1085 CLEARVIEW AVENUE
6 STOREY RESIDENTIAL BUILDING

Functional Servicing and Stormwater Management Report

Project Location:
1085 Clearview Avenue; 1082, 1086 & 1090 St. Matthews Avenue;
64-66 Masonry Court
Burlington, Ontario

Prepared for:
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1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. was retained by LIV Communities to complete a Functional Servicing and Stormwater Management Report for the proposed development of a six (6) storey residential building located at 1085 Clearview Avenue in the City of Burlington. This report is being prepared to supplement the ZBA/OPA submission and will be updated with final design at the SPA and Building Permit stages.

The site is located on a 0.63ha parcel of land located southeast of Masonry Court and southwest of St. Matthews Avenue (see Figure 1 for Location Plan). The site is currently made up of four lots and is bounded by Masonry Court to the northwest, St. Matthews Avenue to the northeast, Clearview Avenue to the southwest and existing residential area to the southeast. There exists a single storey building with associated parking, driveways and landscaped areas as well as three dwellings with associated garages, sheds, driveways and landscaped areas.

1.2 Background Information

The following documents were referenced in the preparation of this report:

Ref.1: *Water Supply for Public Fire Protection* (Fire Underwriters Survey, 1999).

Ref.2: *Standard Drawing Manual* (City of Burlington, 1999).

Ref.3: *MOE Stormwater Management Practices Planning and Design Manual* (Ministry of the Environment, March 2003).

Ref.4: *Design Guidelines for Drinking-Water Systems* (Ministry of the Environment, 2008).

Ref.5: *Ontario Building Code* (2012).

Ref.6: *Water and Wastewater Linear Design Manual v3.0*, Region of Halton (April 2015).

Ref.7: *Preliminary Geotechnical Investigation, Proposed Residential Development* (Soil-Mat Engineering & Consultants Ltd., December 20, 2018).

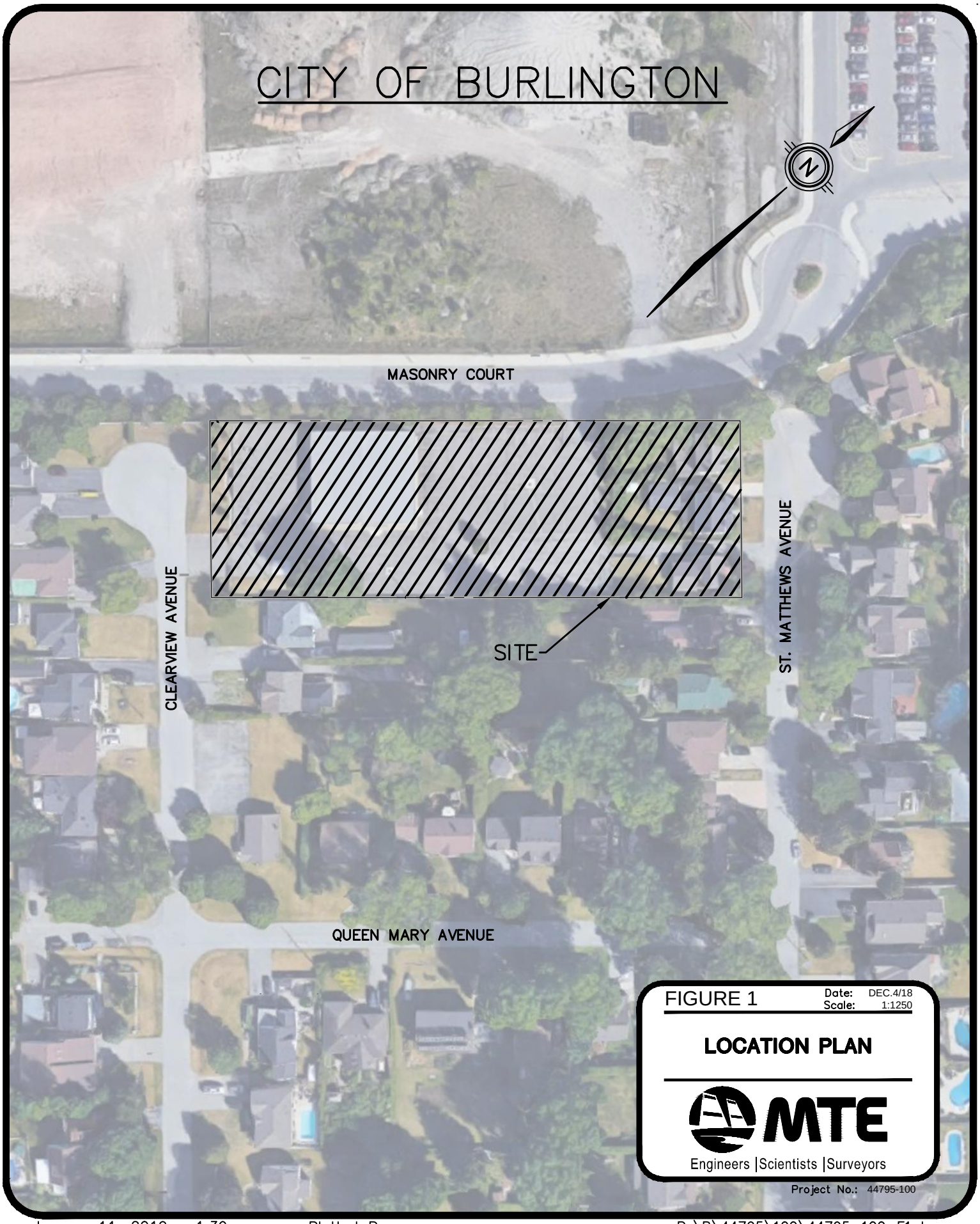


FIGURE 1

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LOCATION PLAN

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1.3 Geotechnical Investigation

A preliminary geotechnical investigation was prepared by Soil-Mat Engineers & Consultants Limited dated December 20, 2018. Sixteen (16) boreholes were advanced at varying depths from approximately 3.7 to 11.1m below the present grade. The majority of the site is overlain with a pavement structure consisting of 75 to 90mm of asphaltic concrete overlying 150 to 225mm of compact granular base. A deposit of sand fill was encountered beneath the pavement structure of seven (7) boreholes to depths of approximately 1.2 to 4.0m beneath the existing pavement surface. Native brown sand was encountered beneath the pavement structure and/or fill material to depths of approximately 4.8 to 6.4m. Below the sand, native clayey silt was encountered to the extent of the borehole depths for boreholes 1 through 4, 201, 202 and 205 and to a depth of 10.1m at borehole 5. Coarse sand and gravel was encountered in borehole 5 beneath the clayey silt up to termination at a depth of 11.1m. Based on our experience with projects in the area and the aforementioned geotechnical report, a SCS Curve Number (CN) of 74 was used where applicable.

As stated in the preliminary geotechnical investigation prepared by Soil-Mat Engineers dated December 20, 2018, the static groundwater elevation is estimated at depths between approximately 4 to 5m below existing grade (elevations between 99.98 and 100.61 m). The proposed building has a first floor elevation of 105.15m (refer to Drawing C1.1). Elevations provided on architectural drawing A4.1 show the underground parking level having a height of 3.6m, giving it an elevation of 101.55m which is well above the established high groundwater level of 100.61m. Therefore, there is not expected to be a requirement for ongoing long-term pumping of water.

Excavations for foundation installation are anticipated to extend to depths of up to approximately 3 to 4m. Excavations through soils above the static groundwater level are expected to remain dry and stable. Some minor infiltration of ground water through more permeable ‘wet’ seams encountered and from surface runoff should be anticipated. This infiltration should be readily controlled with typical construction dewatering methods (i.e. pumping from sumps in the base of excavations). Additional sumps may be required to control groundwater infiltration where excavations extend to within 0.5m of the static groundwater level. More sophisticated groundwater control methods may be required for excavations deeper than about 0.5m below the groundwater level. For further detail and information about groundwater control please refer to Ref. 1.

2.0 SANITARY SERVICES

2.1 Existing Conditions

A 200mm diameter sanitary sewer is located within the Clearview Avenue right-of-way adjacent to the site’s southwestern limits. The sewer has a slope of 1.68% flowing south with a full flow capacity of 42 L/s. There also exists a 450mm diameter sanitary sewer within the St. Matthews Avenue right-of-way adjacent to the site’s northeastern limits. This sewer has a slope of 1.27% flowing south with a full flow capacity of 321 L/s.

The existing dwellings have service connections to the 450mm diameter sanitary sewer on St. Matthews Avenue.

2.2 Sanitary Servicing Demands

The sanitary sewage from the proposed development will outlet to the existing 450mm diameter sanitary sewer on St. Matthews Avenue with a proposed connection.

The anticipated sanitary discharge rate from the proposed development was estimated using Region of Halton and Ontario Building Code design criteria. Design population densities based on the residential units proposed were used to calculate the sanitary discharge. Table 2.1 summarizes the existing and the expected sanitary discharge from the site.

TABLE 2.1 – EXISTING & PROPOSED SANITARY SEWER DISCHARGE

Description	Area (ha) [A]	Units [B]	Population Density [C]	Population	Avg. Flow (L/s) [D]	Peaking Factor [E]	Peak Flow (L/s) [F]
EXISTING							
Ex. Dwellings	0.154	---	55 per/ha	8	0.027	4.42	0.119
Ex. Commercial	0.473	---	90 per/ha	43	0.135	3.46	0.466
Ex. Infiltration Allowance	0.627	---					0.179
Total Existing Sanitary Discharge							**0.76**
PROPOSED							
1 Bed Apartment	---	113	1 per/bed	113	0.360	4.14	1.490
2 Bed Apartment	---	49	1 per/bed	98	0.312	4.14	1.292
Infiltration Allowance	0.627	---					0.179 [G]
Total Proposed Sanitary Discharge							**2.96** [H]

[A] Area reflects site area.
[B] Unit count from Unit Type Analysis provided by the Architect.
[C] Existing population density referenced from "Table 3-1 Residential Dry Weather Flow" and "Table 3-2 Commercial, Industrial, and Community Dry Weather Flow", Halton Water and Wastewater Linear Design Manual (2015) - Single Family and Light commercial. Proposed population density referenced from OBC 3.1.17.1.1(c)(i) – more conservative than Halton Water and Wastewater Linear Design Manual (135 pph). Refer to Appendix A.
[D] Avg. Flow = (Population) x (Unit Sewage Flow) = (113) x (275L/d/cap) / (24x60x60) = 0.360 L/s
[E] Harmon Peaking Factor (PF) = 1 + 14 / (4+$P^{0.5}$) where P = population in thousands
PF = 1 + 14 / (4+$0.211^{0.5}$) = 4.14
[F] Peak Flow = (Avg. Flow) x (PF) = (0.360 L/s) x (4.14) = 1.49 L/s
[G] Infiltration Allowance (IA) based on 0.286 L/s/ha, as outlined in the Halton Water and Wastewater Linear Design Manual (2015).
IA = (0.286 L/s/ha) x (0.627 ha) = 0.179 L/s
[H] Total Sanitary Demand = Peak Flow + Infiltration Allowance = 1.49 + 1.292 + 0.179 = 2.96 L/s

2.3 Proposed Sanitary Servicing Plan

Based on the expected sanitary sewer discharge (see Table 2.1), the proposed site can be serviced with a 150mm diameter sanitary pipe at a 1% slope. The full-flow capacity of a 150mm diameter pipe at a 1% slope is 15.22 L/s; the expected sanitary demand is

well below this limit. The proposed sanitary sewer will connect to the existing 450mm diameter sanitary sewer within the St. Matthews Avenue right-of-way.

Based on plan and profile drawings received from the City of Burlington, the existing 450mm diameter sanitary sewer has a slope of 1.27%; the full-flow capacity of this sewer is 321 L/s. Although the proposed sanitary demand discharging to the existing sewer is 2.2 L/s greater than what exists (see Table 2.1), this accounts for less than 1% of the total capacity of the existing sewer. Therefore it is not expected that there will be capacity issues within the existing sanitary infrastructure due to this proposed development.

3.0 WATER SERVICING

3.1 Existing Conditions

The existing municipal water distribution system around the site consist of a 250mm diameter watermain on Clearview Avenue, a 300mm diameter watermain on Masonry Court and a 150mm diameter watermain on St. Matthews Avenue. Existing municipal hydrants are located within the Masonry Court boulevard at the northeast and southwest end of the site's northwestern limits and in the Clearview Avenue boulevard at the site's southwestern limits.

3.2 Domestic Water Demands

The expected domestic water demand for the proposed development was estimated using the Region of Halton design criteria. Table 3.1 summarizes the domestic water demand requirements for the Average Day, Maximum Day and Peak Hour demand scenarios.

TABLE 3.1 – DOMESTIC WATER DEMANDS

Proposed Apartment Building		
Population	211 people (see Table 2.1)	
Average Day Demand [A]	(275 L/cap/d) x (211 people) =	**0.67 L/s**
Max. Day Peaking Factor [B]	2.25	
Peak Hour Peaking Factor [C]	4.00	
Maximum Day Demand	(2.25) x (0.67 L/s) =	**1.51 L/s**
Peak Hour Demand	(4.00) x (0.67 L/s) =	**2.68 L/s**

[A] Average Day Demand from design factor (a) presented in Halton Water and Wastewater Linear Design Manual (2015). Refer to Appendix B.
[B] Max. Day Peaking Factor from design factor (b) presented in Halton Water and Wastewater Linear Design Manual (2015). Refer to Appendix B.
[C] Peak Hour Peaking Factor from "Table 2-2 Maximum Hourly Demand Peaking Factor", Halton Water and Wastewater Linear Design Manual (2015). Refer to Appendix B.

3.3 Fire Flow Demands

Fire flow demands for the proposed development were determined using the methodology outlined in the "Water Supply for Public Fire Protection" (Fire Underwriters Survey, 1999). The fire demands associated with the proposed building is summarized in Table 3.2 and detailed calculations can be found in the Appendix B.

TABLE 3.2 – REQUIRED FIRE FLOW

Building	Required Fire Flow [A]
Apartment Building	200 L/s
Total Required Water Demand for Site [B]	***201.51 L/s***

[A] Required Fire Flow for apartment building calculated using methodology outlined in FUS (1999).
[B] Total required water demand based on Max Day + Fire Flow.

3.4 Proposed Water Servicing Plan

Water servicing for the site will include the installation of a dual 150mm diameter fire service and 100mm diameter domestic watermain which will connect to the existing 300mm diameter watermain located on Masonry Court. The existing south fire hydrant within the Masonry Court boulevard is to be relocated to accommodate the proposed entrance and sidewalk.

The Region of Halton requires water distribution systems to maintain a minimum residual pressure of 140 kPa (20 psi) when subject to Maximum Day + Fire Flow demands. A hydrant flow test will be required to evaluate the available system pressure.

4.0 STORMWATER MANAGEMENT

4.1 Design Criteria

The stormwater management design criteria for the subject site as established by the City of Burlington are as follows:

i) Attenuation of the post-development peak flow rate for the 100-year storm event to the pre-development (existing) peak flow rate for the 5-year storm event; and
ii) Achieve "Enhanced" level water quality treatment (80% TSS removal).

4.2 Methodology

In order to successfully complete the stormwater management design for the site, the following tasks were undertaken:

i) Determined the pre-development impervious cover of the site and specific sub-catchment parameters for use in the SWMHYMO hydrologic modeling program;

ii) Calculated pre-development runoff hydrographs to establish the allowable runoff rates using the SWMHYMO hydrologic modeling program;
iii) Determined the post-development impervious cover of the site and specific sub-catchment parameters for use in the SWMHYMO hydrologic modeling program;
iv) Calculated post-development runoff hydrographs using the SWMHYMO hydrologic modeling program; and
v) Prepared the site grading and storm servicing to achieve runoff attenuation to meet the SWM criteria.

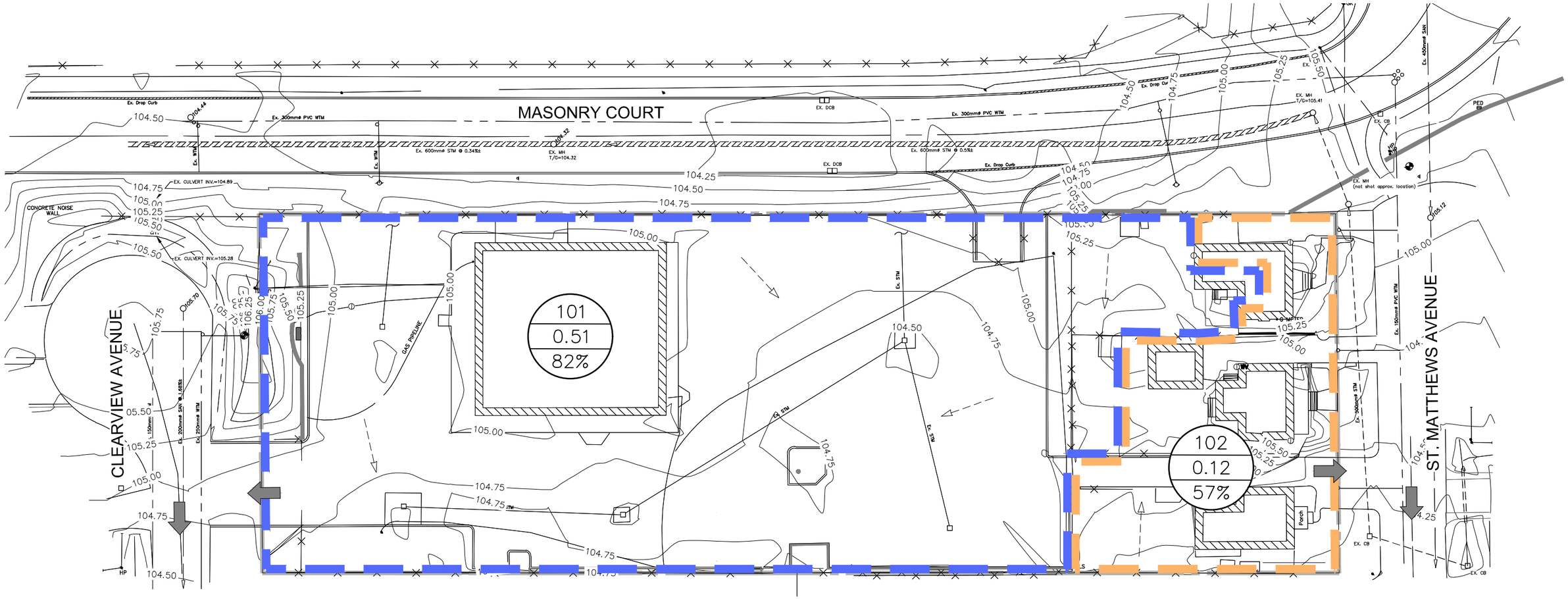
4.3 Existing Conditions

Under existing conditions, the development area is made up of four properties; a single storey commercial building and three dwellings along with associated sheds, driveways, parking and landscaped areas. The commercial portion of the site is serviced via an existing on-site storm sewer system which outlets to the existing 600mm diameter storm sewer within the Masonry Court right-of-way while the three dwellings have service connections to the existing 300mm diameter storm sewer within the St. Matthews Avenue right-of-way which ultimately outlets to the existing 600mm diameter storm sewer on Masonry Court. The overland flow route (major flows) for the commercial site does not follow the minor flows, instead flowing towards Clearview Avenue while the overland flow route for the single family dwelling properties matches their minor flows towards St. Matthews Avenue. The site is generally flat and can be delineated using two (2) catchment areas. Table 4.1 provides a brief description of the catchment areas as well as the size and impervious cover.

TABLE 4.1 – EXISTING CONDITIONS CATCHMENT AREAS

Catchment ID	Catchment Description	% Imp.	Area (ha)
101	Minor flows to Masonry Court, Major flows to Clearview Avenue	82%	0.51
102	Existing site discharging to St. Matthews Avenue	57%	0.12
Total			**0.63**

The existing conditions were assessed using the SWMHYMO hydrologic modeling program developed by J.F. Sabourin & Associates for the 2 to 100-year City of Burlington design storm (4-hour duration Chicago distribution). The existing minor flows to Masonry Court were estimated to be the 5-year flow rate calculated using the rational method as this is what the storm sewers would have been designed for (refer to Appendix C for calculations). Table 4.2 summarizes the pre-development runoff rates for each of the aforementioned design storm events.



LEGEND

- SITE BOUNDARY
- EXISTING SPOT ELEVATIONS/CONTOURS (326)
- EXISTING STORM SEWER (Ex. MH)
- CATCHMENT 101
- CATCHMENT 102
- OVERLAND FLOW ROUTE (MAJOR STORM)
- EXISTING DIRECTION OF DRAINAGE
- 101 / 0.51 / 82% — CATCHMENT ID / AREA (Ha) / % IMP

FIGURE 2

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PRE-DEVELOPMENT DRAINAGE AREA PLAN

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TABLE 4.2 – IDF PARAMETERS AND CORRESPONDING PRE-DEVELOPMENT RUNOFF RATES

Constant [A]	2-Yr.	5-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
A	592.60	697.40	798.50	926.90	1019.40	1114.20
B	6	5	5	5	5	5
C	0.780	0.764	0.763	0.762	0.761	0.761
Outlet	**Peak Flow Rate (m^3/s) [B]**					
101 Minor Flows to Masonry Court	0.080	**0.097**	0.097	0.097	0.097	0.097
101 Major Flows to Clearview Avenue	0.000	**0.008**	0.025	0.046	0.063	0.079
102 to St Matthews Avenue	0.013	**0.018**	0.022	0.026	0.029	0.033

[A] IDF parameters from City of Burlington's Standard Drawing Manual (1999). Refer to Appendix C.
[B] Q taken from SWMHYMO output for pre-development hydrologic model.

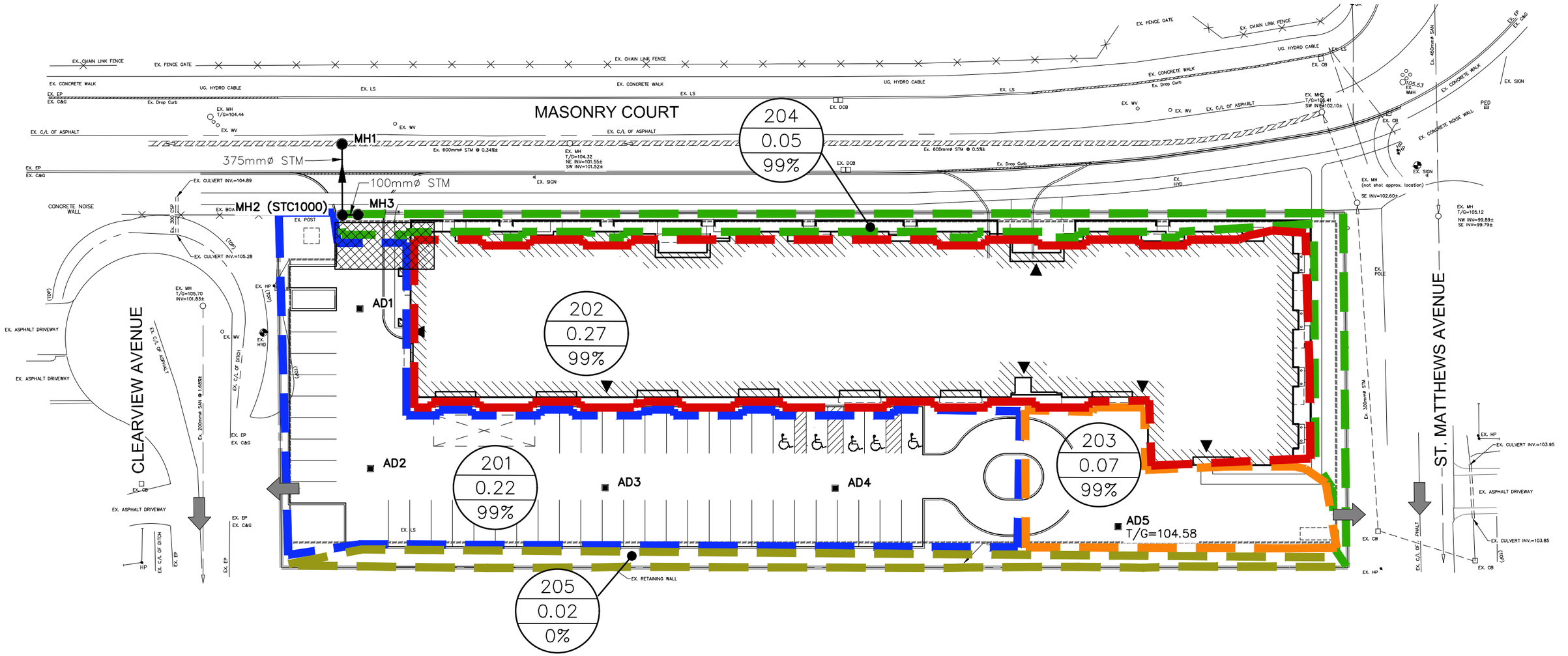
4.4 Proposed Conditions – Quantity Control

The proposed conditions drainage pattern is delineated by four (4) catchment areas (see Figure 3). Table 4.3 provides a brief description of each catchment area as well as the size and impervious cover associated with each. Areas located above the proposed underground parking structure were considered to be impervious. Stormwater runoff from the site will be conveyed to the existing 600mm diameter storm sewer located within the Masonry Court right-of-way. Due to grading constraints, emergency overland flows will continue to be directed towards Clearview Avenue and St. Matthews Avenue. Based on plan and profile drawings provided by the City of Burlington, the overland flow route for any emergency flows to Clearview Avenue and St. Matthews Avenue is southeast towards Plains Road East where it eventually flows into Lake Ontario.

