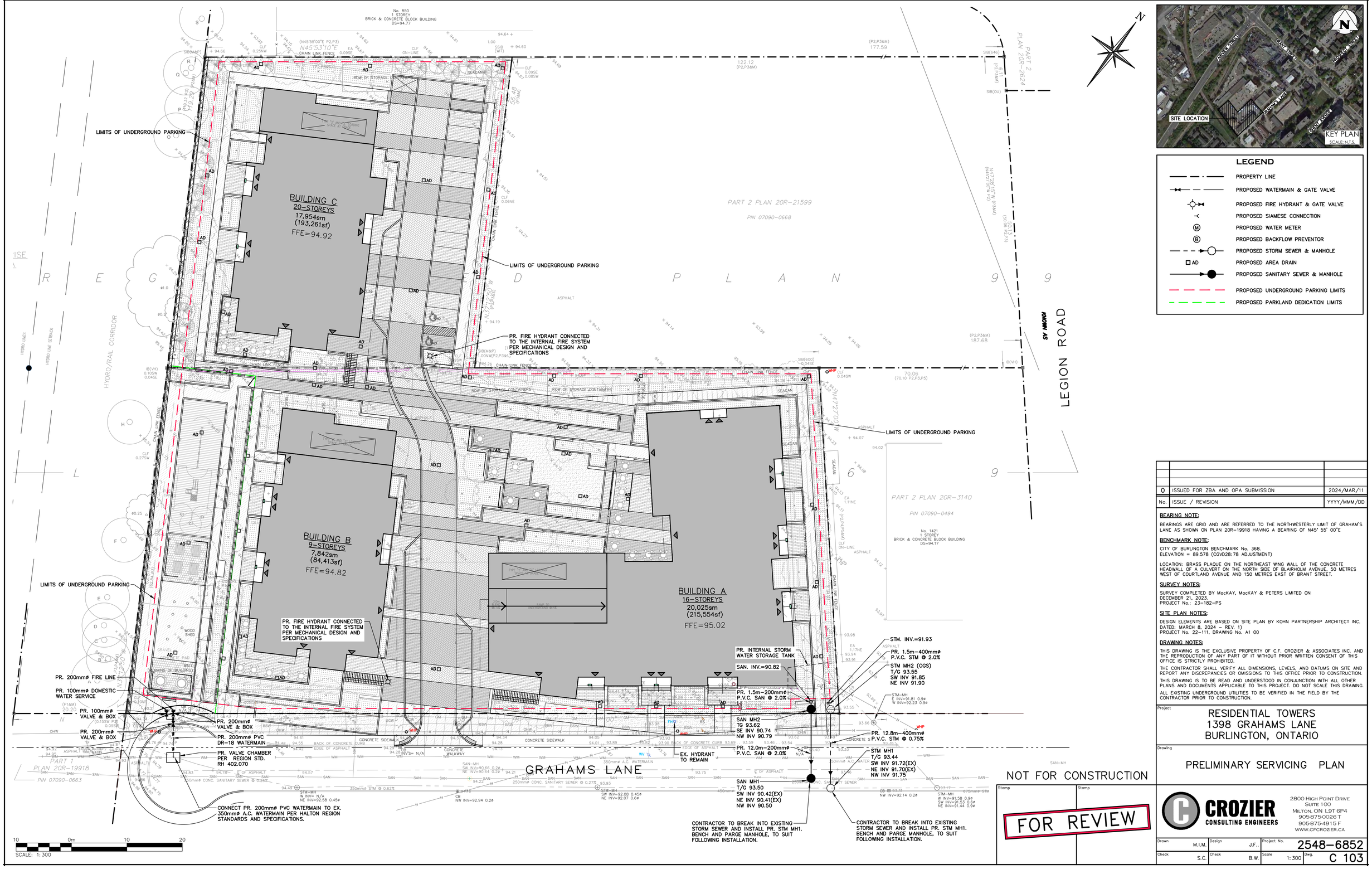
Stamp

FOR REVIEW

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M.	J.F.	2548-6852	
Check	Check	Scale	Dwg.
S.C.	B.W.	1: 300	C 102



LEGEND

- PROPERTY LINE
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE CONNECTION
- (M) PROPOSED WATER METER
- (B) PROPOSED BACKFLOW PREVENTOR
- PROPOSED STORM SEWER & MANHOLE
- AD PROPOSED AREA DRAIN
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED UNDERGROUND PARKING LIMITS
- PROPOSED PARKLAND DEDICATION LIMITS