TABLE 4.3 – PROPOSED CONDITIONS CATCHMENT AREAS

Catchment ID	Catchment Description	% Imp.[A]	Area (ha)
201	Minor flows to Masonry Court, major flows discharging to Clearview Avenue (controlled)	99%	0.22
202	Building Roof discharging to Masonry Court (controlled)	99%	0.27
203	Minor flows to Masonry Court, major flows discharging to St. Matthews Avenue (controlled)	99%	0.07
204	Proposed perimeter area of site discharging to Masonry Court (Uncontrolled)	99%	0.05
205	Proposed perimeter area of site discharging to Clearview Avenue (Uncontrolled)	0%	0.02
Total			**0.63**

[A] Landscaped surfaces over underground parking structures considered impervious as per City standards.



LEGEND

- SITE BOUNDARY
- EXISTING SPOT ELEVATIONS/CONTOURS (326)
- EXISTING STORM SEWER (Ex. MH)
- CATCHMENT 201
- CATCHMENT 202
- CATCHMENT 203
- CATCHMENT 204
- CATCHMENT 205
- OVERLAND FLOW ROUTE (MAJOR STORM)
- PROPOSED STORM SEWER (MH 21.3m–300mmø STM @ 1.30%)
- CATCHMENT ID (101) / AREA (Ha) (0.51) / % IMP (82%)
- UNDERGROUND STORM WATER TANK

FIGURE 3

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POST-DEVELOPMENT DRAINAGE AREA PLAN

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May 17, 2019 — 7:48 a.m. — Plotted By: jasztalos

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The grading design will direct emergency overland flows onto Clearview Avenue and St. Matthews Avenue similar to existing conditions if all on-site storage has been exhausted. Storm events up to and including the 100-year design storm will be captured and controlled to the existing 5-year storm event flow rate and conveyed to the existing Masonry Court storm sewer. The water will be conveyed to a stormwater management tank located within the underground parking area. A small 100mm diameter orifice pipe will be installed at the outlet of the SWM tank. Table 4.4 summarizes the stage-storage-discharge relationship for the controlled area.

TABLE 4.4 – STAGE-STORAGE-DISCHARGE RELATIONSHIP FOR ORIFICE CONTROL AT SWM TANK

Elevation (m)	Head (m)	Cumulative Storage Volume (m^3) [A]	Discharge, Q (m^3/s) [B]	Comments
101.91	0.00	0.0	0.0000	C/L of 100mm Orifice Pipe
102.57	0.66	50.6	0.0232	
104.25	2.34	195.0	0.0436	Top of Tank

[A] Storage volume based on tank volume.
[B] From orifice equation $Q=CA(2gH)^{0.5}$ for a 100mm diameter orifice pipe.
Where: C = 0.82, A=cross-sectional area, g=9.81, H=pressure head

The proposed conditions were assessed using the SWMHYMO hydrologic modeling program developed by J.F. Sabourin & Associates for the 2 to 100-year City of Burlington design storm (4-hour duration Chicago design storm). The proposed area drain inlet capacities were calculated using the Ontario Building Code and catchment areas. Table 4.5 summarizes the inlet capacities and storage volume provided for the two (2) catchments containing area drains. Table 4.6 summarizes the proposed conditions site discharge and compares them to the associated pre-development peak discharge (i.e. allowable discharge rate).

TABLE 4.5 – AREA DRAIN INLET CAPACITIES

Catchment ID	Area (ha)	15 min Rainfall (mm) [A]	Capacity, Q (m^3/s) [B]	Storage Volume Provided (m^3) [C]
201	0.20	23	0.051	102.1
203	0.15	23	0.038	21.4

[A] 15 minute rainfall from MMAH Supplementary Standard SB-1, “Climatic and Seismic Data”. Refer to Appendix C.
[B] Capacity from Ontario Building Code (OBC), Section 7.4.10.4.(1). Refer to Appendix C.
[C] Storage volume provided in the form of parking lot ponding. Refer to Appendix C for calculations.

TABLE 4.6 – POST-DEVELOPMENT SITE DISCHARGE

Storm Event	Site Peak Discharge Rates (m^3/s)					
	Proposed Conditions [A]			5-Year Allowable Conditions [B]		
	Clearview Avenue	St Matthews Avenue	Masonry Court	Clearview Avenue	St Matthews Avenue	Masonry Court
2-yr	0.001	0.000	0.035	0.008	0.018	0.097
5-yr	0.001	0.000	0.041			
10-yr	0.002	0.000	0.044			
25-yr	0.002	0.000	0.048			
50-yr	0.003	0.000	0.051			
100-yr	**0.003**	**0.000**	**0.054**			

[A] Total site discharge with SWM controls, taken from SWMHYMO output; refer to Appendix C.
[B] From Table 4.2.

TABLE 4.7 – POST-DEVELOPMENT STORAGE RQUIREMENTS

Catchment	100-Year Storm Event		
	Storage Provided (m^3) [A]	Storage Used (m^3) [B]	Depth of Ponding (m)
201	102	18	0.16 @ AD2, AD3 0.06 @ AD4 0 @ AD1
203	21	0	0 @ AD5
Tanks	195	181	---

[A] From Table 4.5.
[B] Total storage used from SWMHYMO output. Refer to Appendix C.

The analysis indicates the following:

- For all outlets, post development flows for all storm events are less than the pre-development peak discharge rate for the 5-year storm event as summarized in Table 4.6. This satisfies the stormwater management quantity control requirement set by the City of Burlington;
- There is sufficient storage volume provided on-site to attenuate the 100-year storm event to the 5-year pre-development level.

4.5 Proposed Conditions – Quality Control

Stormwater quality control for the site will be provided by a Stormceptor oil/grit separator (or approved equivalent) that will be installed at the downstream end of the proposed on-site storm sewer system prior to connecting to the existing 600mm diameter storm sewer located within the Masonry Court right-of-way.

The following parameters were used to size the oil/grit separator device:

- Catchment Area (201+202+203) = 0.56 ha

- % Imperviousness = 83% (calculated via weighted average)
- Particle Distribution = Fine

The analysis indicates that a Stormceptor STC-1000 will provide 80% TSS removal which meets the requirements for an “Enhanced” (Level 1, or 80% TSS removal) level of water quality protection. The Stormceptor sizing output information is included in Appendix C.

5.0 EROSION AND SEDIMENT CONTROL

During construction, erosion and sedimentation controls will be provided primarily via a sediment control fence to be erected around the perimeter of the construction area wherever runoff has the potential of leaving the site or entering into the storm sewer system. All proposed on-site catchbasin manholes and nearby off-site catchbasins will be fitted with silt sacks within the structures to mitigate sediment transport during construction. A mudmat will be constructed at the proposed accesses from Masonry Court to mitigate the transport of sediments to the surrounding roads.

All erosion and sediment controls must be inspected and maintained regularly for the full duration of construction until the Engineer or the City approves removal of the measures. The Contractor shall inspect all erosion and sediment controls weekly and after any rainfall event and rectify any deficiencies immediately.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information provided herein, it is concluded that the development can be constructed to meet the servicing requirements of the City of Burlington and the Region of Halton. Based on the foregoing analysis, it is concluded that:

- Sanitary service for the proposed development can be achieved with a 150mm diameter pipe at a 1% slope connecting to the existing 450mm diameter sanitary sewer on St. Matthews Avenue;
- Water servicing will be provided via a dual 100mm diameter domestic and 150mm diameter fire service connected to the existing 300mm diameter watermain located on Masonry Court. The existing south hydrant within the Masonry Court boulevard will need to be relocated to accommodate the proposed entrance and sidewalk;
- A hydrant flow test will need to be conducted to ensure pressures in the system are sufficient to service the site;
- The peak flow rates for the 2 to 100-year design storm events under post-development conditions match pre-development 5-year rates, therefore meeting the City of Burlington’s requirements;
- Stormwater quality control can be provided in the form of an OGS unit along with other best management practices.

It is recommended that:

- The site grading be undertaken according to the proposed elevations, details and erosion control measures shown on the enclosed engineering drawings;
- The oil/grit separator unit be installed as detailed on the enclosed engineering drawings;
- Erosion and sediment control measures are to be installed as outlined in this report and as per the engineering drawings and maintained until the site is stabilized;
- The proposed stormwater management plan presented in this report and the site servicing works illustrated on the attached engineering drawings be accepted in support of the site plan approval process.

All of which is respectfully submitted,

MTE CONSULTANTS INC.



Kayam Ramsewak, P.Eng., C.E.T.
Manager, Civil Engineering

ALP

APPENDIX A

WASTEWATER CALCULATIONS

6 Storey Residential Development
1085 Clearview Avenue, Burlington, ON
MTE Project #: 44795-100
Date: 12/10/2018

Sanitary Demand Calculations

Location	Residential					Commercial & Restaurant		Total (Residential + Commercial + Restaurant)		
	Area [1] (ha)	Units [2]	Population Density [3] (pph)	Population (persons)	Demand (L/s)	Area (ha)	Demand (L/s)	Total Average Demand (L/s)	Total Peaked Demand (L/s)	Total Peaked Demand + Infiltration (L/s)
Existing										
Dwellings	0.154		55.0	8	0.027			0.027	0.119	
Commercial Building	0.473		90.0	43		0.47	0.135	0.135	0.466	
Sub Total	0.627			51	0.027			0.162	0.585	0.76
Proposed										
1 Bedroom Apartments	0.627	121	1	121	0.385			0.385	1.600	
2 Bedroom Apartments		35	2	70	0.223			0.223	0.927	
Total		156		191	0.608			**0.608**	**2.526**	**2.71**

Sanitary Demand		
Residential Daily Demands [4]	275	L/ca/day
	0.0032	L/ca/sec
Harmon PF [5] (Ex. Dwellings)	4.42	
Harmon PF [5] (Ex. Commercial)	3.46	
Harmon PF [5] (Prop. Residential)	4.16	
Commercial Space Daily Demands [6]	24750	L/ha/d
	0.2865	L/ha/s
Site Area	0.627	ha
Infiltration Allowance [7]	0.286	L/s/ha
	0.179	L/s

Note 1: Area based on existing topographic survey and proposed site plan
Note 2: Unit count based on unit type analysis provided by Architect
Note 3: Population Density based on Halton Region Design Standards (existing) and OBC 3.1.17.1.1ci (proposed) since more conservative than Halton Region Design Standards
Note 4: Residential Demand based on Halton Region Design Standards
Note 5: Harmon Peaking Factor = 1 + (14/(4+(P/1000)^{½})), 5.0 max (modified 0.8PF for commercial)
Note 6: Commercial Space Demand based on Halton Region Design Standards
Note 7: Infiltration allowance based on Halton Region Design Standards

3.1.16. Fabrics

3.1.16.1. Fabric Awnings, Canopies and Marquees

(1) Fabrics used as part of an awning, *canopy* or *marquee* that is located within or attached to a *building* of any type of construction shall conform to CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films".

3.1.17. Occupant Load

3.1.17.1. Occupant Load Determination

(1) The *occupant load* of a *floor area* or part of a *floor area*, or of a *building* or part of a *building* not having a *floor area*, shall be based on,
(a) the number of seats in an *assembly occupancy* having fixed seats,
(b) two persons per sleeping room or sleeping area in a *dwelling unit* or *suite*, or
(c) the number of persons,
  (i) for which the area is designed, or
  (ii) determined from Table 3.1.17.1. for *occupancies* other than those described in Clauses (a) and (b).

(2) If a *floor area* or part of it has been designed for an *occupant load* other than that determined from Table 3.1.17.1., a permanent sign indicating that *occupant load* shall be posted in a conspicuous location.

(3) For the purposes of this Article, *mezzanines*, tiers and balconies shall be regarded as part of the *floor area*.

(4) If a room or group of rooms is intended for different *occupancies* at different times, the value to be used from Table 3.1.17.1. shall be the value that gives the greatest number of persons for the *occupancies* concerned.

(5) Except as provided by Sentence (6) or (7), in dining, alcoholic beverage and cafeteria spaces the *occupant load* shall be determined from Table 3.1.17.1.

(6) The *occupant load* in Sentence (5) is permitted to be the number of persons for which the space is designed.

(7) The *occupant load* in Sentence (6) shall be not more than that determined by using an area of 0.6 m^2 per person.

Table 3-1 Residential Dry Weather Flow

Type of Development	Equivalent Population Density (persons/hectare)	Unit Sewage Flow	
		m^3pcd	m^3/person/s
Single Family	55	0.275	0.003183×10^{-3}
Semi-detached, duplex and 4-plex	100	0.275	0.003183×10^{-3}
Townhouse, Maisonette (6 storey apt. or less)	135	0.275	0.003183×10^{-3}
Apartment (over 6 stories High)	285	0.275	0.003183×10^{-3}

Notes:
1) m^3pcd = metres^3 per capita per day
2) m^3/ha/s = metres^3 per hectare per second
3) m^3/ha/day = metres^3 per hectare per day

Table 3-2 Commercial, Industrial, and Community Dry Weather Flow

Type of Development	Equivalent Population Density (persons/hectare)	Unit Sewage Flow	
		m^3/ha/day	m^3/ha/s
Light Commercial Areas	90	24.750	0.28646×10^{-3}
Community Services	40	11.000	0.12732×10^{-3}
Light Industrial Areas	125	34.375	0.003183×10^{-3}
Hospitals	4 persons per bed	1.1 m^3/bed/day	0.0127×10^{-3} m^3/bed/s

Notes:
1) m^3pcd = metres^3 per capita per day
2) m^3/ha/s = metres^3 per hectare per second
3) m^3/ha/day = metres^3 per hectare per day

3.2.3. Peak Wastewater Flow Factor

a. Residential and Community Services Land Use

The peak wastewater flow will be derived by applying the ratio established by the Harmon Formula to the average wastewater flow for residential and community services areas as follow:

$$M = 1 + \frac{14}{4 + \sqrt{P}}$$

where, M = ratio of peak flow to average flow
P = tributary population in thousands

Note: The minimum permissible peaking factor M is 2.0

The value of M for tributary population up to 13,200 can be obtained from Halton Standard RH 2002.01.

b. Commercial and Industrial Land Use

For commercial and industrial land uses, the peaking factor will be determined from a modified Harmon Formula as follows:

$$M_e = 0.80 \cdot (1 + \frac{14}{4 + \sqrt{P_e}})$$

where, M_e = ratio of peak flow to average flow
P_e = equivalent tributary population in thousands

c. Combined Land Use

When a tributary area consists of residential, industrial and commercial land uses, the peaking factor shall be calculated using the modified Harmon Formula as follow:

$$M_{av} = K_{av}\ x\ (1 + \frac{14}{4 + \sqrt{P + P_e}})$$

where,

$$K_{av} = \frac{A_R + 0.80\ x\ (A_I + A_C)}{A_R + A_I + A_C}$$

and A_R = residential area
A_I = industrial area
A_C = commercial area

3.2.4. Inflow/Infiltration Allowance

a. Except under unusual circumstances, the inflow/infiltration allowance shall be a minimum of 0.286×10^{-3} m^3s/ha for all types of land use.

3.3. Pipe Size

3.3.1. To determine the pipe size and its capacity, the Halton Standard Design Table RH 2000 or Manning's Formula shall be used. Manning's Formula is expressed as:

$$Q = \frac{1}{n} R^{2/3} \; x \; S^{1/2} \; x \; A$$

where,

Q	=	design flow (m^3/sec)
n	=	coefficient of roughness (dimensionless)
R	=	hydraulic radius (m)
S	=	slope (m/m)
A	=	section area of flow (m^2)

Table 3-3 Coefficient of Roughness Values

Type of Pipe	Coefficient of Roughness (n)
Vitrified Clay (VC)	0.013
Concrete	0.013
Polyvinyl Chloride (PVC)	0.010*
Polyethylene (PE)	0.010*

Note: *For Master Plans, Secondary Plans, Area Servicing Plans and all local municipal plans, the coefficient of Roughness Values for PVC and PE shall be 0.013.

3.3.2. For residential areas, the minimum pipe shall be 200 mm diameter.

3.3.3. For commercial and industrial areas, the minimum pipe size shall be 300 mm diameter.

3.4. Flow Velocities

3.4.1. The flow velocity shall be determined from the Halton Standard Design Table RH 2000 or from the following:

$$V = \frac{Q}{A}$$

where,

V	=	flow velocity (m/sec)
Q	=	design flow (m^3/sec)
A	=	cross section area of flow (m^2)

The minimum velocity in a pipe shall be 0.6 m/sec based on actual flows.

APPENDIX B

WATER CALCULATIONS

6 Storey Residential Development

1085 Clearview Avenue, Burlington, ON
MTE Project #: 44795-100
Date: 12/10/2018

Residential Peaking Factors[1]:	
Avg. Day	1.0
Max. Day	2.25
Peak Hour	4.0

MTE More Than Engineering

Water Demand Calculations

	Residential				Final Demand		
Location	Units (ea)	Population Density (persons/unit) [2]	Population (persons)	Demand (L/s)	Avg Day Demand Qavg (L/s)	Max Day Demand Qmax.day (L/s)	Peak Hour Demand Qpeak (L/s)
Residential							
1 Bedroom Apartments	121	1.0	121	0.385	0.385	0.867	1.541
2 Bedroom Apartments	35	2.0	70	0.223	0.223	0.501	0.891
Sub Total	156		191	0.608	**0.608**	**1.368**	**2.432**
Totals					***0.608***	***1.368***	***2.432***

Water Demand [3]	
Average Residential Daily Demands	275 L/d/person
	0.0032 L/s/person

Fire Flow [4]	
Fire Flow (Hyatt Hotel)	200 L/s

Max Day + Fire Flow Demand	
Qmax.day+fire (Hyatt Hotel)	201.37 L/s

Note 1: Peaking factors based on Halton Region Design Guidelines
Note 2: Residential Population Density based on OBC 3.1.17.1.1(c)(i)
Note 3: Water Demands based on Halton Region Design Guidelines
Note 4: Fire flows calculated using FUS (1999) guidelines - See attached worksheet

d. Proposing pressure reducing valves to ensure pressures are within standard operating limits, and

e. Adjusting zone boundaries to ensure pressures are within standard operating limits.

2.2.3. Individual hydraulic and capacity studies may be required for development areas.

2.3. Equivalent Population

2.3.1. The equivalent population densities listed in Table 2-1 shall be used to estimate the design of the water service connection demand for the different types of development.

Table 2-1 Equivalent Population Density and Water service connection Demand

Type of Development	Equivalent Population Density (Person/Hectare)	Average Day Service Demands (m^3/ha/day)
Single Family	55	15.125
Semi-detached duplex and 4-plex	100	27.5
Townhouse, Maisonette (6 storey apt. or less)	135	37.125
Apartments (over 6 stories high)	285	78.375
Light Commercial Areas	90	24.75
Community Services	40	11.00
Light Industrial Areas	125	34.375
Hospitals	4 persons/bed	

2.4. Design Factors

2.4.1. The following are the design factors for water distribution systems:

a. Average Daily Demand = 0.275 m^3 per capita

b. Maximum Daily Demand Peaking Factor = 2.25

c. Maximum Hourly Demand Peaking Factor: See Table 2-2

Table 2-2 Maximum Hourly Demand Peaking Factor

Type of Development	Maximum Hourly Demand Peaking Factor
Residential	4.00
Industrial	2.25
Commercial	2.25
Community Services	2.25

6 Storey Residential Development

1085 Clearview Avenue, Burlington, ON
MTE Project #: 44795-100
Date: 12/10/2018

FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES)

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 1999).

An estimate of the fire flow required is given by the following formula:

$$F = 220\,C\sqrt{A}$$

where:

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible).
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
= 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = Total floor area in square metres

Adjustments to the calculated fire flow can be made based on occupancy, sprinkler protection and exposure to other structures. The table below summarizes the adjustments made to the basic fire flow demand.

			(1)		(2)		(3)		(4)		**Final Adjusted**		
Building	Area "A" [A] (m^2)	C [B]	Fire Flow "F"		Occupancy		Sprinkler		Exposure		**Fire Flow**		
			(l/min)	(l/s)	%	Adjusted Fire Flow (L/min)	%	Adjustment (L/min)	%	Adjustment (L/min)	**(L/min)**	**Rounded(L/min)**	**(L/s)**
Apartments	11,060	0.8	19,000	316.7	-15	16,150	-40	-6,460	15	2,423	12,113	12,000	**200**

Note [A]: Area "A" represents the Gross Floor Area as indicated on the unit matrix.
Note [B]: Construction type confirmed by the Architect

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	No charge
Free Burning	15%
Rapid Burning	25%

(3) Sprinkler

40% credit for adequately designed system per NFPA 13. Additional 10% if water supply standard for both the system and fire department hose lines.

(4) Exposure

0 to 3m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
30.1 to 45m	5%	exceed 75%

NW	> 45m	0
NE	42.30m	5
SE	20.10m	10
SW	> 45m	0
	TOTAL	15

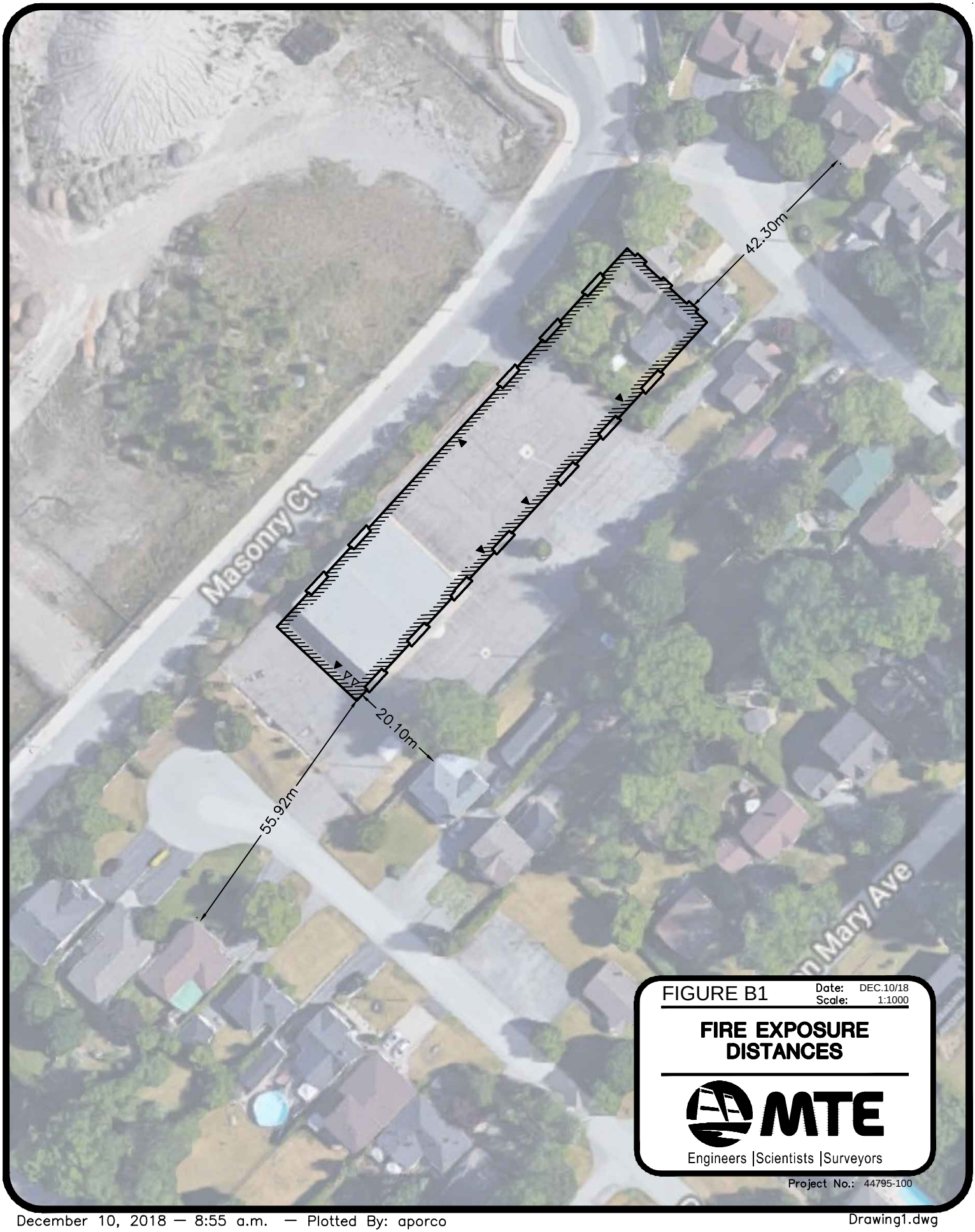


FIGURE B1

Date: DEC.10/18
Scale: 1:1000

FIRE EXPOSURE DISTANCES

MTE
Engineers | Scientists | Surveyors

Project No.: 44795-100

December 10, 2018 — 8:55 a.m. — Plotted By: aporco

Drawing1.dwg

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

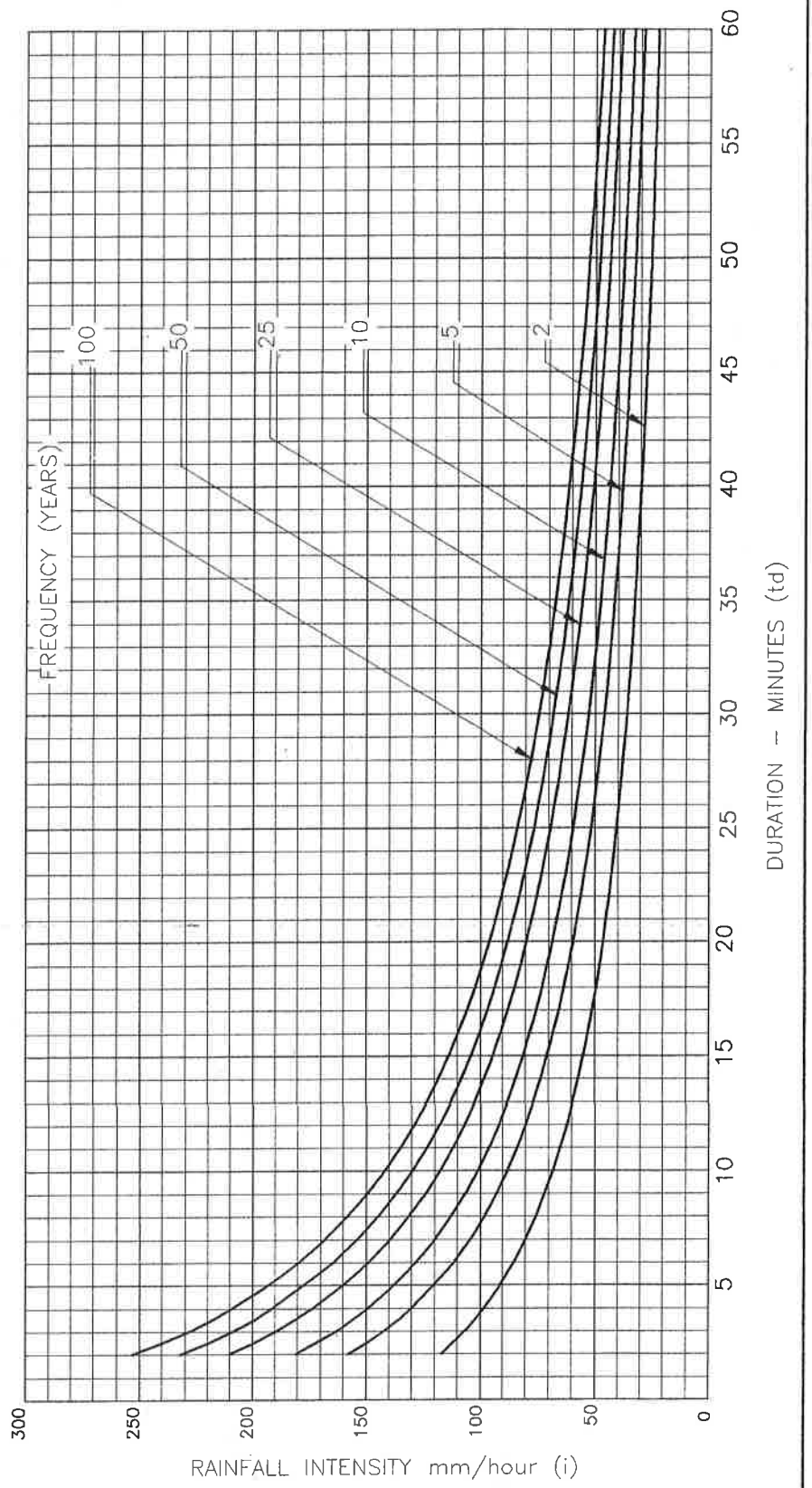
DATE: JUNE/98	REV. 2

EQUATION OF CURVE

$$i_{100} = \frac{1114.20}{(td+5)^{0.761}} \qquad i_{10} = \frac{798.50}{(td+5)^{0.763}}$$

$$i_{50} = \frac{1019.40}{(td+5)^{0.761}} \qquad i_{5} = \frac{697.40}{(td+5)^{0.764}}$$

$$i_{25} = \frac{926.90}{(td+5)^{0.762}} \qquad i_{2} = \frac{592.60}{(td+6)^{0.780}}$$



APPROVED	CITY OF BURLINGTON	METRIC
J. Eidsvaag	ENGINEERING DEPARTMENT	SCALE: N.T.S.
DIRECTOR OF ENGINEERING		
DATE: Feb. 17/99	INTENSITY, DURATION, FREQUENCY CURVES	DWG. NO. S-IDF

1085 Clearview Avenue
City of Burlington
Stormwater Management

EXISTING CONDITIONS ALLOWABLE RELEASE RATE

Catchment ID	Catchment Description	Hydrograph Method	Area (ha)	Perv. CN	Perv. Ia (mm)	Impervious (%)		Flow Length (m)		Manning "n"		Slope (%)		Time to Peak Tp (hrs)
						TIMP	XIMP	Perv.	Imperv.	Perv.	Imperv.	Perv.	Imperv.	
101	Minor flows to Masonry Court, Major Flows to Clearview Avenue	STANDHYD	0.51	74	8.92	82	82	5	10	0.250	0.013	2.0	1.0	
102	Existing site to St. Matthews Avenue	STANDHYD	0.12	74	8.92	57	57	5	15	0.250	0.013	2.0	1.0	
Total			**0.63**											

PROPOSED CONDITIONS HYDROLOGIC MODELING PARAMETERS

Catchment ID	Catchment Description	Hydrograph Method	Area (ha)	Perv. CN	Perv. Ia (mm)	Impervious (%)		Flow Length (m)		Manning "n"		Slope (%)		Time to Peak Tp (hrs)
						TIMP	XIMP	Perv.	Imperv.	Perv.	Imperv.	Perv.	Imperv.	
201	Proposed site to Clearview Avenue	STANDHYD	0.22	74	8.92	95	95	5	35	0.250	0.013	2.0	1.0	
202	Proposed roof to Masonry Court	STANDHYD	0.27	74	8.92	99	99	10	15	0.250	0.013	2.0	1.0	
203	Proposed site to St. Matthews Avenue	STANDHYD	0.07	74	8.92	99	99	10	15	0.250	0.013	2.0	1.0	
204	Proposed site to Masonry Court (uncontrolled) and Matthews	STANDHYD	0.05	74	8.92	99	99	3	3	0.250	0.013	2.0	1.0	
205	Landscape flow south west to rear lot properties (uncontrolled)	NASH	0.02	74	8.92									0.02
Total			**0.63**											

- Pervious Initial Abstraction (Perv. Ia) = (0.1 x S), where S = (25400 / CN) - 254
- Depression Storage over Impervious areas (DPSI) = 1.0mm

Burlington, Ontario
STORMWATER MANAGEMENT

Time to Peak Calculations

Time to peak (Tp) values derived from time of concentration (Tc) calculations based on the Airport Method Equation:

$$T_c = \frac{3.26\,(1.1-C)\,L^{0.5}}{S_w^{\,0.33}}$$ *(MTO Drainage Manual Design Chart 1.12)*

T_c = Overland flow time of concentration (min)

L = Flow length for impervious area = (Area/1.5) $^{0.5}$ Area in m^2

S = Basin slope (%)

C = Runoff coefficient

From this, **Time-to-peak (Tp) = 0.67 Tc**

The time to peak values used in the NASHYD command for the proposed conditions hydrologic modeling are shown below.

Catchment ID	Area (ha)	Length (m)	"C"	Slope (m/m)	Tc (min)	Tp (min)	Tp (hrs)
205	0.02	2	0.20	0.2	1.54	1.03	0.02

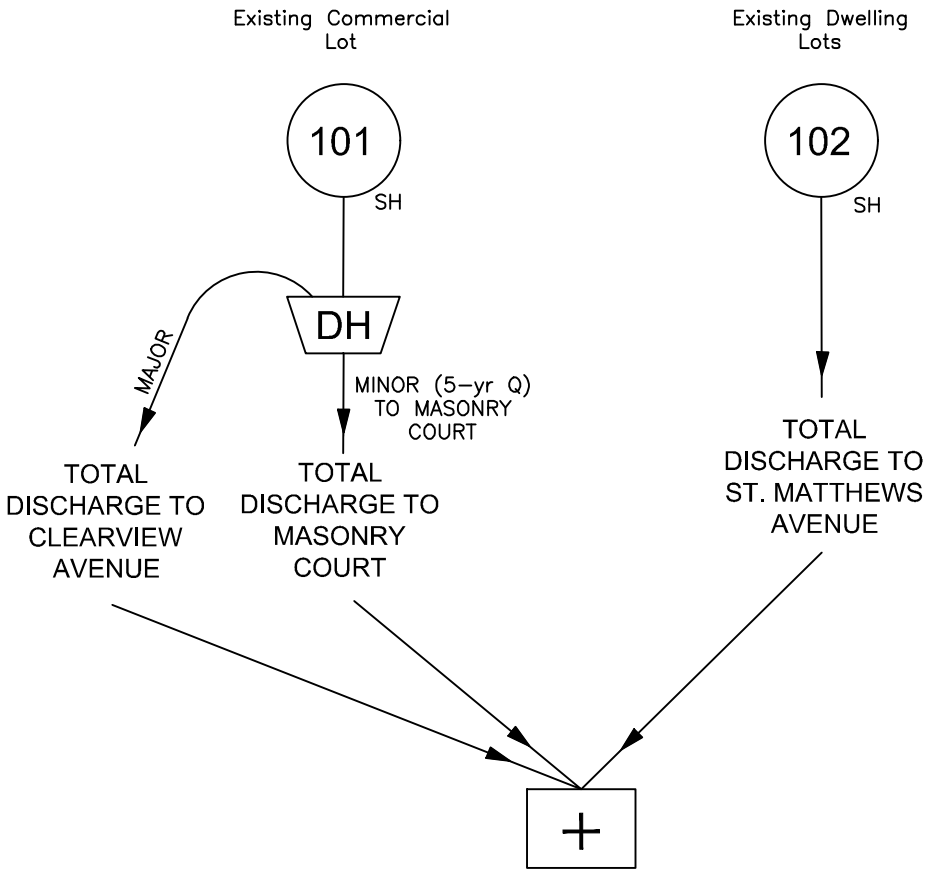
1085 Clearview Avenue
City of Burlington
STORMWATER MANAGEMENT

Project Number: 44795-100
Date: May 17, 2019
File: Q:\44795\100\SWM\44795-100 SWM Calculations.xlsx

Orifice Calculations for Catchment 201 $Q_o=C_d*A_o*(2*g*H_o)^{0.5}$		
	Orifice	**Description**
C_d	0.82	Orifice Pipe
Invert (m)	101.86	
CL elevation (m)	101.91	
Diameter (mm)	100	
Type (H/V)	V	

STAGE-STORAGE-DISCHARGE RELATIONSHIP

Description	**Stage**	**Incremental Volume**	**Cumulative Volume**	**Orifice**		
				Orifice Area	**H_o**	**Flow**
	m	m^3	m^3	m^2	*m*	m^3/s
C/L of orifice	101.91	0.0	0.0	0.008	0.00	0.0000
	102.57	50.6	50.6	0.008	0.66	0.0232
Top of Tank	104.25	144.4	195.0	0.008	2.34	0.0436



TOTAL DISCHARGE FROM SITE

LEGEND

101	CATCHMENT ID	- "SH" denotes STANDHYD hydrograph command
+	ADD HYDROGRAPHS	- "DH" denotes DUALHYD hydrograph command

Date: DEC. 10/18

PRE DEVELOPMENT SWM MODEL SCHEMATIC

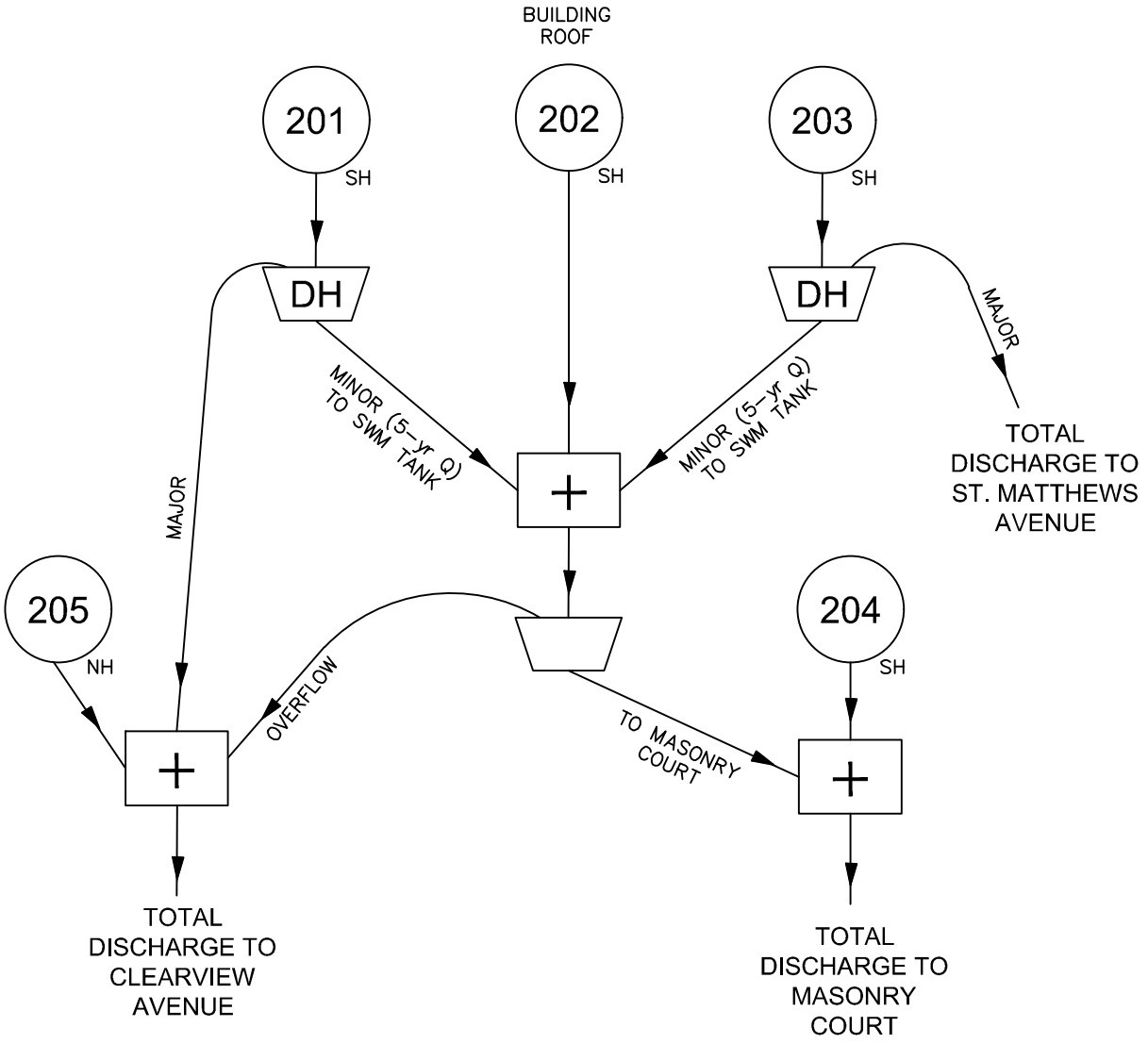
MTE

Engineers | Scientists | Surveyors

Project No.: 44795-100

January 11, 2019 — 2:10 p.m. — Plotted By: aporco

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LEGEND

201 — CATCHMENT ID

\+ — ADD HYDROGRAPHS

ROUTE RESERVOIR

- "SH" denotes STANDHYD hydrograph command
- "NH" denotes NASHYD hydrograph command
- "DH" denotes DUALHYD hydrograph command

Date: DEC. 10/18

POST DEVELOPMENT SWM MODEL SCHEMATIC

MTE

Engineers | Scientists | Surveyors

Project No.: 44795-100

May 17, 2019 — 3:27 p.m. — Plotted By: jasztalos

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00004> *#               BURLINGTON, ONTARIO
00005> *#  JOB NUMBER  : 44795-100
00006> *#       Date   : MAY 2019
00007> *#  Modeller    : ALP
00008> *#    Company   : MTE CONSULTANTS INC.
00009> *#       File   : 44795.DAT
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00016> *#########################################################################|
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00018> *#                     EXISTING CONDITIONS HYDROLOGIC MODELING
00019> *#                  ================================================
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00021> *#########################################################################|
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00034> *Note: Minor system for commercial lot outlets to storm sewer on Masonry Court
00035> *Major overland flows proceed to Clearview Avenue
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00058> *#
00059> *#                     PROPOSED CONDITIONS HYDROLOGIC MODELING
00060> *#                  ================================================
00061> *#
00062> *#########################################################################|
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00064> *AREA 201 - Minor Flow to Masonry Court, Major Flow to Clearview Avenue
00065> *#*************************************************************************|
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00087>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00088>                     SCS curve number CN=[74],
00089>                     Pervious   surfaces: IAper=[8.92](mm), SLPP=[2.0](%),
00090>                                          LGP=[10](m), MNP=[0.250], SCP=[0](min),
00091>                     Impervious surfaces: IAimp=[1](mm), SLPI=[1.0](%),
00092>                                          LGI=[15](m), MNI=[0.013], SCI=[0](min),
00093>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00094> *%-----------------|-------------------------------------------------------|
00095> *#*****************************************************************|
00096> *AREA 203 - Minor Flow to Masonry Court, Major Flow to St. Matthews Avenue
00097> *#*****************************************************************|
00098> CALIB STANDHYD      ID=[4], NHYD=["203"], DT=[1.0](min), AREA=[0.07](ha),
00099>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00100>                     SCS curve number CN=[74],
00101>                     Pervious   surfaces: IAper=[8.92](mm), SLPP=[2.0](%),
00102>                                          LGP=[10](m), MNP=[0.250], SCP=[0](min),
00103>                     Impervious surfaces: IAimp=[1](mm), SLPI=[1.0](%),
00104>                                          LGI=[15](m), MNI=[0.013], SCI=[0](min),
00105>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00106> *%-----------------|-------------------------------------------------------|
00107> *Note: Minor system for 203 outlets to storm sewer on Masonry Court
00108> *Major overland flows proceed to St. Matthews Avenue
00109> *%-----------------|-------------------------------------------------------|
00110> COMPUTE DUALHYD     IDin=[4], CINLET=[0.038](cms), NINLET=[1],
00111>                     MAJID=[5], MajNHYD=["ST.MATT"],
00112>                     MINID=[6], MinNHYD=["202mnr"],
00113>                     TMJSTO=[21.4](cu-m)
00114> *%-----------------|-------------------------------------------------------|
00115> *#*****************************************************************|
00116> *AREA 204 - Site Perimeter Uncontrolled to Masonry Court
00117> *#*****************************************************************|
00118> CALIB STANDHYD      ID=[7], NHYD=["204"], DT=[1.0](min), AREA=[0.05](ha),
00119>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00120>                     SCS curve number CN=[74],
00121>                     Pervious   surfaces: IAper=[8.92](mm), SLPP=[2.0](%),
00122>                                          LGP=[3](m), MNP=[0.250], SCP=[0](min),
00123>                     Impervious surfaces: IAimp=[1](mm), SLPI=[1.0](%),
00124>                                          LGI=[3](m), MNI=[0.013], SCI=[0](min),
00125>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00126> *%-----------------|-------------------------------------------------------|
00127> *ADD TOTAL DRAINAGE TO TANK
00128> ADD HYD             IDsum=[8], NHYD=["TOTANK"], IDs to add=[1,3,6]
00129> *%-----------------|-------------------------------------------------------|
00130> *Control to Masonry Court via orifice plate on outlet from tank
```

```
00131> *%-----------------|-------------------------------------------------------|
00132> ROUTE RESERVOIR     IDout=[6],   NHYD=["CTL-TANK"],  IDin=[8],
00133>                     RDT=[1](min),
00134>                           TABLE of ( OUTFLOW-STORAGE ) values
00135>                                     (cms) - (ha-m)
00136>  0.0000    0.00000
00137>  0.0232    0.00506
00138>  0.0436    0.01950
00139>                                      -1       -1   (max twenty pts)
00140>                           IDovf=[1], NHYDovf=["OVF-TANK"]
00141> *%-----------------|-------------------------------------------------------|
00142> *ADD TOTAL DRAINAGE TO MASONRY
00143> ADD HYD             IDsum=[3], NHYD=["MASONRY"], IDs to add=[6,7]
00144> *%-----------------|-------------------------------------------------------|
00145> *#*****************************************************************|
00146> *AREA 205 - Site Perimeter Uncontrolled to Clearview
00147> *#*****************************************************************|
00148> CALIB NASHYD        ID=[7] NHYD=["205"], DT=[1.0]min, AREA=[0.02](ha),
00149>                     DWF=[0](cms),  CN/C=[74], IA=[8.92](mm),
00150>                     N=[3], TP=[0.02]hrs,
00151>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00152> *%-----------------|-------------------------------------------------------|
00153> *ADD TOTAL DRAINAGE TO CLEARVIEW
00154> ADD HYD             IDsum=[4], NHYD=["CLEARVIEW"], IDs to add=[1,2,7]
00155> *%-----------------|-------------------------------------------------------|
00156> *ADD TOTAL DRAINAGE FROM SITE
00157> ADD HYD             IDsum=[9], NHYD=["PROP"], IDs to add=[3,4,5]
00158> *%-----------------|-------------------------------------------------------|
00159> *AREA CHECK
00160> ADD HYD             IDsum=[8], NHYD=["CHECK"], IDs to add=[9,10]
00161> *%-----------------|-------------------------------------------------------|
00162> *%-----------------|-------------------------------------------------------|
00163> * RUN REMAINING DESIGN STORMS (City of Burlington 4-hour duration 5 TO 100-YR)
00164> *
00165> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[005]
00166>                     {"BURL_005.stm"]
00167>
00168> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[010]
00169>                    ["BURL_010.stm"]
00170>
00171> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[025]
00172>                    {"BURL_025.stm"]
00173>
00174> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[050]
00175>                    ["BURL_050.stm"]
00176>
00177> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[100]
00178>                    ["BURL_100.stm"]
00179>
00180> *%-----------------|-------------------------------------------------------|
00181> FINISH
00182>
00183>
00184>
00185>
00186>
00187>
00188>
00189>
00190>
00191>
00192>
00193>
00194>
00195>
```

00196>
00197>
00198>
00199>
00200>
00201>
00202>
00203>
00204>

```
00001> ================================================================================
00002>
00003>    SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>    S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>    SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>        S   W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>    SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
00008>                                                          9   9  9   9   # 3053466
00009>         StormWater Management HYdrologic Model            999    999    =========
00010>
00011>  ********************************************************************************
00012>  ***************************** SWMHYMO Ver/4.05  ****************************
00013>  *********  A single event and continuous hydrologic simulation model  *********
00014>  *********     based on the principles of HYMO and its successors      *********
00015>  *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
00016>  ********************************************************************************
00017>  ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
00018>  *********                  Ottawa,  Ontario: (613) 836-3884           *********
00019>  *********                  Gatineau, Quebec: (819) 243-6858           *********
00020>  *********                  E-Mail: swmhymo@jfsa.Com                   *********
00021>  ********************************************************************************
00022>
00023>  +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  +++++++++ Licensed user: MTE Consultants Inc.                          +++++++++
00025>  +++++++++                Burlington           SERIAL#:3053466        +++++++++
00026>  +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ********************************************************************************
00029>  *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
00030>  *********           Maximum value for ID numbers  :     10            *********
00031>  *********           Max. number of rainfall points: 105408            *********
00032>  *********           Max. number of flow points    : 105408            *********
00033>  ********************************************************************************
00034>
00035>
00036>  **********************   D E T A I L E D   O U T P U T   **********************
00037>  ********************************************************************************
00038>  *         DATE: 2019-05-17     TIME: 15:21:39     RUN COUNTER: 001188         *
00039>  ********************************************************************************
00040>  * Input   filename: Q:\44795\100\SWM\SWMHYMO\44795.dat                          *
00041>  * Output  filename: Q:\44795\100\SWM\SWMHYMO\44795.out                          *
00042>  * Summary filename: Q:\44795\100\SWM\SWMHYMO\44795.sum                          *
00043>  * User comments:                                                               *
00044>  * 1:_____________________________________________________________________________*
00045>  * 2:_____________________________________________________________________________*
00046>  * 3:_____________________________________________________________________________*
00047>  ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001----------------------------------------------------------------------
00051> *#*****************************************************************************|
00052> *#  Project Name: 1085 CLEARVIEW AVENUE
00053> *#               BURLINGTON, ONTARIO
00054> *#  JOB NUMBER  : 44795-100
00055> *#       Date   : MAY 2019
00056> *#  Modeller    : ALP
00057> *#    Company   : MTE CONSULTANTS INC.
00058> *#       File   : 44795.DAT
00059> *
00060>   ** END OF RUN :   1
00061>
00062> ********************************************************************************
00063>
00064>
00065>
```