No.	ISSUE / REVISION	YYYY/MMM/DD
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PROJECT No.: 23-182-PS

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PROJECT No. 22-111, DRAWING No. A1 00

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Project

RESIDENTIAL TOWERS
1398 GRAHAMS LANE
BURLINGTON, ONTARIO

Drawing

PRELIMINARY SERVICING PLAN

NOT FOR CONSTRUCTION

Stamp

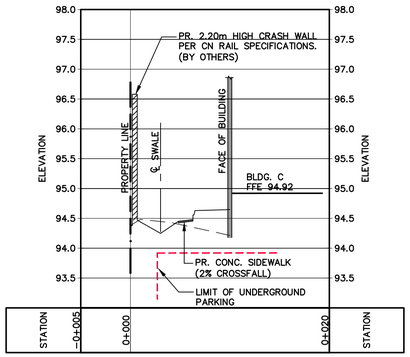
FOR REVIEW

Stamp

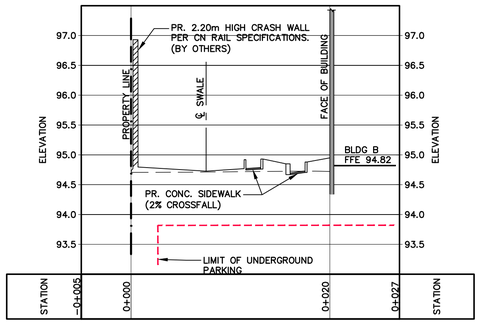
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
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Drawn	Design	Project No.	
M.I.M.	J.F.	2548-6852	
Check	Check	Scale	Dwg.
S.C.	B.W.	1: 300	C 103

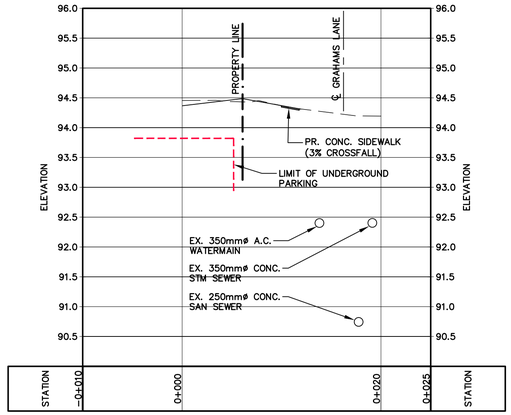
SECTION A



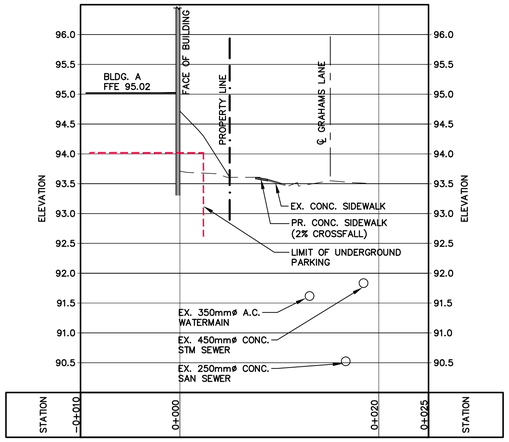
SECTION B



SECTION C



SECTION D





No.	ISSUE / REVISION	YYYY/MMM/DD
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PROJECT No.: 23-182-PS