```
00066>
00067>
00068> --------------------
00069> | START            |  Project  dir.: Q:\44795\100\SWM\SWMHYMO\
00070> --------------------  Rainfall dir.: Q:\44795\100\SWM\SWMHYMO\
00071>     TZERO =   .00 hrs on        0
00072>     METOUT=   2 (output = METRIC)
00073>     NRUN  = 002
00074>     NSTORM=   1
00075>            #  1=BURL_002.stm
00076> ------------------------------------------------------------------------------
00077> 002:0002---------------------------------------------------------------------
00078> *#*************************************************************************|
00079> *#  Project Name: 1085 CLEARVIEW AVENUE
00080> *#               BURLINGTON, ONTARIO
00081> *#  JOB NUMBER  : 44795-100
00082> *#       Date   : MAY 2019
00083> *#  Modeller    : ALP
00084> *#    Company   : MTE CONSULTANTS INC.
00085> *#       File   : 44795.DAT
00086> *
00087> ------------------------------------------------------------------------------
00088> 002:0002---------------------------------------------------------------------
00089> --------------------
00090> | READ STORM       |    Filename: 2-YR BURLINGTON CHICAGO STORM (4-HR DURA
00091> | Ptotal=  32.34 mm|    Comments: 2-YR BURLINGTON CHICAGO STORM (4-HR DURA
00092> --------------------
00093>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00094>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00095>                .17   2.193 |   1.17  17.083 |   2.17   5.221 |   3.17   2.635
00096>                .33   2.511 |   1.33  68.163 |   2.33   4.444 |   3.33   2.448
00097>                .50   2.955 |   1.50  22.413 |   2.50   3.884 |   3.50   2.289
00098>                .67   3.627 |   1.67  11.979 |   2.67   3.459 |   3.67   2.151
00099>                .83   4.775 |   1.83   8.270 |   2.83   3.126 |   3.83   2.031
00100>               1.00   7.239 |   2.00   6.374 |   3.00   2.857 |   4.00   1.925
00101>
00102> ------------------------------------------------------------------------------
00103> 002:0003---------------------------------------------------------------------
00104> *
00105> *#############################################################################|
00106> *#
00107> *#                     EXISTING CONDITIONS HYDROLOGIC MODELING
00108> *#                  ================================================
00109> *#
00110> *#############################################################################|
00111> *#*************************************************************************|
00112> *AREA 101 - Existing Commercial Lot
00113> *#*************************************************************************|
00114> ----------------------
00115> | CALIB STANDHYD     |   Area    (ha)=     .51
00116> | 01:101    DT= 1.00 |   Total Imp(%)=   82.00   Dir. Conn.(%)=   82.00
00117> ----------------------
00118>                               IMPERVIOUS    PERVIOUS (i)
00119>      Surface Area     (ha)=        .42          .09
00120>      Dep. Storage     (mm)=       1.00         8.92
00121>      Average Slope     (%)=       1.00         2.00
00122>      Length            (m)=      10.00         5.00
00123>      Mannings n           =       .013         .250
00124>
00125>      Max.eff.Inten.(mm/hr)=      68.16         7.94
00126>                 over (min)        1.00         6.00
00127>      Storage Coeff.  (min)=         .75 (ii)    6.33 (ii)
00128>      Unit Hyd. Tpeak (min)=       1.00         6.00
00129>      Unit Hyd. peak  (cms)=       1.25          .18
00130>                                                        *TOTALS*
```

```
00131>      PEAK FLOW       (cms)=        .08          .00           .080 (iii)
00132>      TIME TO PEAK    (hrs)=       1.33         1.42          1.333
00133>      RUNOFF VOLUME    (mm)=      31.34         4.87         26.577
00134>      TOTAL RAINFALL   (mm)=      32.34        32.34         32.342
00135>      RUNOFF COEFFICIENT   =        .97          .15           .822
00136>
00137>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00138>            CN* =  74.0    Ia = Dep. Storage  (Above)
00139>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00140>            THAN THE STORAGE COEFFICIENT.
00141>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00142>
00143> ------------------------------------------------------------------------------
00144> 002:0004---------------------------------------------------------------------
00145> *Note: Minor system for commercial lot outlets to storm sewer on Masonry Court
00146> *Major overland flows proceed to Clearview Avenue
00147> ----------------------
00148> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .097  (cms)
00149> | TotalHyd 01:101    |   Number of inlets in system [NINLET] =       1
00150> ----------------------   Total minor system capacity         =    .097  (cms)
00151>                          Total major system storage [TMJSTO] =       0.(cu.m.)
00152>
00153>                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
00154>                                   (ha)     (cms)     (hrs)     (mm)    (cms)
00155>      TOTAL HYD.   01:101           .51      .080     1.333   26.577     .000
00156>      ========================================================================
00157>      MAJOR SYST   02:101MJR        .00      .000      .000     .000     .000
00158>      MINOR SYST   03:101mnr        .51      .080     1.333   26.577     .000
00159>
00160>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00161>
00162> ------------------------------------------------------------------------------
00163> 002:0005---------------------------------------------------------------------
00164> *#*****************************************************************************|
00165> *AREA 102 - Existing Dwelling Lots to St. Matthews Avenue
00166> *#*****************************************************************************|
00167> ----------------------
00168> | CALIB STANDHYD     |   Area    (ha)=     .12
00169> | 01:102    DT= 1.00 |   Total Imp(%)=   57.00   Dir. Conn.(%)=   57.00
00170> ----------------------
00171>                              IMPERVIOUS    PERVIOUS (i)
00172>      Surface Area     (ha)=        .07          .05
00173>      Dep. Storage     (mm)=       1.00         8.92
00174>      Average Slope     (%)=       1.00         2.00
00175>      Length            (m)=      15.00         5.00
00176>      Mannings n             =       .013         .250
00177>
00178>      Max.eff.Inten.(mm/hr)=      68.16         7.39
00179>                 over (min)        1.00         7.00
00180>      Storage Coeff.  (min)=        .95 (ii)    6.70 (ii)
00181>      Unit Hyd. Tpeak (min)=       1.00         7.00
00182>      Unit Hyd. peak  (cms)=       1.10          .17
00183>                                                          *TOTALS*
00184>      PEAK FLOW       (cms)=        .01          .00           .013 (iii)
00185>      TIME TO PEAK    (hrs)=       1.33         1.43          1.333
00186>      RUNOFF VOLUME    (mm)=      31.34         4.87         19.959
00187>      TOTAL RAINFALL   (mm)=      32.34        32.34         32.342
00188>      RUNOFF COEFFICIENT   =        .97          .15           .617
00189>
00190>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00191>            CN* =  74.0    Ia = Dep. Storage  (Above)
00192>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00193>            THAN THE STORAGE COEFFICIENT.
00194>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00195>
```

```
00196> ------------------------------------------------------------------------------
00197> 002:0006-------------------------------------------------------------------------
00198> *ADD TOTAL AREA CONTRIBUTING TO SITE DISCHARGE
00199> ------------------------
00200> | ADD HYD (EX        ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00201> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00202>                       ID1 01:102            .12     .013    1.33  19.96    .000
00203>                      +ID2 02:101MJR         .00     .000     .00    .00    .000
00204>                      +ID3 03:101mnr         .51     .080    1.33  26.58    .000
00205>                       ========================================================
00206>                       SUM 10:EX             .63     .093    1.33  25.32    .000
00207>
00208>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00209>
00210> ------------------------------------------------------------------------------
00211> 002:0007-------------------------------------------------------------------------
00212> *#############################################################################|
00213> *#
00214> *#                     PROPOSED CONDITIONS HYDROLOGIC MODELING
00215> *#                  ================================================
00216> *#
00217> *#############################################################################|
00218> *#*****************************************************************************|
00219> *AREA 201 - Minor Flow to Masonry Court, Major Flow to Clearview Avenue
00220> *#*****************************************************************************|
00221> ----------------------
00222> | CALIB STANDHYD     |   Area    (ha)=     .22
00223> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00224> ----------------------
00225>                              IMPERVIOUS    PERVIOUS (i)
00226>      Surface Area     (ha)=        .22          .00
00227>      Dep. Storage     (mm)=       1.00         8.92
00228>      Average Slope     (%)=       1.00         2.00
00229>      Length            (m)=      35.00         5.00
00230>      Mannings n             =       .013         .250
00231>
00232>      Max.eff.Inten.(mm/hr)=      68.16         7.39
00233>                 over (min)        2.00         7.00
00234>      Storage Coeff.  (min)=       1.59 (ii)    7.33 (ii)
00235>      Unit Hyd. Tpeak (min)=       2.00         7.00
00236>      Unit Hyd. peak  (cms)=        .64          .16
00237>                                                          *TOTALS*
00238>      PEAK FLOW       (cms)=        .04          .00          .041 (iii)
00239>      TIME TO PEAK    (hrs)=       1.33         1.43         1.333
00240>      RUNOFF VOLUME    (mm)=      31.34         4.87        31.078
00241>      TOTAL RAINFALL   (mm)=      32.34        32.34        32.342
00242>      RUNOFF COEFFICIENT   =        .97          .15          .961
00243>
00244>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00245>            CN* =  74.0    Ia = Dep. Storage  (Above)
00246>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00247>            THAN THE STORAGE COEFFICIENT.
00248>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00249>
00250> ------------------------------------------------------------------------------
00251> 002:0008-------------------------------------------------------------------------
00252> *Note: Minor system for 201 outlets to storm sewer on Masonry Court
00253> *Major overland flows proceed to Clearview Avenue
00254> ----------------------
00255> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .051  (cms)
00256> | TotalHyd 01:201    |   Number of inlets in system [NINLET] =      1
00257> ----------------------   Total minor system capacity         =    .051  (cms)
00258>                          Total major system storage [TMJSTO] =    102.(cu.m.)
00259>
00260>                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
```

```
                                    (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   01:201             .22      .041     1.333   31.078     .000
     ==========================================================================
     MAJOR SYST   02:201MJR          .00      .000      .000     .000     .000
     MINOR SYST   03:201mnr          .22      .041     1.333   31.078     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     Maximum MAJOR SYSTEM storage used =       0.(cu.m.)

--------------------------------------------------------------------------------
002:0009----------------------------------------------------------------------
*#*****************************************************************************|
*AREA 202 - Building Roof to Masonry Court
*#*****************************************************************************|
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .27
| 01:202    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .27          .00
     Dep. Storage     (mm)=       1.00         8.92
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        10.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      68.16         6.50
                 over (min)        1.00        10.00
     Storage Coeff.  (min)=         .95 (ii)   10.12 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.10          .11
                                                      *TOTALS*
     PEAK FLOW       (cms)=         .05          .00          .051 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.57         1.333
     RUNOFF VOLUME    (mm)=      31.34         4.87        31.077
     TOTAL RAINFALL   (mm)=      32.34        32.34        32.342
     RUNOFF COEFFICIENT   =        .97          .15          .961

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0010----------------------------------------------------------------------
*#*****************************************************************************|
*AREA 203 - Minor Flow to Masonry Court, Major Flow to St. Matthews Avenue
*#*****************************************************************************|
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .07
| 04:203    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .00
     Dep. Storage     (mm)=       1.00         8.92
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        10.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      68.16         6.50
                 over (min)        1.00        10.00
     Storage Coeff.  (min)=         .95 (ii)   10.12 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.10          .12
```

```
                                                                    *TOTALS*
     PEAK FLOW       (cms)=        .01          .00           .013 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.57          1.333
     RUNOFF VOLUME    (mm)=      31.34         4.87         31.077
     TOTAL RAINFALL   (mm)=      32.34        32.34         32.342
     RUNOFF COEFFICIENT   =        .97          .15           .961

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0011--------------------------------------------------------------------------
*Note: Minor system for 203 outlets to storm sewer on Masonry Court
*Major overland flows proceed to St. Matthews Avenue
-----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .038  (cms)
| TotalHyd 04:203    |   Number of inlets in system [NINLET] =       1
-----------------------   Total minor system capacity         =    .038  (cms)
                          Total major system storage [TMJSTO] =      21.(cu.m.)

                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                   (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   04:203           .07      .013     1.333   31.077     .000
     ================================================================================
     MAJOR SYST   05:ST.MAT        .00      .000      .000     .000     .000
     MINOR SYST   06:202mnr        .07      .013     1.333   31.077     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     Maximum MAJOR SYSTEM storage used =       0.(cu.m.)

--------------------------------------------------------------------------------
002:0012--------------------------------------------------------------------------
*#*************************************************************************|
*AREA 204 - Site Perimeter Uncontrolled to Masonry Court
*#*************************************************************************|
-----------------------
| CALIB STANDHYD     |   Area    (ha)=     .05
| 07:204    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
-----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .05          .00
     Dep. Storage     (mm)=       1.00         8.92
     Average Slope     (%)=       1.00         2.00
     Length            (m)=       3.00         3.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      68.16         9.40
                 over (min)        1.00         4.00
     Storage Coeff.  (min)=        .36 (ii)    4.20 (ii)
     Unit Hyd. Tpeak (min)=       1.00         4.00
     Unit Hyd. peak  (cms)=       1.59          .28
                                                                    *TOTALS*
     PEAK FLOW       (cms)=        .01          .00           .009 (iii)
     TIME TO PEAK    (hrs)=       1.25         1.38          1.333
     RUNOFF VOLUME    (mm)=      31.34         4.87         31.077
     TOTAL RAINFALL   (mm)=      32.34        32.34         32.342
     RUNOFF COEFFICIENT   =        .97          .15           .961

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
00391>            THAN THE STORAGE COEFFICIENT.
00392>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00393>
00394> ------------------------------------------------------------------------------
00395> 002:0013-------------------------------------------------------------------------
00396> *ADD TOTAL DRAINAGE TO TANK
00397> ------------------------
00398> | ADD HYD (TOTANK    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00399> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00400>                       ID1 01:202           .27      .051    1.33  31.08    .000
00401>                      +ID2 03:201mnr        .22      .041    1.33  31.08    .000
00402>                      +ID3 06:202mnr        .07      .013    1.33  31.08    .000
00403>                       ============================================================
00404>                       SUM 08:TOTANK         .56      .105    1.33  31.08    .000
00405>
00406>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00407>
00408> ------------------------------------------------------------------------------
00409> 002:0014-------------------------------------------------------------------------
00410> *Control to Masonry Court via orifice plate on outlet from tank
00411> ---------------------
00412> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00413> |  IN>08:(TOTANK)   |
00414> | OUT<06:(CTL-TA)   |    =========  OUTLFOW STORAGE TABLE  =========
00415> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00416>                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
00417>                             .000  .0000E+00   |     .044  .1950E-01
00418>                             .023  .5060E-02   |     .000  .0000E+00
00419>
00420>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
00421>      --------------------      (ha)     (cms)     (hrs)       (mm)
00422>      INFLOW >08: (TOTANK)       .56      .105     1.333     31.077
00423>      OUTFLOW<06: (CTL-TA)       .56      .027     1.517     31.077
00424>     OVERFLOW<01: (OVF-TA)       .00      .000      .000       .000
00425>
00426>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00427>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00428>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00429>
00430>
00431>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   25.680
00432>                    TIME SHIFT OF PEAK FLOW         (min)=    11.00
00433>                    MAXIMUM  STORAGE   USED       (ha.m.)=.7708E-02
00434>
00435> ------------------------------------------------------------------------------
00436> 002:0015-------------------------------------------------------------------------
00437> *ADD TOTAL DRAINAGE TO MASONRY
00438> ------------------------
00439> | ADD HYD (MASONRY   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00440> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00441>                       ID1 06:CTL-TANK       .56      .027    1.52  31.08    .000
00442>                      +ID2 07:204            .05      .009    1.33  31.08    .000
00443>                       ============================================================
00444>                       SUM 03:MASONRY        .61      .035    1.33  31.08    .000
00445>
00446>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00447>
00448> ------------------------------------------------------------------------------
00449> 002:0016-------------------------------------------------------------------------
00450> *#*************************************************************************|
00451> *AREA 205 - Site Perimeter Uncontrolled to Clearview
00452> *#*************************************************************************|
00453> ----------------------
00454> | CALIB NASHYD       |   Area    (ha)=     .02   Curve Number   (CN)=74.00
00455> | 07:205    DT= 1.00 |   Ia      (mm)=   8.920   # of Linear Res.(N)= 3.00
```

```
00456> ----------------------   U.H. Tp(hrs)=    .020
00457>
00458>      Unit Hyd Qpeak  (cms)=     .038
00459>
00460>      PEAK FLOW       (cms)=     .001 (i)
00461>      TIME TO PEAK    (hrs)=    1.333
00462>      RUNOFF VOLUME    (mm)=    4.866
00463>      TOTAL RAINFALL   (mm)=   32.342
00464>      RUNOFF COEFFICIENT   =     .150
00465>
00466>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00467>
00468>       *** WARNING: Time step is too large for value of TP.
00469>                    R.V. may be ok.  Peak flow could be off.
00470> ------------------------------------------------------------------------------
00471> 002:0017---------------------------------------------------------------------
00472> *ADD TOTAL DRAINAGE TO CLEARVIEW
00473> ------------------------
00474> | ADD HYD (CLEARVIEW ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00475> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00476>                       ID1 01:OVF-TANK       .00     .000     .00    .00    .000
00477>                      +ID2 02:201MJR         .00     .000     .00    .00    .000
00478>                      +ID3 07:205            .02     .001    1.33   4.87    .000
00479>                       ============================================================
00480>                       SUM 04:CLEARVIEW      .02     .001    1.33   4.87    .000
00481>
00482>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00483>
00484> ------------------------------------------------------------------------------
00485> 002:0018---------------------------------------------------------------------
00486> *ADD TOTAL DRAINAGE FROM SITE
00487> ------------------------
00488> | ADD HYD (PROP      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00489> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00490>                       ID1 03:MASONRY        .61     .035    1.33  31.08    .000
00491>                      +ID2 04:CLEARVIEW      .02     .001    1.33   4.87    .000
00492>                      +ID3 05:ST.MATT        .00     .000     .00    .00    .000
00493>                       ============================================================
00494>                       SUM 09:PROP           .63     .035    1.33  30.25    .000
00495>
00496>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00497>
00498> ------------------------------------------------------------------------------
00499> 002:0019---------------------------------------------------------------------
00500> *AREA CHECK
00501> ------------------------
00502> | ADD HYD (CHECK     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00503> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00504>                       ID1 09:PROP           .63     .035    1.33  30.25    .000
00505>                      +ID2 10:EX             .63     .093    1.33  25.32    .000
00506>                       ============================================================
00507>                       SUM 08:CHECK         1.26     .128    1.33  27.78    .000
00508>
00509>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00510>
00511> ------------------------------------------------------------------------------
00512> 002:0020---------------------------------------------------------------------
00513> * RUN REMAINING DESIGN STORMS (City of Burlington 4-hour duration 5 TO 100-YR)
00514> *
00515>   ** END OF RUN :   4
00516>
00517> ******************************************************************************
00518>
00519>
00520>
```

```
00521>
00522>
00523> --------------------
00524> | START            |  Project  dir.: Q:\44795\100\SWM\SWMHYMO\
00525> --------------------  Rainfall dir.: Q:\44795\100\SWM\SWMHYMO\
00526>     TZERO =   .00 hrs on        0
00527>     METOUT=   2 (output = METRIC)
00528>     NRUN  = 005
00529>     NSTORM=   1
00530>            #  1=BURL_005.stm
00531> ----------------------------------------------------------------------------------
00532> 005:0002--------------------------------------------------------------------------
00533> *#*****************************************************************************|
00534> *#  Project Name: 1085 CLEARVIEW AVENUE
00535> *#               BURLINGTON, ONTARIO
00536> *#  JOB NUMBER  : 44795-100
00537> *#       Date   : MAY 2019
00538> *#  Modeller    : ALP
00539> *#    Company   : MTE CONSULTANTS INC.
00540> *#       File   : 44795.DAT
00541> *
00542> ----------------------------------------------------------------------------------
00543> 005:0002--------------------------------------------------------------------------
00544> --------------------
00545> | READ STORM       |    Filename: 5-YR BURLINGTON CHICAGO STORM (4-HR DURA
00546> | Ptotal=  41.70 mm|    Comments: 5-YR BURLINGTON CHICAGO STORM (4-HR DURA
00547> --------------------
00548>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00549>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00550>                .17   2.963 |   1.17  21.285 |   2.17   6.805 |   3.17   3.535
00551>                .33   3.374 |   1.33  88.094 |   2.33   5.834 |   3.33   3.293
00552>                .50   3.946 |   1.50  27.774 |   2.50   5.128 |   3.50   3.087
00553>                .67   4.803 |   1.67  15.072 |   2.67   4.590 |   3.67   2.908
00554>                .83   6.247 |   1.83  10.561 |   2.83   4.165 |   3.83   2.751
00555>               1.00   9.295 |   2.00   8.234 |   3.00   3.820 |   4.00   2.612
00556>
00557> ----------------------------------------------------------------------------------
00558> 005:0003--------------------------------------------------------------------------
00559> *
00560> *################################################################################|
00561> *#
00562> *#                     EXISTING CONDITIONS HYDROLOGIC MODELING
00563> *#                  ================================================
00564> *#
00565> *################################################################################|
00566> *#*****************************************************************************|
00567> *AREA 101 - Existing Commercial Lot
00568> *#*****************************************************************************|
00569> ----------------------
00570> | CALIB STANDHYD     |   Area    (ha)=     .51
00571> | 01:101    DT= 1.00 |   Total Imp(%)=   82.00   Dir. Conn.(%)=   82.00
00572> ----------------------
00573>                               IMPERVIOUS    PERVIOUS (i)
00574>      Surface Area     (ha)=        .42          .09
00575>      Dep. Storage     (mm)=       1.00         8.92
00576>      Average Slope     (%)=       1.00         2.00
00577>      Length            (m)=      10.00         5.00
00578>      Mannings n           =       .013         .250
00579>
00580>      Max.eff.Inten.(mm/hr)=      88.09        17.82
00581>                 over (min)        1.00         5.00
00582>      Storage Coeff.  (min)=         .68 (ii)    4.72 (ii)
00583>      Unit Hyd. Tpeak (min)=        1.00         5.00
00584>      Unit Hyd. peak  (cms)=        1.31          .23
00585>                                                      *TOTALS*
```