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Project

RESIDENTIAL TOWERS
1398 GRAHAMS LANE
BURLINGTON, ONTARIO

Drawing

CROSS SECTIONS

NOT FOR CONSTRUCTION

Stamp

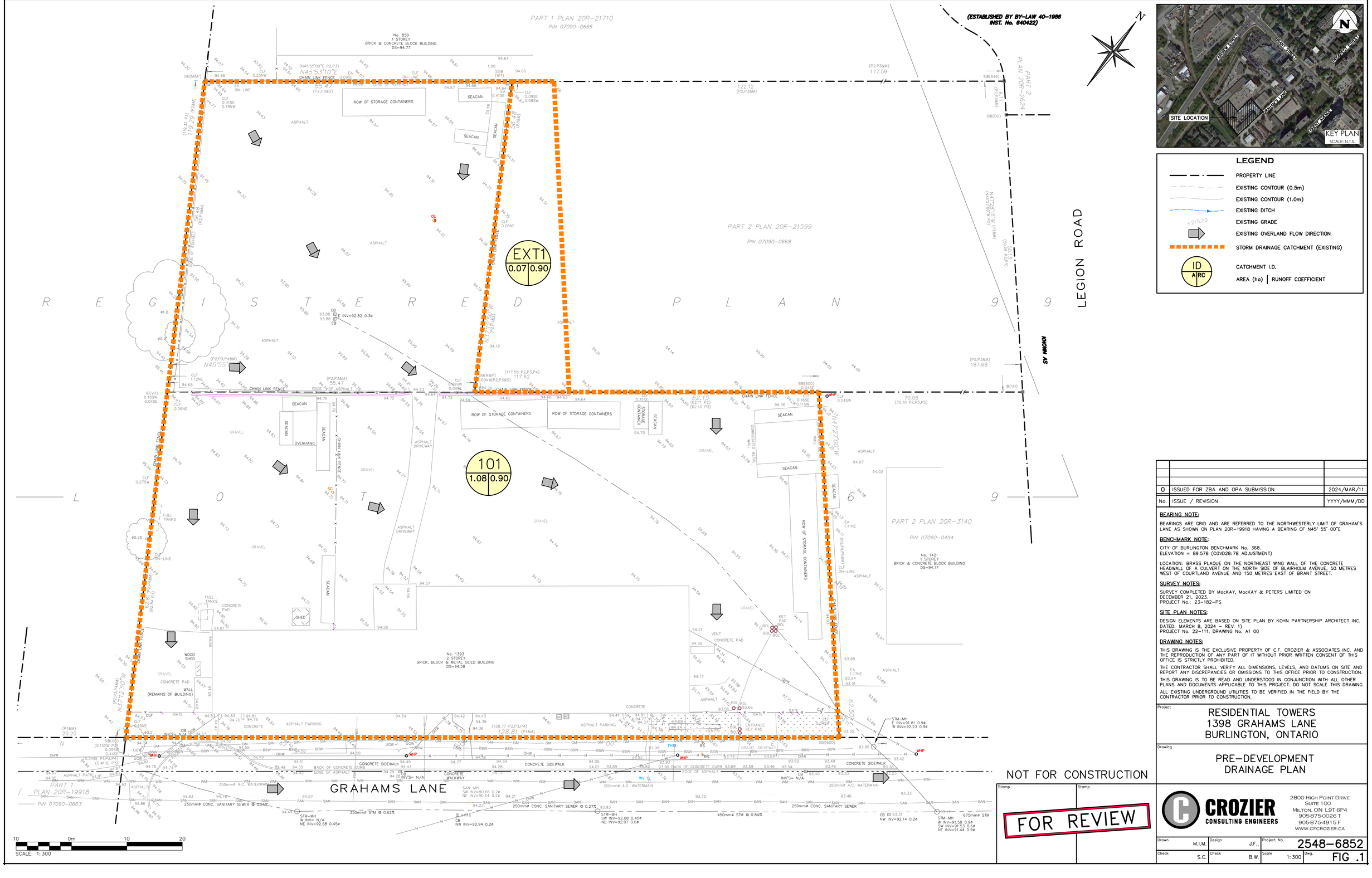
FOR REVIEW

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905 875 0026 T
905 875 4915 F
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Drawn	Design	Project No.	
M.I.M.	J.F.		2548-6852
Check	Check	Scale	Dwg.
S.C.	B.W.	1: 300	C 104

FIGURES



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT (EXISTING)
- CATCHMENT I.D.
- AREA (ha) | RUNOFF COEFFICIENT

No.	ISSUE / REVISION	YYYY/MMM/DD
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Project

RESIDENTIAL TOWERS
1398 GRAHAMS LANE
BURLINGTON, ONTARIO

Drawing

PRE-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

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FOR REVIEW

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M.	J.F.	2548-6852	
Check	Check	Scale	Dwg.
S.C.	B.W.	1:300	FIG .1



No.	ISSUE / REVISION	YYYY/MMM/DD
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Project
RESIDENTIAL TOWERS
1398 GRAHAMS LANE
BURLINGTON, ONTARIO

Drawing
POST-DEVELOPMENT DRAINAGE PLAN

Stamp

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
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905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M.	J.F.	2548-6852	
Check	Check	Scale	Dwg.
S.C.	B.W.	1: 300	FIG. 2