```
00586>      PEAK FLOW       (cms)=        .10          .00          .105 (iii)
00587>      TIME TO PEAK    (hrs)=       1.33         1.38         1.333
00588>      RUNOFF VOLUME    (mm)=      40.70         8.80        34.955
00589>      TOTAL RAINFALL   (mm)=      41.70        41.70        41.696
00590>      RUNOFF COEFFICIENT   =        .98          .21          .838
00591>
00592>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00593>            CN* =  74.0    Ia = Dep. Storage  (Above)
00594>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00595>            THAN THE STORAGE COEFFICIENT.
00596>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00597>
00598> ---------------------------------------------------------------------------
00599> 005:0004-----------------------------------------------------------------
00600> *Note: Minor system for commercial lot outlets to storm sewer on Masonry Court
00601> *Major overland flows proceed to Clearview Avenue
00602> ----------------------
00603> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .097  (cms)
00604> | TotalHyd 01:101    |   Number of inlets in system [NINLET] =       1
00605> ----------------------   Total minor system capacity         =    .097  (cms)
00606>                          Total major system storage [TMJSTO] =       0.(cu.m.)
00607>
00608>                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
00609>                                   (ha)     (cms)     (hrs)     (mm)    (cms)
00610>      TOTAL HYD.   01:101           .51      .105     1.333   34.955     .000
00611>      ==========================================================================
00612>      MAJOR SYST   02:101MJR        .01      .008     1.333   34.955     .000
00613>      MINOR SYST   03:101mnr        .50      .097     1.200   34.955     .000
00614>
00615>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00616>
00617> ---------------------------------------------------------------------------
00618> 005:0005-----------------------------------------------------------------
00619> *#*************************************************************************|
00620> *AREA 102 - Existing Dwelling Lots to St. Matthews Avenue
00621> *#*************************************************************************|
00622> ----------------------
00623> | CALIB STANDHYD     |   Area    (ha)=     .12
00624> | 01:102    DT= 1.00 |   Total Imp(%)=   57.00   Dir. Conn.(%)=   57.00
00625> ----------------------
00626>                              IMPERVIOUS    PERVIOUS (i)
00627>      Surface Area     (ha)=        .07          .05
00628>      Dep. Storage     (mm)=       1.00         8.92
00629>      Average Slope     (%)=       1.00         2.00
00630>      Length            (m)=      15.00         5.00
00631>      Mannings n           =       .013         .250
00632>
00633>      Max.eff.Inten.(mm/hr)=      88.09        17.82
00634>                 over (min)        1.00         5.00
00635>      Storage Coeff.  (min)=         .86 (ii)    4.90 (ii)
00636>      Unit Hyd. Tpeak (min)=       1.00         5.00
00637>      Unit Hyd. peak  (cms)=       1.17          .23
00638>                                                          *TOTALS*
00639>      PEAK FLOW       (cms)=        .02          .00          .018 (iii)
00640>      TIME TO PEAK    (hrs)=       1.33         1.38         1.333
00641>      RUNOFF VOLUME    (mm)=      40.70         8.80        26.982
00642>      TOTAL RAINFALL   (mm)=      41.70        41.70        41.696
00643>      RUNOFF COEFFICIENT   =        .98          .21          .647
00644>
00645>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00646>            CN* =  74.0    Ia = Dep. Storage  (Above)
00647>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00648>            THAN THE STORAGE COEFFICIENT.
00649>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00650>
```

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00651> ------------------------------------------------------------------------------
00652> 005:0006-------------------------------------------------------------------------
00653> *ADD TOTAL AREA CONTRIBUTING TO SITE DISCHARGE
00654> ------------------------
00655> | ADD HYD (EX        ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00656> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00657>                       ID1 01:102            .12     .018    1.33  26.98    .000
00658>                      +ID2 02:101MJR         .01     .008    1.33  34.96    .000
00659>                      +ID3 03:101mnr         .50     .097    1.20  34.96    .000
00660>                       ========================================================
00661>                       SUM 10:EX             .63     .123    1.33  33.44    .000
00662>
00663>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00664>
00665> ------------------------------------------------------------------------------
00666> 005:0007-------------------------------------------------------------------------
00667> *#############################################################################|
00668> *#
00669> *#                     PROPOSED CONDITIONS HYDROLOGIC MODELING
00670> *#                  ================================================
00671> *#
00672> *#############################################################################|
00673> *#*****************************************************************************|
00674> *AREA 201 - Minor Flow to Masonry Court, Major Flow to Clearview Avenue
00675> *#*****************************************************************************|
00676> ----------------------
00677> | CALIB STANDHYD     |   Area    (ha)=     .22
00678> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00679> ----------------------
00680>                              IMPERVIOUS    PERVIOUS (i)
00681>      Surface Area     (ha)=        .22          .00
00682>      Dep. Storage     (mm)=       1.00         8.92
00683>      Average Slope     (%)=       1.00         2.00
00684>      Length            (m)=      35.00         5.00
00685>      Mannings n            =       .013         .250
00686>
00687>      Max.eff.Inten.(mm/hr)=      88.09        16.73
00688>                 over (min)        1.00         6.00
00689>      Storage Coeff.  (min)=       1.43 (ii)    5.58 (ii)
00690>      Unit Hyd. Tpeak (min)=       1.00         6.00
00691>      Unit Hyd. peak  (cms)=        .85          .20
00692>                                                          *TOTALS*
00693>      PEAK FLOW       (cms)=        .05          .00          .053 (iii)
00694>      TIME TO PEAK    (hrs)=       1.33         1.40         1.333
00695>      RUNOFF VOLUME    (mm)=      40.70         8.80        40.377
00696>      TOTAL RAINFALL   (mm)=      41.70        41.70        41.696
00697>      RUNOFF COEFFICIENT   =        .98          .21          .968
00698>
00699>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00700>            CN* =  74.0    Ia = Dep. Storage  (Above)
00701>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00702>            THAN THE STORAGE COEFFICIENT.
00703>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00704>
00705> ------------------------------------------------------------------------------
00706> 005:0008-------------------------------------------------------------------------
00707> *Note: Minor system for 201 outlets to storm sewer on Masonry Court
00708> *Major overland flows proceed to Clearview Avenue
00709> ----------------------
00710> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .051  (cms)
00711> | TotalHyd 01:201    |   Number of inlets in system [NINLET] =      1
00712> ----------------------   Total minor system capacity         =    .051  (cms)
00713>                          Total major system storage [TMJSTO] =    102.(cu.m.)
00714>
00715>                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
```

```
00716>                                  (ha)     (cms)     (hrs)     (mm)    (cms)
00717>      TOTAL HYD.   01:201          .22      .053     1.333   40.377     .000
00718>      ========================================================================
00719>      MAJOR SYST   02:201MJR       .00      .000      .000     .000     .000
00720>      MINOR SYST   03:201mnr       .22      .051     1.350   40.499     .000
00721>
00722>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00723>
00724>      Maximum MAJOR SYSTEM storage used =       1.(cu.m.)
00725>
00726> ----------------------------------------------------------------------------
00727> 005:0009--------------------------------------------------------------------
00728> *#*************************************************************************|
00729> *AREA 202 - Building Roof to Masonry Court
00730> *#*************************************************************************|
00731> ----------------------
00732> | CALIB STANDHYD     |   Area    (ha)=     .27
00733> | 01:202    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00734> ----------------------
00735>                              IMPERVIOUS    PERVIOUS (i)
00736>      Surface Area     (ha)=        .27          .00
00737>      Dep. Storage     (mm)=       1.00         8.92
00738>      Average Slope     (%)=       1.00         2.00
00739>      Length            (m)=      15.00        10.00
00740>      Mannings n             =      .013         .250
00741>
00742>      Max.eff.Inten.(mm/hr)=      88.09        15.61
00743>                 over (min)        1.00         7.00
00744>      Storage Coeff.  (min)=        .86 (ii)    7.32 (ii)
00745>      Unit Hyd. Tpeak (min)=       1.00         7.00
00746>      Unit Hyd. peak  (cms)=       1.17          .16
00747>                                                      *TOTALS*
00748>      PEAK FLOW       (cms)=        .07          .00          .065 (iii)
00749>      TIME TO PEAK    (hrs)=       1.33         1.43         1.333
00750>      RUNOFF VOLUME    (mm)=      40.70         8.80        40.377
00751>      TOTAL RAINFALL   (mm)=      41.70        41.70        41.696
00752>      RUNOFF COEFFICIENT   =        .98          .21          .968
00753>
00754>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00755>            CN* =  74.0    Ia = Dep. Storage  (Above)
00756>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00757>            THAN THE STORAGE COEFFICIENT.
00758>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00759>
00760> ----------------------------------------------------------------------------
00761> 005:0010--------------------------------------------------------------------
00762> *#*************************************************************************|
00763> *AREA 203 - Minor Flow to Masonry Court, Major Flow to St. Matthews Avenue
00764> *#*************************************************************************|
00765> ----------------------
00766> | CALIB STANDHYD     |   Area    (ha)=     .07
00767> | 04:203    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00768> ----------------------
00769>                              IMPERVIOUS    PERVIOUS (i)
00770>      Surface Area     (ha)=        .07          .00
00771>      Dep. Storage     (mm)=       1.00         8.92
00772>      Average Slope     (%)=       1.00         2.00
00773>      Length            (m)=      15.00        10.00
00774>      Mannings n             =      .013         .250
00775>
00776>      Max.eff.Inten.(mm/hr)=      88.09        15.61
00777>                 over (min)        1.00         7.00
00778>      Storage Coeff.  (min)=        .86 (ii)    7.32 (ii)
00779>      Unit Hyd. Tpeak (min)=       1.00         7.00
00780>      Unit Hyd. peak  (cms)=       1.17          .16
```

```
                                                                    *TOTALS*
     PEAK FLOW       (cms)=        .02          .00           .017 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.43          1.333
     RUNOFF VOLUME    (mm)=      40.70         8.80         40.377
     TOTAL RAINFALL   (mm)=      41.70        41.70         41.696
     RUNOFF COEFFICIENT   =        .98          .21           .968

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
005:0011-----------------------------------------------------------------
*Note: Minor system for 203 outlets to storm sewer on Masonry Court
*Major overland flows proceed to St. Matthews Avenue
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .038  (cms)
| TotalHyd 04:203    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity         =    .038  (cms)
                         Total major system storage [TMJSTO] =      21.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   04:203           .07      .017     1.333   40.377     .000
     ========================================================================
     MAJOR SYST   05:ST.MAT        .00      .000      .000     .000     .000
     MINOR SYST   06:202mnr        .07      .017     1.333   40.377     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     Maximum MAJOR SYSTEM storage used =       0.(cu.m.)

---------------------------------------------------------------------------
005:0012-----------------------------------------------------------------
*#*************************************************************************|
*AREA 204 - Site Perimeter Uncontrolled to Masonry Court
*#*************************************************************************|
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .05
| 07:204    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .05          .00
     Dep. Storage     (mm)=       1.00         8.92
     Average Slope     (%)=       1.00         2.00
     Length            (m)=       3.00         3.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      88.09        19.90
                over (min)        1.00         3.00
     Storage Coeff.  (min)=        .33 (ii)    3.17 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.62          .36
                                                                    *TOTALS*
     PEAK FLOW       (cms)=        .01          .00           .012 (iii)
     TIME TO PEAK    (hrs)=       1.25         1.35          1.333
     RUNOFF VOLUME    (mm)=      40.70         8.80         40.377
     TOTAL RAINFALL   (mm)=      41.70        41.70         41.696
     RUNOFF COEFFICIENT   =        .98          .21           .968

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
00846>            THAN THE STORAGE COEFFICIENT.
00847>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00848>
00849> ------------------------------------------------------------------------------
00850> 005:0013------------------------------------------------------------------------
00851> *ADD TOTAL DRAINAGE TO TANK
00852> ------------------------
00853> | ADD HYD (TOTANK    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00854> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00855>                       ID1 01:202           .27     .065    1.33  40.38    .000
00856>                      +ID2 03:201mnr        .22     .051    1.35  40.50    .000
00857>                      +ID3 06:202mnr        .07     .017    1.33  40.38    .000
00858>                       ============================================================
00859>                       SUM 08:TOTANK         .56     .133    1.33  40.42    .000
00860>
00861>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00862>
00863> ------------------------------------------------------------------------------
00864> 005:0014------------------------------------------------------------------------
00865> *Control to Masonry Court via orifice plate on outlet from tank
00866> ---------------------
00867> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00868> |  IN>08:(TOTANK)   |
00869> | OUT<06:(CTL-TA)   |    =========  OUTLFOW STORAGE TABLE  =========
00870> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00871>                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
00872>                             .000  .0000E+00   |     .044  .1950E-01
00873>                             .023  .5060E-02   |     .000  .0000E+00
00874>
00875>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
00876>      --------------------      (ha)     (cms)     (hrs)       (mm)
00877>      INFLOW >08: (TOTANK)       .56      .133     1.333     40.425
00878>      OUTFLOW<06: (CTL-TA)       .56      .031     1.517     40.425
00879>     OVERFLOW<01: (OVF-TA)       .00      .000      .000       .000
00880>
00881>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00882>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00883>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00884>
00885>
00886>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   22.951
00887>                     TIME SHIFT OF PEAK FLOW         (min)=    11.00
00888>                     MAXIMUM  STORAGE   USED       (ha.m.)=.1031E-01
00889>
00890> ------------------------------------------------------------------------------
00891> 005:0015------------------------------------------------------------------------
00892> *ADD TOTAL DRAINAGE TO MASONRY
00893> ------------------------
00894> | ADD HYD (MASONRY   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00895> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00896>                       ID1 06:CTL-TANK       .56     .031    1.52  40.42    .000
00897>                      +ID2 07:204            .05     .012    1.33  40.38    .000
00898>                       ============================================================
00899>                       SUM 03:MASONRY        .61     .041    1.33  40.42    .000
00900>
00901>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00902>
00903> ------------------------------------------------------------------------------
00904> 005:0016------------------------------------------------------------------------
00905> *#*************************************************************************|
00906> *AREA 205 - Site Perimeter Uncontrolled to Clearview
00907> *#*************************************************************************|
00908> ---------------------
00909> | CALIB NASHYD       |   Area    (ha)=     .02   Curve Number   (CN)=74.00
00910> | 07:205    DT= 1.00 |   Ia      (mm)=   8.920   # of Linear Res.(N)= 3.00
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```
00911> ----------------------   U.H. Tp(hrs)=    .020
00912>
00913>      Unit Hyd Qpeak  (cms)=     .038
00914>
00915>      PEAK FLOW       (cms)=     .001 (i)
00916>      TIME TO PEAK    (hrs)=    1.333
00917>      RUNOFF VOLUME    (mm)=    8.802
00918>      TOTAL RAINFALL   (mm)=   41.696
00919>      RUNOFF COEFFICIENT   =     .211
00920>
00921>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00922>
00923>       *** WARNING: Time step is too large for value of TP.
00924>                    R.V. may be ok.  Peak flow could be off.
00925> ------------------------------------------------------------------------------
00926> 005:0017---------------------------------------------------------------------
00927> *ADD TOTAL DRAINAGE TO CLEARVIEW
00928> ------------------------
00929> | ADD HYD (CLEARVIEW ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00930> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00931>                       ID1 01:OVF-TANK       .00     .000     .00    .00    .000
00932>                      +ID2 02:201MJR         .00     .000     .00    .00    .000
00933>                      +ID3 07:205            .02     .001    1.33   8.80    .000
00934>                       ============================================================
00935>                       SUM 04:CLEARVIEW      .02     .001    1.33   8.80    .000
00936>
00937>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00938>
00939> ------------------------------------------------------------------------------
00940> 005:0018---------------------------------------------------------------------
00941> *ADD TOTAL DRAINAGE FROM SITE
00942> ------------------------
00943> | ADD HYD (PROP      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00944> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00945>                       ID1 03:MASONRY        .61     .041    1.33  40.42    .000
00946>                      +ID2 04:CLEARVIEW      .02     .001    1.33   8.80    .000
00947>                      +ID3 05:ST.MATT        .00     .000     .00    .00    .000
00948>                       ============================================================
00949>                       SUM 09:PROP           .63     .042    1.33  39.42    .000
00950>
00951>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00952>
00953> ------------------------------------------------------------------------------
00954> 005:0019---------------------------------------------------------------------
00955> *AREA CHECK
00956> ------------------------
00957> | ADD HYD (CHECK     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00958> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00959>                       ID1 09:PROP           .63     .042    1.33  39.42    .000
00960>                      +ID2 10:EX             .63     .123    1.33  33.44    .000
00961>                       ============================================================
00962>                       SUM 08:CHECK         1.26     .165    1.33  36.43    .000
00963>
00964>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00965>
00966> ------------------------------------------------------------------------------
00967> 005:0020---------------------------------------------------------------------
00968> * RUN REMAINING DESIGN STORMS (City of Burlington 4-hour duration 5 TO 100-YR)
00969> *
00970> ------------------------------------------------------------------------------
00971> 005:0002---------------------------------------------------------------------
00972>   ** END OF RUN :   9
00973>
00974> ******************************************************************************
00975>
```

```
00976>
00977>
00978>
00979>
00980> --------------------
00981> | START            |  Project  dir.: Q:\44795\100\SWM\SWMHYMO\
00982> --------------------  Rainfall dir.: Q:\44795\100\SWM\SWMHYMO\
00983>     TZERO =   .00 hrs on        0
00984>     METOUT=   2 (output = METRIC)
00985>     NRUN  = 010
00986>     NSTORM=   1
00987>            #  1=BURL_010.stm
00988> ------------------------------------------------------------------------------
00989> 010:0002--------------------------------------------------------------------------
00990> *#*************************************************************************|
00991> *#  Project Name: 1085 CLEARVIEW AVENUE
00992> *#               BURLINGTON, ONTARIO
00993> *#  JOB NUMBER  : 44795-100
00994> *#       Date   : MAY 2019
00995> *#  Modeller    : ALP
00996> *#    Company   : MTE CONSULTANTS INC.
00997> *#       File   : 44795.DAT
00998> *
00999> ------------------------------------------------------------------------------
01000> 010:0002--------------------------------------------------------------------------
01001> --------------------
01002> | READ STORM       |    Filename: 10-YR BURLINGTON CHICAGO STORM (4-HR DUR
01003> | Ptotal=  48.00 mm|    Comments: 10-YR BURLINGTON CHICAGO STORM (4-HR DUR
01004> --------------------
01005>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01006>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01007>                .17   3.423 |   1.17  24.501 |   2.17   7.852 |   3.17   4.083
01008>                .33   3.898 |   1.33 101.139 |   2.33   6.733 |   3.33   3.805
01009>                .50   4.558 |   1.50  31.955 |   2.50   5.920 |   3.50   3.567
01010>                .67   5.545 |   1.67  17.363 |   2.67   5.300 |   3.67   3.360
01011>                .83   7.210 |   1.83  12.175 |   2.83   4.810 |   3.83   3.179
01012>               1.00  10.719 |   2.00   9.497 |   3.00   4.413 |   4.00   3.019
01013>
01014> ------------------------------------------------------------------------------
01015> 010:0003--------------------------------------------------------------------------
01016> *
01017> *#############################################################################|
01018> *#
01019> *#                     EXISTING CONDITIONS HYDROLOGIC MODELING
01020> *#                  ================================================
01021> *#
01022> *#############################################################################|
01023> *#*************************************************************************|
01024> *AREA 101 - Existing Commercial Lot
01025> *#*************************************************************************|
01026> ----------------------
01027> | CALIB STANDHYD     |   Area    (ha)=     .51
01028> | 01:101    DT= 1.00 |   Total Imp(%)=   82.00   Dir. Conn.(%)=   82.00
01029> ----------------------
01030>                              IMPERVIOUS    PERVIOUS (i)
01031>      Surface Area     (ha)=        .42          .09
01032>      Dep. Storage     (mm)=       1.00         8.92
01033>      Average Slope     (%)=       1.00         2.00
01034>      Length            (m)=      10.00         5.00
01035>      Mannings n             =       .013         .250
01036>
01037>      Max.eff.Inten.(mm/hr)=     101.14        26.28
01038>                 over (min)        1.00         4.00
01039>      Storage Coeff.  (min)=        .64 (ii)    4.10 (ii)
01040>      Unit Hyd. Tpeak (min)=       1.00         4.00
```

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01041>      Unit Hyd. peak  (cms)=       1.34          .28
01042>                                                          *TOTALS*
01043>      PEAK FLOW       (cms)=        .12          .00           .122 (iii)
01044>      TIME TO PEAK    (hrs)=       1.32         1.37          1.333
01045>      RUNOFF VOLUME    (mm)=      47.00        11.90         40.686
01046>      TOTAL RAINFALL   (mm)=      48.00        48.00         48.004
01047>      RUNOFF COEFFICIENT   =        .98          .25           .848
01048>
01049>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01050>            CN* =  74.0    Ia = Dep. Storage  (Above)
01051>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01052>            THAN THE STORAGE COEFFICIENT.
01053>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01054>
01055> ---------------------------------------------------------------------------
01056> 010:0004-----------------------------------------------------------------
01057> *Note: Minor system for commercial lot outlets to storm sewer on Masonry Court
01058> *Major overland flows proceed to Clearview Avenue
01059> ----------------------
01060> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .097  (cms)
01061> | TotalHyd 01:101    |   Number of inlets in system [NINLET] =       1
01062> ----------------------   Total minor system capacity         =    .097  (cms)
01063>                          Total major system storage [TMJSTO] =       0.(cu.m.)
01064>
01065>                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
01066>                                   (ha)     (cms)     (hrs)     (mm)    (cms)
01067>      TOTAL HYD.   01:101           .51      .122     1.333   40.686     .000
01068>      ========================================================================
01069>      MAJOR SYST   02:101MJR        .03      .025     1.333   40.686     .000
01070>      MINOR SYST   03:101mnr        .48      .097     1.183   40.686     .000
01071>
01072>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01073>
01074> ---------------------------------------------------------------------------
01075> 010:0005-----------------------------------------------------------------
01076> *#*************************************************************************|
01077> *AREA 102 - Existing Dwelling Lots to St. Matthews Avenue
01078> *#*************************************************************************|
01079> ----------------------
01080> | CALIB STANDHYD     |   Area    (ha)=     .12
01081> | 01:102    DT= 1.00 |   Total Imp(%)=   57.00   Dir. Conn.(%)=   57.00
01082> ----------------------
01083>                              IMPERVIOUS    PERVIOUS (i)
01084>      Surface Area     (ha)=        .07          .05
01085>      Dep. Storage     (mm)=       1.00         8.92
01086>      Average Slope     (%)=       1.00         2.00
01087>      Length            (m)=      15.00         5.00
01088>      Mannings n           =       .013         .250
01089>
01090>      Max.eff.Inten.(mm/hr)=     101.14        26.28
01091>                 over (min)        1.00         4.00
01092>      Storage Coeff.  (min)=        .81 (ii)    4.27 (ii)
01093>      Unit Hyd. Tpeak (min)=       1.00         4.00
01094>      Unit Hyd. peak  (cms)=       1.20          .27
01095>                                                          *TOTALS*
01096>      PEAK FLOW       (cms)=        .02          .00           .022 (iii)
01097>      TIME TO PEAK    (hrs)=       1.33         1.37          1.333
01098>      RUNOFF VOLUME    (mm)=      47.00        11.90         31.911
01099>      TOTAL RAINFALL   (mm)=      48.00        48.00         48.004
01100>      RUNOFF COEFFICIENT   =        .98          .25           .665
01101>
01102>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01103>            CN* =  74.0    Ia = Dep. Storage  (Above)
01104>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01105>            THAN THE STORAGE COEFFICIENT.
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01106>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01107>
01108> ---------------------------------------------------------------------------
01109> 010:0006-----------------------------------------------------------------
01110> *ADD TOTAL AREA CONTRIBUTING TO SITE DISCHARGE
01111> ------------------------
01112> | ADD HYD (EX        ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01113> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01114>                       ID1 01:102            .12     .022    1.33  31.91    .000
01115>                      +ID2 02:101MJR         .03     .025    1.33  40.69    .000
01116>                      +ID3 03:101mnr         .48     .097    1.18  40.69    .000
01117>                       ========================================================
01118>                       SUM 10:EX             .63     .143    1.33  39.01    .000
01119>
01120>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01121>
01122> ---------------------------------------------------------------------------
01123> 010:0007-----------------------------------------------------------------
01124> *#############################################################################|
01125> *#
01126> *#                     PROPOSED CONDITIONS HYDROLOGIC MODELING
01127> *#                ================================================
01128> *#
01129> *#############################################################################|
01130> *#*****************************************************************************|
01131> *AREA 201 - Minor Flow to Masonry Court, Major Flow to Clearview Avenue
01132> *#*****************************************************************************|
01133> ----------------------
01134> | CALIB STANDHYD     |   Area    (ha)=     .22
01135> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01136> ----------------------
01137>                              IMPERVIOUS    PERVIOUS (i)
01138>      Surface Area     (ha)=        .22          .00
01139>      Dep. Storage     (mm)=       1.00         8.92
01140>      Average Slope     (%)=       1.00         2.00
01141>      Length            (m)=      35.00         5.00
01142>      Mannings n           =       .013         .250
01143>
01144>      Max.eff.Inten.(mm/hr)=     101.14        25.00
01145>                over (min)        1.00         5.00
01146>      Storage Coeff.  (min)=       1.35 (ii)    4.88 (ii)
01147>      Unit Hyd. Tpeak (min)=       1.00         5.00
01148>      Unit Hyd. peak  (cms)=        .89          .23
01149>                                                        *TOTALS*
01150>      PEAK FLOW       (cms)=        .06          .00          .061 (iii)
01151>      TIME TO PEAK    (hrs)=       1.33         1.38         1.333
01152>      RUNOFF VOLUME    (mm)=      47.00        11.90        46.653
01153>      TOTAL RAINFALL   (mm)=      48.00        48.00        48.004
01154>      RUNOFF COEFFICIENT   =        .98          .25          .972
01155>
01156>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01157>            CN* =  74.0    Ia = Dep. Storage  (Above)
01158>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01159>            THAN THE STORAGE COEFFICIENT.
01160>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01161>
01162> ---------------------------------------------------------------------------
01163> 010:0008-----------------------------------------------------------------
01164> *Note: Minor system for 201 outlets to storm sewer on Masonry Court
01165> *Major overland flows proceed to Clearview Avenue
01166> ----------------------
01167> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .051  (cms)
01168> | TotalHyd 01:201    |   Number of inlets in system [NINLET] =      1
01169> ----------------------   Total minor system capacity         =    .051  (cms)
01170>                          Total major system storage [TMJSTO] =     102.(cu.m.)
```

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01171>
01172>                   ID: NHYD        AREA     QPEAK     TPEAK      R.V.      DWF
01173>                                   (ha)     (cms)     (hrs)      (mm)    (cms)
01174>      TOTAL HYD.   01:201           .22      .061     1.333    46.653     .000
01175>      ========================================================================
01176>      MAJOR SYST   02:201MJR        .00      .000      .000      .000     .000
01177>      MINOR SYST   03:201mnr        .22      .051     1.217    47.138     .000
01178>
01179>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01180>
01181>      Maximum MAJOR SYSTEM storage used =       4.(cu.m.)
01182>
01183> ----------------------------------------------------------------------------
01184> 010:0009--------------------------------------------------------------------
01185> *#*************************************************************************|
01186> *AREA 202 - Building Roof to Masonry Court
01187> *#*************************************************************************|
01188> ----------------------
01189> | CALIB STANDHYD     |   Area    (ha)=     .27
01190> | 01:202    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01191> ----------------------
01192>                              IMPERVIOUS    PERVIOUS (i)
01193>      Surface Area     (ha)=        .27          .00
01194>      Dep. Storage     (mm)=       1.00         8.92
01195>      Average Slope     (%)=       1.00         2.00
01196>      Length            (m)=      15.00        10.00
01197>      Mannings n             =       .013         .250
01198>
01199>      Max.eff.Inten.(mm/hr)=     101.14        23.68
01200>                  over (min)        1.00         6.00
01201>      Storage Coeff.  (min)=        .81 (ii)    6.28 (ii)
01202>      Unit Hyd. Tpeak (min)=       1.00         6.00
01203>      Unit Hyd. peak  (cms)=       1.20          .18
01204>                                                      *TOTALS*
01205>      PEAK FLOW       (cms)=        .08          .00          .075 (iii)
01206>      TIME TO PEAK    (hrs)=       1.33         1.40         1.333
01207>      RUNOFF VOLUME    (mm)=      47.00        11.90        46.653
01208>      TOTAL RAINFALL   (mm)=      48.00        48.00        48.004
01209>      RUNOFF COEFFICIENT   =        .98          .25          .972
01210>
01211>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01212>            CN* =  74.0    Ia = Dep. Storage  (Above)
01213>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01214>            THAN THE STORAGE COEFFICIENT.
01215>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01216>
01217> ----------------------------------------------------------------------------
01218> 010:0010--------------------------------------------------------------------
01219> *#*************************************************************************|
01220> *AREA 203 - Minor Flow to Masonry Court, Major Flow to St. Matthews Avenue
01221> *#*************************************************************************|
01222> ----------------------
01223> | CALIB STANDHYD     |   Area    (ha)=     .07
01224> | 04:203    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01225> ----------------------
01226>                              IMPERVIOUS    PERVIOUS (i)
01227>      Surface Area     (ha)=        .07          .00
01228>      Dep. Storage     (mm)=       1.00         8.92
01229>      Average Slope     (%)=       1.00         2.00
01230>      Length            (m)=      15.00        10.00
01231>      Mannings n             =       .013         .250
01232>
01233>      Max.eff.Inten.(mm/hr)=     101.14        23.68
01234>                  over (min)        1.00         6.00
01235>      Storage Coeff.  (min)=        .81 (ii)    6.28 (ii)
```

```
01236>      Unit Hyd. Tpeak (min)=       1.00         6.00
01237>      Unit Hyd. peak  (cms)=       1.20          .18
01238>                                                        *TOTALS*
01239>      PEAK FLOW       (cms)=        .02          .00          .019 (iii)
01240>      TIME TO PEAK    (hrs)=       1.33         1.40         1.333
01241>      RUNOFF VOLUME    (mm)=      47.00        11.90        46.653
01242>      TOTAL RAINFALL   (mm)=      48.00        48.00        48.004
01243>      RUNOFF COEFFICIENT   =        .98          .25          .972
01244>
01245>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01246>            CN* =  74.0    Ia = Dep. Storage  (Above)
01247>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01248>            THAN THE STORAGE COEFFICIENT.
01249>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01250>
01251> ------------------------------------------------------------------------------
01252> 010:0011---------------------------------------------------------------------
01253> *Note: Minor system for 203 outlets to storm sewer on Masonry Court
01254> *Major overland flows proceed to St. Matthews Avenue
01255> ----------------------
01256> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .038  (cms)
01257> | TotalHyd 04:203    |   Number of inlets in system [NINLET] =       1
01258> ----------------------   Total minor system capacity         =    .038  (cms)
01259>                          Total major system storage [TMJSTO] =      21.(cu.m.)
01260>
01261>                    ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
01262>                                    (ha)     (cms)     (hrs)     (mm)    (cms)
01263>      TOTAL HYD.   04:203           .07      .019     1.333   46.653     .000
01264>      ========================================================================
01265>      MAJOR SYST   05:ST.MAT        .00      .000      .000     .000     .000
01266>      MINOR SYST   06:202mnr        .07      .019     1.333   46.653     .000
01267>
01268>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01269>
01270>      Maximum MAJOR SYSTEM storage used =       0.(cu.m.)
01271>
01272> ------------------------------------------------------------------------------
01273> 010:0012---------------------------------------------------------------------
01274> *#*************************************************************************|
01275> *AREA 204 - Site Perimeter Uncontrolled to Masonry Court
01276> *#*************************************************************************|
01277> ----------------------
01278> | CALIB STANDHYD     |   Area    (ha)=     .05
01279> | 07:204    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01280> ----------------------
01281>                               IMPERVIOUS    PERVIOUS (i)
01282>      Surface Area     (ha)=        .05          .00
01283>      Dep. Storage     (mm)=       1.00         8.92
01284>      Average Slope     (%)=       1.00         2.00
01285>      Length            (m)=       3.00         3.00
01286>      Mannings n           =       .013         .250
01287>
01288>      Max.eff.Inten.(mm/hr)=     101.14        27.51
01289>                over (min)        1.00         3.00
01290>      Storage Coeff.  (min)=        .31 (ii)    2.81 (ii)
01291>      Unit Hyd. Tpeak (min)=       1.00         3.00
01292>      Unit Hyd. peak  (cms)=       1.63          .39
01293>                                                        *TOTALS*
01294>      PEAK FLOW       (cms)=        .01          .00          .014 (iii)
01295>      TIME TO PEAK    (hrs)=       1.25         1.35         1.333
01296>      RUNOFF VOLUME    (mm)=      47.00        11.90        46.653
01297>      TOTAL RAINFALL   (mm)=      48.00        48.00        48.004
01298>      RUNOFF COEFFICIENT   =        .98          .25          .972
01299>
01300>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
01301>            CN* =  74.0    Ia = Dep. Storage  (Above)
01302>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01303>            THAN THE STORAGE COEFFICIENT.
01304>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01305>
01306> ------------------------------------------------------------------------------
01307> 010:0013----------------------------------------------------------------------
01308> *ADD TOTAL DRAINAGE TO TANK
01309> ------------------------
01310> | ADD HYD (TOTANK    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01311> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01312>                       ID1 01:202           .27      .075    1.33  46.65    .000
01313>                      +ID2 03:201mnr        .22      .051    1.22  47.14    .000
01314>                      +ID3 06:202mnr        .07      .019    1.33  46.65    .000
01315>                       ========================================================
01316>                       SUM 08:TOTANK         .56      .146    1.33  46.84    .000
01317>
01318>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01319>
01320> ------------------------------------------------------------------------------
01321> 010:0014----------------------------------------------------------------------
01322> *Control to Masonry Court via orifice plate on outlet from tank
01323> ---------------------
01324> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
01325> |  IN>08:(TOTANK)   |
01326> | OUT<06:(CTL-TA)   |    =========  OUTLFOW STORAGE TABLE  =========
01327> --------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01328>                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
01329>                            .000  .0000E+00   |     .044  .1950E-01
01330>                            .023  .5060E-02   |     .000  .0000E+00
01331>
01332>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01333>      --------------------       (ha)     (cms)     (hrs)       (mm)
01334>      INFLOW >08: (TOTANK)        .56      .146     1.333     46.843
01335>      OUTFLOW<06: (CTL-TA)        .56      .033     1.517     46.843
01336>     OVERFLOW<01: (OVF-TA)        .00      .000      .000       .000
01337>
01338>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01339>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01340>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
01341>
01342>
01343>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   22.851
01344>                     TIME SHIFT OF PEAK FLOW         (min)=    11.00
01345>                     MAXIMUM  STORAGE   USED       (ha.m.)=.1221E-01
01346>
01347> ------------------------------------------------------------------------------
01348> 010:0015----------------------------------------------------------------------
01349> *ADD TOTAL DRAINAGE TO MASONRY
01350> ------------------------
01351> | ADD HYD (MASONRY   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01352> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01353>                       ID1 06:CTL-TANK       .56      .033    1.52  46.84    .000
01354>                      +ID2 07:204            .05      .014    1.33  46.65    .000
01355>                       ========================================================
01356>                       SUM 03:MASONRY        .61      .044    1.33  46.83    .000
01357>
01358>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01359>
01360> ------------------------------------------------------------------------------
01361> 010:0016----------------------------------------------------------------------
01362> *#*****************************************************************************|
01363> *AREA 205 - Site Perimeter Uncontrolled to Clearview
01364> *#*****************************************************************************|
01365> ----------------------
```

```
01366> | CALIB NASHYD       |   Area    (ha)=     .02   Curve Number   (CN)=74.00
01367> | 07:205    DT= 1.00 |   Ia      (mm)=   8.920   # of Linear Res.(N)= 3.00
01368> ----------------------   U.H. Tp(hrs)=    .020
01369>
01370>      Unit Hyd Qpeak  (cms)=     .038
01371>
01372>      PEAK FLOW       (cms)=     .002 (i)
01373>      TIME TO PEAK    (hrs)=    1.333
01374>      RUNOFF VOLUME    (mm)=   11.901
01375>      TOTAL RAINFALL   (mm)=   48.004
01376>      RUNOFF COEFFICIENT   =     .248
01377>
01378>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01379>
01380>       *** WARNING: Time step is too large for value of TP.
01381>                    R.V. may be ok.  Peak flow could be off.
01382> --------------------------------------------------------------------------------
01383> 010:0017--------------------------------------------------------------------------
01384> *ADD TOTAL DRAINAGE TO CLEARVIEW
01385> ------------------------
01386> | ADD HYD (CLEARVIEW ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01387> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01388>                       ID1 01:OVF-TANK       .00     .000     .00    .00    .000
01389>                      +ID2 02:201MJR         .00     .000     .00    .00    .000
01390>                      +ID3 07:205            .02     .002    1.33  11.90    .000
01391>                       ============================================================
01392>                       SUM 04:CLEARVIEW      .02     .002    1.33  11.90    .000
01393>
01394>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01395>
01396> --------------------------------------------------------------------------------
01397> 010:0018--------------------------------------------------------------------------
01398> *ADD TOTAL DRAINAGE FROM SITE
01399> ------------------------
01400> | ADD HYD (PROP      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01401> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01402>                       ID1 03:MASONRY        .61     .044    1.33  46.83    .000
01403>                      +ID2 04:CLEARVIEW      .02     .002    1.33  11.90    .000
01404>                      +ID3 05:ST.MATT        .00     .000     .00    .00    .000
01405>                       ============================================================
01406>                       SUM 09:PROP           .63     .046    1.33  45.72    .000
01407>
01408>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01409>
01410> --------------------------------------------------------------------------------
01411> 010:0019--------------------------------------------------------------------------
01412> *AREA CHECK
01413> ------------------------
01414> | ADD HYD (CHECK     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01415> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01416>                       ID1 09:PROP           .63     .046    1.33  45.72    .000
01417>                      +ID2 10:EX             .63     .143    1.33  39.01    .000
01418>                       ============================================================
01419>                       SUM 08:CHECK         1.26     .189    1.33  42.37    .000
01420>
01421>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01422>
01423> --------------------------------------------------------------------------------
01424> 010:0020--------------------------------------------------------------------------
01425> * RUN REMAINING DESIGN STORMS (City of Burlington 4-hour duration 5 TO 100-YR)
01426> *
01427> --------------------------------------------------------------------------------
01428> 010:0002--------------------------------------------------------------------------
01429> --------------------------------------------------------------------------------
01430> 010:0002--------------------------------------------------------------------------
```

```
01431>   ** END OF RUN :  24
01432>
01433> ****************************************************************************
01434>
01435>
01436>
01437>
01438>
01439> --------------------
01440> | START            |  Project  dir.: Q:\44795\100\SWM\SWMHYMO\
01441> --------------------  Rainfall dir.: Q:\44795\100\SWM\SWMHYMO\
01442>     TZERO =   .00 hrs on        0
01443>     METOUT=   2 (output = METRIC)
01444>     NRUN  = 025
01445>     NSTORM=   1
01446>            #  1=BURL_025.stm
01447> ------------------------------------------------------------------------------
01448> 025:0002--------------------------------------------------------------------
01449> *#*************************************************************************|
01450> *#  Project Name: 1085 CLEARVIEW AVENUE
01451> *#               BURLINGTON, ONTARIO
01452> *#  JOB NUMBER  : 44795-100
01453> *#       Date   : MAY 2019
01454> *#  Modeller    : ALP
01455> *#    Company   : MTE CONSULTANTS INC.
01456> *#       File   : 44795.DAT
01457> *
01458> ------------------------------------------------------------------------------
01459> 025:0002--------------------------------------------------------------------
01460> --------------------
01461> | READ STORM       |    Filename: 25-YR BURLINGTON CHICAGO STORM (4-HR DUR
01462> | Ptotal=  56.03 mm|    Comments: 25-YR BURLINGTON CHICAGO STORM (4-HR DUR
01463> --------------------
01464>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01465>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01466>                .17   4.010 |   1.17  28.592 |   2.17   9.185 |   3.17   4.782
01467>                .33   4.566 |   1.33 117.720 |   2.33   7.879 |   3.33   4.457
01468>                .50   5.337 |   1.50  37.274 |   2.50   6.929 |   3.50   4.178
01469>                .67   6.491 |   1.67  20.279 |   2.67   6.204 |   3.67   3.937
01470>                .83   8.435 |   1.83  14.230 |   2.83   5.632 |   3.83   3.725
01471>               1.00  12.531 |   2.00  11.105 |   3.00   5.167 |   4.00   3.538
01472>
01473> ------------------------------------------------------------------------------
01474> 025:0003--------------------------------------------------------------------
01475> *
01476> *#############################################################################|
01477> *#
01478> *#                     EXISTING CONDITIONS HYDROLOGIC MODELING
01479> *#                  ================================================
01480> *#
01481> *#############################################################################|
01482> *#*************************************************************************|
01483> *AREA 101 - Existing Commercial Lot
01484> *#*************************************************************************|
01485> ----------------------
01486> | CALIB STANDHYD     |   Area    (ha)=     .51
01487> | 01:101    DT= 1.00 |   Total Imp(%)=   82.00   Dir. Conn.(%)=   82.00
01488> ----------------------
01489>                              IMPERVIOUS    PERVIOUS (i)
01490>      Surface Area     (ha)=        .42          .09
01491>      Dep. Storage     (mm)=       1.00         8.92
01492>      Average Slope     (%)=       1.00         2.00
01493>      Length            (m)=      10.00         5.00
01494>      Mannings n           =       .013         .250
01495>
```

```
01496>      Max.eff.Inten.(mm/hr)=     117.72        36.75
01497>                 over (min)        1.00         4.00
01498>      Storage Coeff.  (min)=         .60 (ii)    3.63 (ii)
01499>      Unit Hyd. Tpeak (min)=        1.00         4.00
01500>      Unit Hyd. peak  (cms)=        1.38          .30
01501>                                                        *TOTALS*
01502>      PEAK FLOW       (cms)=         .14          .01          .143 (iii)
01503>      TIME TO PEAK    (hrs)=        1.32         1.37         1.333
01504>      RUNOFF VOLUME    (mm)=       55.03        16.28        48.055
01505>      TOTAL RAINFALL   (mm)=       56.03        56.03        56.030
01506>      RUNOFF COEFFICIENT   =         .98          .29          .858
01507>
01508>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01509>            CN* =  74.0    Ia = Dep. Storage  (Above)
01510>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01511>            THAN THE STORAGE COEFFICIENT.
01512>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01513>
01514> ---------------------------------------------------------------------------
01515> 025:0004-----------------------------------------------------------------------
01516> *Note: Minor system for commercial lot outlets to storm sewer on Masonry Court
01517> *Major overland flows proceed to Clearview Avenue
01518> ----------------------
01519> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .097  (cms)
01520> | TotalHyd 01:101    |   Number of inlets in system [NINLET] =       1
01521> ----------------------   Total minor system capacity         =    .097  (cms)
01522>                          Total major system storage [TMJSTO] =       0.(cu.m.)
01523>
01524>                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
01525>                                   (ha)     (cms)     (hrs)     (mm)    (cms)
01526>      TOTAL HYD.   01:101           .51      .143     1.333   48.055     .000
01527>      ========================================================================
01528>      MAJOR SYST   02:101MJR         .05      .046     1.333   48.055     .000
01529>      MINOR SYST   03:101mnr         .46      .097     1.183   48.055     .000
01530>
01531>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01532>
01533> ---------------------------------------------------------------------------
01534> 025:0005-----------------------------------------------------------------------
01535> *#*************************************************************************|
01536> *AREA 102 - Existing Dwelling Lots to St. Matthews Avenue
01537> *#*************************************************************************|
01538> ----------------------
01539> | CALIB STANDHYD     |   Area    (ha)=     .12
01540> | 01:102    DT= 1.00 |   Total Imp(%)=   57.00   Dir. Conn.(%)=   57.00
01541> ----------------------
01542>                               IMPERVIOUS    PERVIOUS (i)
01543>      Surface Area     (ha)=        .07          .05
01544>      Dep. Storage     (mm)=       1.00         8.92
01545>      Average Slope     (%)=       1.00         2.00
01546>      Length            (m)=      15.00         5.00
01547>      Mannings n           =        .013         .250
01548>
01549>      Max.eff.Inten.(mm/hr)=     117.72        36.75
01550>                 over (min)        1.00         4.00
01551>      Storage Coeff.  (min)=         .77 (ii)    3.79 (ii)
01552>      Unit Hyd. Tpeak (min)=        1.00         4.00
01553>      Unit Hyd. peak  (cms)=        1.24          .29
01554>                                                        *TOTALS*
01555>      PEAK FLOW       (cms)=         .02          .00          .026 (iii)
01556>      TIME TO PEAK    (hrs)=        1.33         1.37         1.333
01557>      RUNOFF VOLUME    (mm)=       55.03        16.28        38.366
01558>      TOTAL RAINFALL   (mm)=       56.03        56.03        56.030
01559>      RUNOFF COEFFICIENT   =         .98          .29          .685
01560>
```

```
01561>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01562>            CN* =  74.0    Ia = Dep. Storage  (Above)
01563>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01564>            THAN THE STORAGE COEFFICIENT.
01565>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01566>
01567> ------------------------------------------------------------------------------
01568> 025:0006--------------------------------------------------------------------
01569> *ADD TOTAL AREA CONTRIBUTING TO SITE DISCHARGE
01570> ------------------------
01571> | ADD HYD (EX        ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01572> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01573>                        ID1 01:102           .12      .026    1.33  38.37    .000
01574>                       +ID2 02:101MJR        .05      .046    1.33  48.05    .000
01575>                       +ID3 03:101mnr        .46      .097    1.18  48.05    .000
01576>                        ============================================================
01577>                        SUM 10:EX             .63      .169    1.33  46.21    .000
01578>
01579>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01580>
01581> ------------------------------------------------------------------------------
01582> 025:0007--------------------------------------------------------------------
01583> *#############################################################################|
01584> *#
01585> *#                      PROPOSED CONDITIONS HYDROLOGIC MODELING
01586> *#                  ================================================
01587> *#
01588> *#############################################################################|
01589> *#*****************************************************************************|
01590> *AREA 201 - Minor Flow to Masonry Court, Major Flow to Clearview Avenue
01591> *#*****************************************************************************|
01592> ----------------------
01593> | CALIB STANDHYD     |   Area    (ha)=     .22
01594> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01595> ----------------------
01596>                              IMPERVIOUS    PERVIOUS (i)
01597>      Surface Area     (ha)=        .22          .00
01598>      Dep. Storage     (mm)=       1.00         8.92
01599>      Average Slope     (%)=       1.00         2.00
01600>      Length            (m)=      35.00         5.00
01601>      Mannings n           =       .013         .250
01602>
01603>      Max.eff.Inten.(mm/hr)=     117.72        36.75
01604>                  over (min)        1.00         4.00
01605>      Storage Coeff.  (min)=       1.27 (ii)    4.30 (ii)
01606>      Unit Hyd. Tpeak (min)=       1.00         4.00
01607>      Unit Hyd. peak  (cms)=        .92          .27
01608>                                                          *TOTALS*
01609>      PEAK FLOW       (cms)=        .07          .00          .071 (iii)
01610>      TIME TO PEAK    (hrs)=       1.33         1.37         1.333
01611>      RUNOFF VOLUME    (mm)=      55.03        16.28        54.643
01612>      TOTAL RAINFALL   (mm)=      56.03        56.03        56.030
01613>      RUNOFF COEFFICIENT   =        .98          .29          .975
01614>
01615>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01616>            CN* =  74.0    Ia = Dep. Storage  (Above)
01617>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01618>            THAN THE STORAGE COEFFICIENT.
01619>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01620>
01621> ------------------------------------------------------------------------------
01622> 025:0008--------------------------------------------------------------------
01623> *Note: Minor system for 201 outlets to storm sewer on Masonry Court
01624> *Major overland flows proceed to Clearview Avenue
01625> ----------------------
```

```
01626> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .051  (cms)
01627> | TotalHyd 01:201    |   Number of inlets in system [NINLET] =       1
01628> ----------------------   Total minor system capacity         =    .051  (cms)
01629>                          Total major system storage [TMJSTO] =     102.(cu.m.)
01630>
01631>                    ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
01632>                                    (ha)     (cms)     (hrs)     (mm)    (cms)
01633>      TOTAL HYD.   01:201           .22      .071     1.333   54.643     .000
01634>      ========================================================================
01635>      MAJOR SYST   02:201MJR         .00      .000      .000     .000     .000
01636>      MINOR SYST   03:201mnr         .22      .051     1.200   55.289     .000
01637>
01638>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01639>
01640>      Maximum MAJOR SYSTEM storage used =      10.(cu.m.)
01641>
01642> ------------------------------------------------------------------------------
01643> 025:0009----------------------------------------------------------------------
01644> *#*****************************************************************************|
01645> *AREA 202 - Building Roof to Masonry Court
01646> *#*****************************************************************************|
01647> ----------------------
01648> | CALIB STANDHYD     |   Area    (ha)=     .27
01649> | 01:202    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01650> ----------------------
01651>                                IMPERVIOUS    PERVIOUS (i)
01652>      Surface Area     (ha)=        .27          .00
01653>      Dep. Storage     (mm)=       1.00         8.92
01654>      Average Slope     (%)=       1.00         2.00
01655>      Length            (m)=      15.00        10.00
01656>      Mannings n           =       .013         .250
01657>
01658>      Max.eff.Inten.(mm/hr)=     117.72        35.19
01659>                 over (min)        1.00         5.00
01660>      Storage Coeff.  (min)=        .77 (ii)    5.43 (ii)
01661>      Unit Hyd. Tpeak (min)=       1.00         5.00
01662>      Unit Hyd. peak  (cms)=       1.24          .21
01663>                                                        *TOTALS*
01664>      PEAK FLOW       (cms)=        .09          .00          .088 (iii)
01665>      TIME TO PEAK    (hrs)=       1.33         1.38         1.333
01666>      RUNOFF VOLUME    (mm)=      55.03        16.28        54.643
01667>      TOTAL RAINFALL   (mm)=      56.03        56.03        56.030
01668>      RUNOFF COEFFICIENT   =        .98          .29          .975
01669>
01670>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01671>            CN* =  74.0    Ia = Dep. Storage  (Above)
01672>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01673>            THAN THE STORAGE COEFFICIENT.
01674>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01675>
01676> ------------------------------------------------------------------------------
01677> 025:0010----------------------------------------------------------------------
01678> *#*****************************************************************************|
01679> *AREA 203 - Minor Flow to Masonry Court, Major Flow to St. Matthews Avenue
01680> *#*****************************************************************************|
01681> ----------------------
01682> | CALIB STANDHYD     |   Area    (ha)=     .07
01683> | 04:203    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01684> ----------------------
01685>                                IMPERVIOUS    PERVIOUS (i)
01686>      Surface Area     (ha)=        .07          .00
01687>      Dep. Storage     (mm)=       1.00         8.92
01688>      Average Slope     (%)=       1.00         2.00
01689>      Length            (m)=      15.00        10.00
01690>      Mannings n           =       .013         .250
```

```
01691>
01692>      Max.eff.Inten.(mm/hr)=     117.72        35.19
01693>                  over (min)        1.00         5.00
01694>      Storage Coeff.  (min)=         .77 (ii)    5.43 (ii)
01695>      Unit Hyd. Tpeak (min)=        1.00         5.00
01696>      Unit Hyd. peak  (cms)=        1.24          .22
01697>                                                        *TOTALS*
01698>      PEAK FLOW       (cms)=         .02          .00          .023 (iii)
01699>      TIME TO PEAK    (hrs)=        1.33         1.38         1.333
01700>      RUNOFF VOLUME    (mm)=       55.03        16.28        54.643
01701>      TOTAL RAINFALL   (mm)=       56.03        56.03        56.030
01702>      RUNOFF COEFFICIENT   =         .98          .29          .975
01703>
01704>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01705>            CN* =  74.0    Ia = Dep. Storage  (Above)
01706>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01707>            THAN THE STORAGE COEFFICIENT.
01708>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01709>
01710> ------------------------------------------------------------------------------
01711> 025:0011--------------------------------------------------------------------
01712> *Note: Minor system for 203 outlets to storm sewer on Masonry Court
01713> *Major overland flows proceed to St. Matthews Avenue
01714> ----------------------
01715> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .038  (cms)
01716> | TotalHyd 04:203    |   Number of inlets in system [NINLET] =       1
01717> ----------------------   Total minor system capacity         =    .038  (cms)
01718>                          Total major system storage [TMJSTO] =      21.(cu.m.)
01719>
01720>                    ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
01721>                                    (ha)     (cms)     (hrs)     (mm)    (cms)
01722>      TOTAL HYD.   04:203           .07      .023     1.333   54.643     .000
01723>      ==========================================================================
01724>      MAJOR SYST   05:ST.MAT        .00      .000      .000     .000     .000
01725>      MINOR SYST   06:202mnr        .07      .023     1.333   54.643     .000
01726>
01727>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01728>
01729>      Maximum MAJOR SYSTEM storage used =       0.(cu.m.)
01730>
01731> ------------------------------------------------------------------------------
01732> 025:0012--------------------------------------------------------------------
01733> *#*************************************************************************|
01734> *AREA 204 - Site Perimeter Uncontrolled to Masonry Court
01735> *#*************************************************************************|
01736> ----------------------
01737> | CALIB STANDHYD     |   Area    (ha)=     .05
01738> | 07:204    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
01739> ----------------------
01740>                              IMPERVIOUS    PERVIOUS (i)
01741>      Surface Area     (ha)=        .05          .00
01742>      Dep. Storage     (mm)=       1.00         8.92
01743>      Average Slope     (%)=       1.00         2.00
01744>      Length            (m)=       3.00         3.00
01745>      Mannings n           =       .013         .250
01746>
01747>      Max.eff.Inten.(mm/hr)=     117.72        39.70
01748>                  over (min)        1.00         2.00
01749>      Storage Coeff.  (min)=         .29 (ii)    2.45 (ii)
01750>      Unit Hyd. Tpeak (min)=        1.00         2.00
01751>      Unit Hyd. peak  (cms)=        1.64          .49
01752>                                                        *TOTALS*
01753>      PEAK FLOW       (cms)=         .02          .00          .016 (iii)
01754>      TIME TO PEAK    (hrs)=        1.30         1.33         1.333
01755>      RUNOFF VOLUME    (mm)=       55.03        16.28        54.643
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01756>      TOTAL RAINFALL   (mm)=      56.03        56.03         56.030
01757>      RUNOFF COEFFICIENT   =        .98          .29           .975
01758>
01759>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01760>            CN* =  74.0    Ia = Dep. Storage  (Above)
01761>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01762>            THAN THE STORAGE COEFFICIENT.
01763>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01764>
01765> ------------------------------------------------------------------------------
01766> 025:0013--------------------------------------------------------------------
01767> *ADD TOTAL DRAINAGE TO TANK
01768> ------------------------
01769> | ADD HYD (TOTANK    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01770> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01771>                       ID1 01:202           .27      .088    1.33  54.64    .000
01772>                      +ID2 03:201mnr        .22      .051    1.20  55.29    .000
01773>                      +ID3 06:202mnr        .07      .023    1.33  54.64    .000
01774>                       ============================================================
01775>                       SUM 08:TOTANK         .56      .161    1.33  54.90    .000
01776>
01777>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01778>
01779> ------------------------------------------------------------------------------
01780> 025:0014--------------------------------------------------------------------
01781> *Control to Masonry Court via orifice plate on outlet from tank
01782> ---------------------
01783> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
01784> |  IN>08:(TOTANK)   |
01785> | OUT<06:(CTL-TA)   |    =========  OUTLFOW STORAGE TABLE  =========
01786> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01787>                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
01788>                             .000  .0000E+00   |     .044  .1950E-01
01789>                             .023  .5060E-02   |     .000  .0000E+00
01790>
01791>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
01792>      --------------------      (ha)     (cms)     (hrs)       (mm)
01793>      INFLOW >08: (TOTANK)       .56      .161     1.333     54.897
01794>      OUTFLOW<06: (CTL-TA)       .56      .037     1.533     54.897
01795>     OVERFLOW<01: (OVF-TA)       .00      .000      .000       .000
01796>
01797>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01798>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01799>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
01800>
01801>
01802>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   22.731
01803>                    TIME SHIFT OF PEAK FLOW         (min)=    12.00
01804>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1459E-01
01805>
01806> ------------------------------------------------------------------------------
01807> 025:0015--------------------------------------------------------------------
01808> *ADD TOTAL DRAINAGE TO MASONRY
01809> ------------------------
01810> | ADD HYD (MASONRY   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01811> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01812>                       ID1 06:CTL-TANK       .56      .037    1.53  54.90    .000
01813>                      +ID2 07:204            .05      .016    1.33  54.64    .000
01814>                       ============================================================
01815>                       SUM 03:MASONRY        .61      .048    1.33  54.88    .000
01816>
01817>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01818>
01819> ------------------------------------------------------------------------------
01820> 025:0016--------------------------------------------------------------------
```

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01821> *#############################################################################|
01822> *AREA 205 - Site Perimeter Uncontrolled to Clearview
01823> *#############################################################################|
01824> ----------------------
01825> | CALIB NASHYD       |   Area    (ha)=     .02   Curve Number   (CN)=74.00
01826> | 07:205    DT= 1.00 |   Ia      (mm)=   8.920   # of Linear Res.(N)= 3.00
01827> ----------------------   U.H. Tp(hrs)=    .020
01828>
01829>      Unit Hyd Qpeak  (cms)=     .038
01830>
01831>      PEAK FLOW       (cms)=     .002 (i)
01832>      TIME TO PEAK    (hrs)=    1.333
01833>      RUNOFF VOLUME    (mm)=   16.274
01834>      TOTAL RAINFALL   (mm)=   56.030
01835>      RUNOFF COEFFICIENT   =     .290
01836>
01837>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01838>
01839>       *** WARNING: Time step is too large for value of TP.
01840>                    R.V. may be ok.  Peak flow could be off.
01841> -------------------------------------------------------------------------------
01842> 025:0017---------------------------------------------------------------------
01843> *ADD TOTAL DRAINAGE TO CLEARVIEW
01844> ------------------------
01845> | ADD HYD (CLEARVIEW ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01846> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01847>                       ID1 01:OVF-TANK       .00     .000     .00    .00    .000
01848>                      +ID2 02:201MJR         .00     .000     .00    .00    .000
01849>                      +ID3 07:205            .02     .002    1.33  16.27    .000
01850>                       ============================================================
01851>                       SUM 04:CLEARVIEW      .02     .002    1.33  16.27    .000
01852>
01853>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01854>
01855> -------------------------------------------------------------------------------
01856> 025:0018---------------------------------------------------------------------
01857> *ADD TOTAL DRAINAGE FROM SITE
01858> ------------------------
01859> | ADD HYD (PROP      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01860> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01861>                       ID1 03:MASONRY        .61     .048    1.33  54.88    .000
01862>                      +ID2 04:CLEARVIEW      .02     .002    1.33  16.27    .000
01863>                      +ID3 05:ST.MATT        .00     .000     .00    .00    .000
01864>                       ============================================================
01865>                       SUM 09:PROP           .63     .050    1.33  53.65    .000
01866>
01867>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01868>
01869> -------------------------------------------------------------------------------
01870> 025:0019---------------------------------------------------------------------
01871> *AREA CHECK
01872> ------------------------
01873> | ADD HYD (CHECK     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01874> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01875>                       ID1 09:PROP           .63     .050    1.33  53.65    .000
01876>                      +ID2 10:EX             .63     .169    1.33  46.21    .000
01877>                       ============================================================
01878>                       SUM 08:CHECK         1.26     .220    1.33  49.93    .000
01879>
01880>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01881>
01882> -------------------------------------------------------------------------------
01883> 025:0020---------------------------------------------------------------------
01884> * RUN REMAINING DESIGN STORMS (City of Burlington 4-hour duration 5 TO 100-YR)
01885> *
```

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01886> --------------------------------------------------------------------------------
01887> 025:0002--------------------------------------------------------------------------
01888> --------------------------------------------------------------------------------
01889> 025:0002--------------------------------------------------------------------------
01890> --------------------------------------------------------------------------------
01891> 025:0002--------------------------------------------------------------------------
01892>   ** END OF RUN :  49
01893>
01894> ********************************************************************************
01895>
01896>
01897>
01898>
01899>
01900> --------------------
01901> | START            |  Project  dir.: Q:\44795\100\SWM\SWMHYMO\
01902> --------------------  Rainfall dir.: Q:\44795\100\SWM\SWMHYMO\
01903>     TZERO =   .00 hrs on        0
01904>     METOUT=   2 (output = METRIC)
01905>     NRUN  = 050
01906>     NSTORM=   1
01907>            #  1=BURL_050.stm
01908> --------------------------------------------------------------------------------
01909> 050:0002--------------------------------------------------------------------------
01910> *#*************************************************************************|
01911> *#  Project Name: 1085 CLEARVIEW AVENUE
01912> *#               BURLINGTON, ONTARIO
01913> *#  JOB NUMBER  : 44795-100
01914> *#       Date   : MAY 2019
01915> *#  Modeller    : ALP
01916> *#    Company   : MTE CONSULTANTS INC.
01917> *#       File   : 44795.DAT
01918> *
01919> --------------------------------------------------------------------------------
01920> 050:0002--------------------------------------------------------------------------
01921> --------------------
01922> | READ STORM       |    Filename: 50-YR BURLINGTON CHICAGO STORM (4-HR DUR
01923> | Ptotal=  61.96 mm|    Comments: 50-YR BURLINGTON CHICAGO STORM (4-HR DUR
01924> --------------------
01925>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01926>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01927>                .17   4.451 |   1.17  31.613 |   2.17  10.180 |   3.17   5.306
01928>                .33   5.067 |   1.33 129.819 |   2.33   8.734 |   3.33   4.946
01929>                .50   5.921 |   1.50  41.194 |   2.50   7.683 |   3.50   4.637
01930>                .67   7.198 |   1.67  22.439 |   2.67   6.881 |   3.67   4.369
01931>                .83   9.350 |   1.83  15.757 |   2.83   6.247 |   3.83   4.135
01932>               1.00  13.879 |   2.00  12.303 |   3.00   5.733 |   4.00   3.927
01933>
01934> --------------------------------------------------------------------------------
01935> 050:0003--------------------------------------------------------------------------
01936> *
01937> *#########################################################################|
01938> *#
01939> *#                     EXISTING CONDITIONS HYDROLOGIC MODELING
01940> *#                  ================================================
01941> *#
01942> *#########################################################################|
01943> *#*************************************************************************|
01944> *AREA 101 - Existing Commercial Lot
01945> *#*************************************************************************|
01946> ----------------------
01947> | CALIB STANDHYD     |   Area    (ha)=     .51
01948> | 01:101    DT= 1.00 |   Total Imp(%)=   82.00   Dir. Conn.(%)=   82.00
01949> ----------------------
01950>                              IMPERVIOUS    PERVIOUS (i)
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```
01951>      Surface Area     (ha)=        .42          .09
01952>      Dep. Storage     (mm)=       1.00         8.92
01953>      Average Slope     (%)=       1.00         2.00
01954>      Length            (m)=      10.00         5.00
01955>      Mannings n           =       .013         .250
01956>
01957>      Max.eff.Inten.(mm/hr)=     129.82        46.77
01958>                 over (min)        1.00         3.00
01959>      Storage Coeff.  (min)=        .58 (ii)    3.32 (ii)
01960>      Unit Hyd. Tpeak (min)=       1.00         3.00
01961>      Unit Hyd. peak  (cms)=       1.40          .35
01962>                                                        *TOTALS*
01963>      PEAK FLOW       (cms)=        .15          .01          .160 (iii)
01964>      TIME TO PEAK    (hrs)=       1.32         1.35         1.333
01965>      RUNOFF VOLUME    (mm)=      60.96        19.77        53.548
01966>      TOTAL RAINFALL   (mm)=      61.96        61.96        61.962
01967>      RUNOFF COEFFICIENT   =        .98          .32          .864
01968>
01969>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01970>            CN* =  74.0    Ia = Dep. Storage  (Above)
01971>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01972>            THAN THE STORAGE COEFFICIENT.
01973>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01974>
01975> ----------------------------------------------------------------------------
01976> 050:0004-------------------------------------------------------------------
01977> *Note: Minor system for commercial lot outlets to storm sewer on Masonry Court
01978> *Major overland flows proceed to Clearview Avenue
01979> ----------------------
01980> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .097  (cms)
01981> | TotalHyd 01:101    |   Number of inlets in system [NINLET] =       1
01982> ----------------------   Total minor system capacity         =    .097  (cms)
01983>                          Total major system storage [TMJSTO] =       0.(cu.m.)
01984>
01985>                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
01986>                                   (ha)     (cms)     (hrs)     (mm)    (cms)
01987>      TOTAL HYD.   01:101           .51      .160     1.333   53.548     .000
01988>      ========================================================================
01989>      MAJOR SYST   02:101MJR         .06      .063     1.333   53.548     .000
01990>      MINOR SYST   03:101mnr         .45      .097     1.183   53.548     .000
01991>
01992>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01993>
01994> ----------------------------------------------------------------------------
01995> 050:0005-------------------------------------------------------------------
01996> *#*************************************************************************|
01997> *AREA 102 - Existing Dwelling Lots to St. Matthews Avenue
01998> *#*************************************************************************|
01999> ----------------------
02000> | CALIB STANDHYD     |   Area    (ha)=     .12
02001> | 01:102    DT= 1.00 |   Total Imp(%)=   57.00   Dir. Conn.(%)=   57.00
02002> ----------------------
02003>                              IMPERVIOUS    PERVIOUS (i)
02004>      Surface Area     (ha)=        .07          .05
02005>      Dep. Storage     (mm)=       1.00         8.92
02006>      Average Slope     (%)=       1.00         2.00
02007>      Length            (m)=      15.00         5.00
02008>      Mannings n           =       .013         .250
02009>
02010>      Max.eff.Inten.(mm/hr)=     129.82        45.08
02011>                 over (min)        1.00         4.00
02012>      Storage Coeff.  (min)=        .74 (ii)    3.52 (ii)
02013>      Unit Hyd. Tpeak (min)=       1.00         4.00
02014>      Unit Hyd. peak  (cms)=       1.26          .31
02015>                                                        *TOTALS*
```

```
02016>      PEAK FLOW       (cms)=        .02          .01           .029 (iii)
02017>      TIME TO PEAK    (hrs)=       1.33         1.37          1.333
02018>      RUNOFF VOLUME    (mm)=      60.96        19.77         43.251
02019>      TOTAL RAINFALL   (mm)=      61.96        61.96         61.962
02020>      RUNOFF COEFFICIENT   =        .98          .32           .698
02021>
02022>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02023>            CN* =  74.0    Ia = Dep. Storage  (Above)
02024>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02025>            THAN THE STORAGE COEFFICIENT.
02026>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02027>
02028> ---------------------------------------------------------------------------
02029> 050:0006-----------------------------------------------------------------
02030> *ADD TOTAL AREA CONTRIBUTING TO SITE DISCHARGE
02031> ------------------------
02032> | ADD HYD (EX        ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02033> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02034>                       ID1 01:102           .12      .029    1.33  43.25    .000
02035>                      +ID2 02:101MJR        .06      .063    1.33  53.55    .000
02036>                      +ID3 03:101mnr        .45      .097    1.18  53.55    .000
02037>                       ============================================================
02038>                       SUM 10:EX             .63      .189    1.33  51.59    .000
02039>
02040>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02041>
02042> ---------------------------------------------------------------------------
02043> 050:0007-----------------------------------------------------------------
02044> *###########################################################################|
02045> *#
02046> *#                     PROPOSED CONDITIONS HYDROLOGIC MODELING
02047> *#                  ================================================
02048> *#
02049> *###########################################################################|
02050> *#*************************************************************************|
02051> *AREA 201 - Minor Flow to Masonry Court, Major Flow to Clearview Avenue
02052> *#*************************************************************************|
02053> ----------------------
02054> | CALIB STANDHYD     |   Area    (ha)=     .22
02055> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02056> ----------------------
02057>                              IMPERVIOUS    PERVIOUS (i)
02058>      Surface Area     (ha)=        .22          .00
02059>      Dep. Storage     (mm)=       1.00         8.92
02060>      Average Slope     (%)=       1.00         2.00
02061>      Length            (m)=      35.00         5.00
02062>      Mannings n             =       .013         .250
02063>
02064>      Max.eff.Inten.(mm/hr)=     129.82        45.08
02065>                 over (min)        1.00         4.00
02066>      Storage Coeff.  (min)=       1.23 (ii)    4.01 (ii)
02067>      Unit Hyd. Tpeak (min)=       1.00         4.00
02068>      Unit Hyd. peak  (cms)=        .95          .28
02069>                                                          *TOTALS*
02070>      PEAK FLOW       (cms)=        .08          .00           .079 (iii)
02071>      TIME TO PEAK    (hrs)=       1.33         1.37          1.333
02072>      RUNOFF VOLUME    (mm)=      60.96        19.77         60.550
02073>      TOTAL RAINFALL   (mm)=      61.96        61.96         61.962
02074>      RUNOFF COEFFICIENT   =        .98          .32           .977
02075>
02076>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02077>            CN* =  74.0    Ia = Dep. Storage  (Above)
02078>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02079>            THAN THE STORAGE COEFFICIENT.
02080>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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02081>
02082> ----------------------------------------------------------------------------
02083> 050:0008----------------------------------------------------------------------
02084> *Note: Minor system for 201 outlets to storm sewer on Masonry Court
02085> *Major overland flows proceed to Clearview Avenue
02086> ----------------------
02087> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .051  (cms)
02088> | TotalHyd 01:201    |   Number of inlets in system [NINLET] =       1
02089> ----------------------   Total minor system capacity         =    .051  (cms)
02090>                          Total major system storage [TMJSTO] =     102.(cu.m.)
02091>
02092>                    ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
02093>                                    (ha)     (cms)     (hrs)     (mm)    (cms)
02094>      TOTAL HYD.   01:201           .22      .079     1.333   60.550     .000
02095>      ========================================================================
02096>      MAJOR SYST   02:201MJR        .00      .000      .000     .000     .000
02097>      MINOR SYST   03:201mnr        .22      .051     1.517   61.088     .000
02098>
02099>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02100>
02101>      Maximum MAJOR SYSTEM storage used =      14.(cu.m.)
02102>
02103> ----------------------------------------------------------------------------
02104> 050:0009----------------------------------------------------------------------
02105> *#*************************************************************************|
02106> *AREA 202 - Building Roof to Masonry Court
02107> *#*************************************************************************|
02108> ----------------------
02109> | CALIB STANDHYD     |   Area    (ha)=     .27
02110> | 01:202    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02111> ----------------------
02112>                              IMPERVIOUS    PERVIOUS (i)
02113>      Surface Area     (ha)=        .27          .00
02114>      Dep. Storage     (mm)=       1.00         8.92
02115>      Average Slope     (%)=       1.00         2.00
02116>      Length            (m)=      15.00        10.00
02117>      Mannings n           =       .013         .250
02118>
02119>      Max.eff.Inten.(mm/hr)=     129.82        43.32
02120>                 over (min)        1.00         5.00
02121>      Storage Coeff.  (min)=        .74 (ii)    5.03 (ii)
02122>      Unit Hyd. Tpeak (min)=       1.00         5.00
02123>      Unit Hyd. peak  (cms)=       1.26          .23
02124>                                                          *TOTALS*
02125>      PEAK FLOW       (cms)=        .10          .00          .097 (iii)
02126>      TIME TO PEAK    (hrs)=       1.33         1.38         1.333
02127>      RUNOFF VOLUME    (mm)=      60.96        19.77        60.550
02128>      TOTAL RAINFALL   (mm)=      61.96        61.96        61.962
02129>      RUNOFF COEFFICIENT   =        .98          .32          .977
02130>
02131>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02132>            CN* =  74.0    Ia = Dep. Storage  (Above)
02133>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02134>            THAN THE STORAGE COEFFICIENT.
02135>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02136>
02137> ----------------------------------------------------------------------------
02138> 050:0010----------------------------------------------------------------------
02139> *#*************************************************************************|
02140> *AREA 203 - Minor Flow to Masonry Court, Major Flow to St. Matthews Avenue
02141> *#*************************************************************************|
02142> ----------------------
02143> | CALIB STANDHYD     |   Area    (ha)=     .07
02144> | 04:203    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02145> ----------------------
```

```
02146>                                IMPERVIOUS    PERVIOUS (i)
02147>      Surface Area     (ha)=        .07          .00
02148>      Dep. Storage     (mm)=       1.00         8.92
02149>      Average Slope     (%)=       1.00         2.00
02150>      Length            (m)=      15.00        10.00
02151>      Mannings n            =       .013         .250
02152>
02153>      Max.eff.Inten.(mm/hr)=     129.82        43.32
02154>                 over (min)        1.00         5.00
02155>      Storage Coeff.  (min)=         .74 (ii)    5.03 (ii)
02156>      Unit Hyd. Tpeak (min)=       1.00         5.00
02157>      Unit Hyd. peak  (cms)=       1.26          .23
02158>                                                      *TOTALS*
02159>      PEAK FLOW       (cms)=        .02          .00          .025 (iii)
02160>      TIME TO PEAK    (hrs)=       1.33         1.38         1.333
02161>      RUNOFF VOLUME    (mm)=      60.96        19.77        60.550
02162>      TOTAL RAINFALL   (mm)=      61.96        61.96        61.962
02163>      RUNOFF COEFFICIENT   =        .98          .32          .977
02164>
02165>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02166>            CN* =  74.0    Ia = Dep. Storage  (Above)
02167>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02168>            THAN THE STORAGE COEFFICIENT.
02169>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02170>
02171> ---------------------------------------------------------------------------
02172> 050:0011-----------------------------------------------------------------
02173> *Note: Minor system for 203 outlets to storm sewer on Masonry Court
02174> *Major overland flows proceed to St. Matthews Avenue
02175> ----------------------
02176> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .038  (cms)
02177> | TotalHyd 04:203    |   Number of inlets in system [NINLET] =       1
02178> ----------------------   Total minor system capacity         =    .038  (cms)
02179>                          Total major system storage [TMJSTO] =      21.(cu.m.)
02180>
02181>                    ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
02182>                                    (ha)     (cms)     (hrs)     (mm)    (cms)
02183>      TOTAL HYD.   04:203           .07      .025     1.333   60.550     .000
02184>      ========================================================================
02185>      MAJOR SYST   05:ST.MAT        .00      .000      .000     .000     .000
02186>      MINOR SYST   06:202mnr        .07      .025     1.333   60.550     .000
02187>
02188>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02189>
02190>      Maximum MAJOR SYSTEM storage used =       0.(cu.m.)
02191>
02192> ---------------------------------------------------------------------------
02193> 050:0012-----------------------------------------------------------------
02194> *#*************************************************************************|
02195> *AREA 204 - Site Perimeter Uncontrolled to Masonry Court
02196> *#*************************************************************************|
02197> ----------------------
02198> | CALIB STANDHYD     |   Area    (ha)=     .05
02199> | 07:204    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02200> ----------------------
02201>                                IMPERVIOUS    PERVIOUS (i)
02202>      Surface Area     (ha)=        .05          .00
02203>      Dep. Storage     (mm)=       1.00         8.92
02204>      Average Slope     (%)=       1.00         2.00
02205>      Length            (m)=       3.00         3.00
02206>      Mannings n            =       .013         .250
02207>
02208>      Max.eff.Inten.(mm/hr)=     129.82        48.40
02209>                 over (min)        1.00         2.00
02210>      Storage Coeff.  (min)=         .28 (ii)    2.27 (ii)
```

```
02211>      Unit Hyd. Tpeak (min)=       1.00         2.00
02212>      Unit Hyd. peak  (cms)=       1.65          .51
02213>                                                      *TOTALS*
02214>      PEAK FLOW       (cms)=        .02          .00          .018 (iii)
02215>      TIME TO PEAK    (hrs)=       1.25         1.33         1.333
02216>      RUNOFF VOLUME    (mm)=      60.96        19.77        60.550
02217>      TOTAL RAINFALL   (mm)=      61.96        61.96        61.962
02218>      RUNOFF COEFFICIENT   =        .98          .32          .977
02219>
02220>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02221>            CN* =  74.0    Ia = Dep. Storage  (Above)
02222>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02223>            THAN THE STORAGE COEFFICIENT.
02224>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02225>
02226> ------------------------------------------------------------------------------
02227> 050:0013---------------------------------------------------------------------
02228> *ADD TOTAL DRAINAGE TO TANK
02229> ------------------------
02230> | ADD HYD (TOTANK    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02231> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02232>                       ID1 01:202           .27      .097    1.33  60.55    .000
02233>                      +ID2 03:201mnr        .22      .051    1.52  61.09    .000
02234>                      +ID3 06:202mnr        .07      .025    1.33  60.55    .000
02235>                       ============================================================
02236>                       SUM 08:TOTANK         .56      .173    1.33  60.76    .000
02237>
02238>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02239>
02240> ------------------------------------------------------------------------------
02241> 050:0014---------------------------------------------------------------------
02242> *Control to Masonry Court via orifice plate on outlet from tank
02243> ---------------------
02244> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
02245> |  IN>08:(TOTANK)   |
02246> | OUT<06:(CTL-TA)   |    =========  OUTLFOW STORAGE TABLE  =========
02247> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02248>                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
02249>                             .000  .0000E+00   |     .044  .1950E-01
02250>                             .023  .5060E-02   |     .000  .0000E+00
02251>
02252>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
02253>      --------------------      (ha)     (cms)     (hrs)       (mm)
02254>      INFLOW >08: (TOTANK)       .56      .173     1.333     60.761
02255>      OUTFLOW<06: (CTL-TA)       .56      .039     1.533     60.761
02256>     OVERFLOW<01: (OVF-TA)       .00      .000      .000       .000
02257>
02258>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
02259>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
02260>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02261>
02262>
02263>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   22.648
02264>                    TIME SHIFT OF PEAK FLOW         (min)=    12.00
02265>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1632E-01
02266>
02267> ------------------------------------------------------------------------------
02268> 050:0015---------------------------------------------------------------------
02269> *ADD TOTAL DRAINAGE TO MASONRY
02270> ------------------------
02271> | ADD HYD (MASONRY   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02272> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02273>                       ID1 06:CTL-TANK       .56      .039    1.53  60.76    .000
02274>                      +ID2 07:204            .05      .018    1.33  60.55    .000
02275>                       ============================================================
```

```
02276>                      SUM 03:MASONRY         .61     .051    1.33  60.74    .000
02277>
02278>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02279>
02280> ---------------------------------------------------------------------------
02281> 050:0016-----------------------------------------------------------------------
02282> *#*************************************************************************|
02283> *AREA 205 - Site Perimeter Uncontrolled to Clearview
02284> *#*************************************************************************|
02285> ----------------------
02286> | CALIB NASHYD       |   Area    (ha)=     .02   Curve Number   (CN)=74.00
02287> | 07:205    DT= 1.00 |   Ia      (mm)=   8.920   # of Linear Res.(N)= 3.00
02288> ----------------------   U.H. Tp(hrs)=    .020
02289>
02290>      Unit Hyd Qpeak  (cms)=     .038
02291>
02292>      PEAK FLOW       (cms)=     .003 (i)
02293>      TIME TO PEAK    (hrs)=    1.333
02294>      RUNOFF VOLUME    (mm)=   19.770
02295>      TOTAL RAINFALL   (mm)=   61.962
02296>      RUNOFF COEFFICIENT   =     .319
02297>
02298>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02299>
02300>       *** WARNING: Time step is too large for value of TP.
02301>                    R.V. may be ok.  Peak flow could be off.
02302> ---------------------------------------------------------------------------
02303> 050:0017-----------------------------------------------------------------------
02304> *ADD TOTAL DRAINAGE TO CLEARVIEW
02305> ------------------------
02306> | ADD HYD (CLEARVIEW ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02307> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02308>                       ID1 01:OVF-TANK        .00     .000     .00    .00    .000
02309>                      +ID2 02:201MJR          .00     .000     .00    .00    .000
02310>                      +ID3 07:205             .02     .003    1.33  19.77    .000
02311>                       ========================================================
02312>                       SUM 04:CLEARVIEW       .02     .003    1.33  19.77    .000
02313>
02314>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02315>
02316> ---------------------------------------------------------------------------
02317> 050:0018-----------------------------------------------------------------------
02318> *ADD TOTAL DRAINAGE FROM SITE
02319> ------------------------
02320> | ADD HYD (PROP      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02321> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02322>                       ID1 03:MASONRY         .61     .051    1.33  60.74    .000
02323>                      +ID2 04:CLEARVIEW       .02     .003    1.33  19.77    .000
02324>                      +ID3 05:ST.MATT         .00     .000     .00    .00    .000
02325>                       ========================================================
02326>                       SUM 09:PROP            .63     .054    1.33  59.44    .000
02327>
02328>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02329>
02330> ---------------------------------------------------------------------------
02331> 050:0019-----------------------------------------------------------------------
02332> *AREA CHECK
02333> ------------------------
02334> | ADD HYD (CHECK     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02335> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02336>                       ID1 09:PROP            .63     .054    1.33  59.44    .000
02337>                      +ID2 10:EX              .63     .189    1.33  51.59    .000
02338>                       ========================================================
02339>                       SUM 08:CHECK          1.26     .243    1.33  55.51    .000
02340>
```

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02341>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02342>
02343> ------------------------------------------------------------------------------
02344> 050:0020----------------------------------------------------------------------
02345> * RUN REMAINING DESIGN STORMS (City of Burlington 4-hour duration 5 TO 100-YR)
02346> *
02347> ------------------------------------------------------------------------------
02348> 050:0002----------------------------------------------------------------------
02349> ------------------------------------------------------------------------------
02350> 050:0002----------------------------------------------------------------------
02351> ------------------------------------------------------------------------------
02352> 050:0002----------------------------------------------------------------------
02353> ------------------------------------------------------------------------------
02354> 050:0002----------------------------------------------------------------------
02355>   ** END OF RUN :  99
02356>
02357> ******************************************************************************
02358>
02359>
02360>
02361>
02362>
02363> --------------------
02364> | START            |  Project  dir.: Q:\44795\100\SWM\SWMHYMO\
02365> --------------------  Rainfall dir.: Q:\44795\100\SWM\SWMHYMO\
02366>     TZERO =   .00 hrs on        0
02367>     METOUT=   2 (output = METRIC)
02368>     NRUN  = 100
02369>     NSTORM=   1
02370>            #  1=BURL_100.stm
02371> ------------------------------------------------------------------------------
02372> 100:0002----------------------------------------------------------------------
02373> *#*************************************************************************|
02374> *#  Project Name: 1085 CLEARVIEW AVENUE
02375> *#               BURLINGTON, ONTARIO
02376> *#  JOB NUMBER  : 44795-100
02377> *#       Date   : MAY 2019
02378> *#  Modeller    : ALP
02379> *#    Company   : MTE CONSULTANTS INC.
02380> *#       File   : 44795.DAT
02381> *
02382> ------------------------------------------------------------------------------
02383> 100:0002----------------------------------------------------------------------
02384> --------------------
02385> | READ STORM       |    Filename: 100-YR BURLINGTON CHICAGO STORM (4-HR DU
02386> | Ptotal=  67.72 mm|    Comments: 100-YR BURLINGTON CHICAGO STORM (4-HR DU
02387> --------------------
02388>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
02389>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
02390>                .17   4.865 |   1.17  34.553 |   2.17  11.126 |   3.17   5.800
02391>                .33   5.538 |   1.33 141.892 |   2.33   9.547 |   3.33   5.406
02392>                .50   6.472 |   1.50  45.024 |   2.50   8.397 |   3.50   5.068
02393>                .67   7.868 |   1.67  24.526 |   2.67   7.521 |   3.67   4.776
02394>                .83  10.219 |   1.83  17.223 |   2.83   6.828 |   3.83   4.519
02395>               1.00  15.170 |   2.00  13.447 |   3.00   6.266 |   4.00   4.292
02396>
02397> ------------------------------------------------------------------------------
02398> 100:0003----------------------------------------------------------------------
02399> *
02400> *#############################################################################|
02401> *#
02402> *#                     EXISTING CONDITIONS HYDROLOGIC MODELING
02403> *#                   ================================================
02404> *#
02405> *#############################################################################|
```

```
02406> *#*************************************************************************|
02407> *AREA 101 - Existing Commercial Lot
02408> *#*************************************************************************|
02409> ----------------------
02410> | CALIB STANDHYD     |   Area    (ha)=     .51
02411> | 01:101    DT= 1.00 |   Total Imp(%)=   82.00   Dir. Conn.(%)=   82.00
02412> ----------------------
02413>                              IMPERVIOUS    PERVIOUS (i)
02414>      Surface Area     (ha)=        .42          .09
02415>      Dep. Storage     (mm)=       1.00         8.92
02416>      Average Slope     (%)=       1.00         2.00
02417>      Length            (m)=      10.00         5.00
02418>      Mannings n           =       .013         .250
02419>
02420>      Max.eff.Inten.(mm/hr)=     141.89        55.67
02421>                 over (min)       1.00         3.00
02422>      Storage Coeff.  (min)=        .56 (ii)    3.12 (ii)
02423>      Unit Hyd. Tpeak (min)=       1.00         3.00
02424>      Unit Hyd. peak  (cms)=       1.42          .37
02425>                                                          *TOTALS*
02426>      PEAK FLOW       (cms)=        .16          .01          .176 (iii)
02427>      TIME TO PEAK    (hrs)=       1.32         1.35         1.333
02428>      RUNOFF VOLUME    (mm)=      66.72        23.36        58.918
02429>      TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
02430>      RUNOFF COEFFICIENT   =        .99          .34          .870
02431>
02432>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02433>            CN* =  74.0    Ia = Dep. Storage  (Above)
02434>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02435>            THAN THE STORAGE COEFFICIENT.
02436>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02437>
02438> ------------------------------------------------------------------------------
02439> 100:0004---------------------------------------------------------------------
02440> *Note: Minor system for commercial lot outlets to storm sewer on Masonry Court
02441> *Major overland flows proceed to Clearview Avenue
02442> ----------------------
02443> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .097  (cms)
02444> | TotalHyd 01:101    |   Number of inlets in system [NINLET] =      1
02445> ----------------------   Total minor system capacity         =    .097  (cms)
02446>                          Total major system storage [TMJSTO] =      0.(cu.m.)
02447>
02448>                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
02449>                                  (ha)     (cms)     (hrs)     (mm)    (cms)
02450>      TOTAL HYD.   01:101          .51      .176     1.333   58.918     .000
02451>      ========================================================================
02452>      MAJOR SYST   02:101MJR        .07      .079     1.333   58.918     .000
02453>      MINOR SYST   03:101mnr        .44      .097     1.183   58.918     .000
02454>
02455>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02456>
02457> ------------------------------------------------------------------------------
02458> 100:0005---------------------------------------------------------------------
02459> *#*************************************************************************|
02460> *AREA 102 - Existing Dwelling Lots to St. Matthews Avenue
02461> *#*************************************************************************|
02462> ----------------------
02463> | CALIB STANDHYD     |   Area    (ha)=     .12
02464> | 01:102    DT= 1.00 |   Total Imp(%)=   57.00   Dir. Conn.(%)=   57.00
02465> ----------------------
02466>                              IMPERVIOUS    PERVIOUS (i)
02467>      Surface Area     (ha)=        .07          .05
02468>      Dep. Storage     (mm)=       1.00         8.92
02469>      Average Slope     (%)=       1.00         2.00
02470>      Length            (m)=      15.00         5.00
```

```
02471>      Mannings n           =       .013         .250
02472>
02473>      Max.eff.Inten.(mm/hr)=     141.89        55.67
02474>                over (min)        1.00         3.00
02475>      Storage Coeff.  (min)=        .71 (ii)    3.27 (ii)
02476>      Unit Hyd. Tpeak (min)=       1.00         3.00
02477>      Unit Hyd. peak  (cms)=       1.28          .35
02478>                                                        *TOTALS*
02479>      PEAK FLOW       (cms)=        .03          .01          .033 (iii)
02480>      TIME TO PEAK    (hrs)=       1.32         1.35         1.333
02481>      RUNOFF VOLUME    (mm)=      66.72        23.36        48.076
02482>      TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
02483>      RUNOFF COEFFICIENT   =        .99          .34          .710
02484>
02485>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02486>            CN* =  74.0    Ia = Dep. Storage  (Above)
02487>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02488>            THAN THE STORAGE COEFFICIENT.
02489>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02490>
02491> ------------------------------------------------------------------------------
02492> 100:0006---------------------------------------------------------------------
02493> *ADD TOTAL AREA CONTRIBUTING TO SITE DISCHARGE
02494> ------------------------
02495> | ADD HYD (EX        ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02496> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02497>                       ID1 01:102           .12      .033    1.33  48.08    .000
02498>                      +ID2 02:101MJR        .07      .079    1.33  58.92    .000
02499>                      +ID3 03:101mnr        .44      .097    1.18  58.92    .000
02500>                       ============================================================
02501>                       SUM 10:EX            .63      .209    1.33  56.85    .000
02502>
02503>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02504>
02505> ------------------------------------------------------------------------------
02506> 100:0007---------------------------------------------------------------------
02507> *#############################################################################|
02508> *#
02509> *#                     PROPOSED CONDITIONS HYDROLOGIC MODELING
02510> *#                  ================================================
02511> *#
02512> *#############################################################################|
02513> *#*****************************************************************************|
02514> *AREA 201 - Minor Flow to Masonry Court, Major Flow to Clearview Avenue
02515> *#*****************************************************************************|
02516> ----------------------
02517> | CALIB STANDHYD     |   Area    (ha)=     .22
02518> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02519> ----------------------
02520>                              IMPERVIOUS    PERVIOUS (i)
02521>      Surface Area     (ha)=        .22          .00
02522>      Dep. Storage     (mm)=       1.00         8.92
02523>      Average Slope     (%)=       1.00         2.00
02524>      Length            (m)=      35.00         5.00
02525>      Mannings n           =       .013         .250
02526>
02527>      Max.eff.Inten.(mm/hr)=     141.89        53.79
02528>                over (min)        1.00         4.00
02529>      Storage Coeff.  (min)=       1.18 (ii)    3.78 (ii)
02530>      Unit Hyd. Tpeak (min)=       1.00         4.00
02531>      Unit Hyd. peak  (cms)=        .97          .29
02532>                                                        *TOTALS*
02533>      PEAK FLOW       (cms)=        .09          .00          .086 (iii)
02534>      TIME TO PEAK    (hrs)=       1.33         1.37         1.333
02535>      RUNOFF VOLUME    (mm)=      66.72        23.36        66.290
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```
02536>      TOTAL RAINFALL   (mm)=      67.72        67.72         67.724
02537>      RUNOFF COEFFICIENT   =        .99          .34           .979
02538>
02539>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02540>            CN* =  74.0    Ia = Dep. Storage  (Above)
02541>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02542>            THAN THE STORAGE COEFFICIENT.
02543>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02544>
02545> ---------------------------------------------------------------------------
02546> 100:0008------------------------------------------------------------------
02547> *Note: Minor system for 201 outlets to storm sewer on Masonry Court
02548> *Major overland flows proceed to Clearview Avenue
02549> ----------------------
02550> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .051  (cms)
02551> | TotalHyd 01:201    |   Number of inlets in system [NINLET] =       1
02552> ----------------------   Total minor system capacity         =    .051  (cms)
02553>                          Total major system storage [TMJSTO] =     102.(cu.m.)
02554>
02555>                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
02556>                                   (ha)     (cms)     (hrs)     (mm)    (cms)
02557>      TOTAL HYD.   01:201           .22      .086     1.333   66.290     .000
02558>      ========================================================================
02559>      MAJOR SYST   02:201MJR        .00      .000      .000     .000     .000
02560>      MINOR SYST   03:201mnr        .22      .051     1.567   66.997     .000
02561>
02562>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02563>
02564>      Maximum MAJOR SYSTEM storage used =      18.(cu.m.)
02565>
02566> ---------------------------------------------------------------------------
02567> 100:0009------------------------------------------------------------------
02568> *#*************************************************************************|
02569> *AREA 202 - Building Roof to Masonry Court
02570> *#*************************************************************************|
02571> ----------------------
02572> | CALIB STANDHYD     |   Area    (ha)=     .27
02573> | 01:202    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02574> ----------------------
02575>                              IMPERVIOUS    PERVIOUS (i)
02576>      Surface Area     (ha)=        .27          .00
02577>      Dep. Storage     (mm)=       1.00         8.92
02578>      Average Slope     (%)=       1.00         2.00
02579>      Length            (m)=      15.00        10.00
02580>      Mannings n             =       .013         .250
02581>
02582>      Max.eff.Inten.(mm/hr)=     141.89        51.83
02583>                  over (min)        1.00         5.00
02584>      Storage Coeff.  (min)=         .71 (ii)    4.71 (ii)
02585>      Unit Hyd. Tpeak (min)=       1.00         5.00
02586>      Unit Hyd. peak  (cms)=       1.28          .24
02587>                                                          *TOTALS*
02588>      PEAK FLOW       (cms)=        .11          .00          .106 (iii)
02589>      TIME TO PEAK    (hrs)=       1.33         1.38         1.333
02590>      RUNOFF VOLUME    (mm)=      66.72        23.36        66.290
02591>      TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
02592>      RUNOFF COEFFICIENT   =        .99          .34          .979
02593>
02594>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02595>            CN* =  74.0    Ia = Dep. Storage  (Above)
02596>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02597>            THAN THE STORAGE COEFFICIENT.
02598>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02599>
02600> ---------------------------------------------------------------------------
```

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02601> 100:0010-------------------------------------------------------------------------
02602> *#*****************************************************************************|
02603> *AREA 203 - Minor Flow to Masonry Court, Major Flow to St. Matthews Avenue
02604> *#*****************************************************************************|
02605> ----------------------
02606> | CALIB STANDHYD     |   Area    (ha)=     .07
02607> | 04:203    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02608> ----------------------
02609>                              IMPERVIOUS    PERVIOUS (i)
02610>      Surface Area     (ha)=        .07          .00
02611>      Dep. Storage     (mm)=       1.00         8.92
02612>      Average Slope     (%)=       1.00         2.00
02613>      Length            (m)=      15.00        10.00
02614>      Mannings n             =       .013         .250
02615>
02616>      Max.eff.Inten.(mm/hr)=     141.89        51.83
02617>                   over (min)       1.00         5.00
02618>      Storage Coeff.  (min)=        .71 (ii)    4.71 (ii)
02619>      Unit Hyd. Tpeak (min)=       1.00         5.00
02620>      Unit Hyd. peak  (cms)=       1.28          .24
02621>                                                          *TOTALS*
02622>      PEAK FLOW       (cms)=        .03          .00          .027 (iii)
02623>      TIME TO PEAK    (hrs)=       1.32         1.38         1.333
02624>      RUNOFF VOLUME    (mm)=      66.72        23.36        66.290
02625>      TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
02626>      RUNOFF COEFFICIENT   =        .99          .34          .979
02627>
02628>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02629>            CN* =  74.0    Ia = Dep. Storage  (Above)
02630>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02631>            THAN THE STORAGE COEFFICIENT.
02632>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02633>
02634> -------------------------------------------------------------------------------
02635> 100:0011-------------------------------------------------------------------------
02636> *Note: Minor system for 203 outlets to storm sewer on Masonry Court
02637> *Major overland flows proceed to St. Matthews Avenue
02638> ----------------------
02639> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .038  (cms)
02640> | TotalHyd 04:203    |   Number of inlets in system [NINLET] =       1
02641> ----------------------   Total minor system capacity         =    .038  (cms)
02642>                          Total major system storage [TMJSTO] =      21.(cu.m.)
02643>
02644>                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
02645>                                   (ha)     (cms)     (hrs)     (mm)    (cms)
02646>      TOTAL HYD.   04:203           .07      .027     1.333   66.290     .000
02647>      ==========================================================================
02648>      MAJOR SYST   05:ST.MAT        .00      .000      .000     .000     .000
02649>      MINOR SYST   06:202mnr        .07      .027     1.333   66.290     .000
02650>
02651>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02652>
02653>      Maximum MAJOR SYSTEM storage used =       0.(cu.m.)
02654>
02655> -------------------------------------------------------------------------------
02656> 100:0012-------------------------------------------------------------------------
02657> *#*****************************************************************************|
02658> *AREA 204 - Site Perimeter Uncontrolled to Masonry Court
02659> *#*****************************************************************************|
02660> ----------------------
02661> | CALIB STANDHYD     |   Area    (ha)=     .05
02662> | 07:204    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02663> ----------------------
02664>                              IMPERVIOUS    PERVIOUS (i)
02665>      Surface Area     (ha)=        .05          .00
```

```
02666>      Dep. Storage     (mm)=       1.00         8.92
02667>      Average Slope     (%)=       1.00         2.00
02668>      Length            (m)=       3.00         3.00
02669>      Mannings n           =       .013         .250
02670>
02671>      Max.eff.Inten.(mm/hr)=     141.89        57.47
02672>                 over (min)        1.00         2.00
02673>      Storage Coeff.  (min)=        .27 (ii)    2.13 (ii)
02674>      Unit Hyd. Tpeak (min)=       1.00         2.00
02675>      Unit Hyd. peak  (cms)=       1.66          .54
02676>                                                          *TOTALS*
02677>      PEAK FLOW       (cms)=        .02          .00          .020 (iii)
02678>      TIME TO PEAK    (hrs)=       1.23         1.33         1.333
02679>      RUNOFF VOLUME    (mm)=      66.72        23.36        66.290
02680>      TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
02681>      RUNOFF COEFFICIENT   =        .99          .34          .979
02682>
02683>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02684>            CN* =  74.0    Ia = Dep. Storage  (Above)
02685>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02686>            THAN THE STORAGE COEFFICIENT.
02687>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02688>
02689> ------------------------------------------------------------------------------
02690> 100:0013---------------------------------------------------------------------
02691> *ADD TOTAL DRAINAGE TO TANK
02692> ------------------------
02693> | ADD HYD (TOTANK    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02694> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02695>                       ID1 01:202           .27      .106    1.33  66.29    .000
02696>                      +ID2 03:201mnr        .22      .051    1.57  67.00    .000
02697>                      +ID3 06:202mnr        .07      .027    1.33  66.29    .000
02698>                       ========================================================
02699>                       SUM 08:TOTANK         .56      .184    1.33  66.57    .000
02700>
02701>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02702>
02703> ------------------------------------------------------------------------------
02704> 100:0014---------------------------------------------------------------------
02705> *Control to Masonry Court via orifice plate on outlet from tank
02706> ---------------------
02707> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
02708> |  IN>08:(TOTANK)   |
02709> | OUT<06:(CTL-TA)   |    =========  OUTLFOW STORAGE TABLE  =========
02710> --------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02711>                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
02712>                            .000  .0000E+00   |     .044  .1950E-01
02713>                            .023  .5060E-02   |     .000  .0000E+00
02714>
02715>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
02716>      --------------------      (ha)     (cms)     (hrs)       (mm)
02717>      INFLOW >08: (TOTANK)       .56      .184     1.333     66.568
02718>      OUTFLOW<06: (CTL-TA)       .56      .042     1.583     66.568
02719>     OVERFLOW<01: (OVF-TA)       .00      .000      .000       .000
02720>
02721>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
02722>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
02723>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02724>
02725>
02726>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   22.591
02727>                     TIME SHIFT OF PEAK FLOW         (min)=    15.00
02728>                     MAXIMUM  STORAGE   USED       (ha.m.)=.1807E-01
02729>
02730> ------------------------------------------------------------------------------
```

```
02731> 100:0015--------------------------------------------------------------------------
02732> *ADD TOTAL DRAINAGE TO MASONRY
02733> ------------------------
02734> | ADD HYD (MASONRY   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02735> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02736>                       ID1 06:CTL-TANK       .56     .042    1.58  66.57    .000
02737>                      +ID2 07:204            .05     .020    1.33  66.29    .000
02738>                       ========================================================
02739>                       SUM 03:MASONRY        .61     .054    1.33  66.55    .000
02740>
02741>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02742>
02743> --------------------------------------------------------------------------------
02744> 100:0016--------------------------------------------------------------------------
02745> *#*******************************************************************************|
02746> *AREA 205 - Site Perimeter Uncontrolled to Clearview
02747> *#*******************************************************************************|
02748> ----------------------
02749> | CALIB NASHYD       |   Area    (ha)=     .02   Curve Number   (CN)=74.00
02750> | 07:205    DT= 1.00 |   Ia      (mm)=   8.920   # of Linear Res.(N)= 3.00
02751> ----------------------   U.H. Tp(hrs)=    .020
02752>
02753>      Unit Hyd Qpeak  (cms)=     .038
02754>
02755>      PEAK FLOW       (cms)=     .003 (i)
02756>      TIME TO PEAK    (hrs)=    1.333
02757>      RUNOFF VOLUME    (mm)=   23.356
02758>      TOTAL RAINFALL   (mm)=   67.724
02759>      RUNOFF COEFFICIENT   =     .345
02760>
02761>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02762>
02763>       *** WARNING: Time step is too large for value of TP.
02764>                    R.V. may be ok.  Peak flow could be off.
02765> --------------------------------------------------------------------------------
02766> 100:0017--------------------------------------------------------------------------
02767> *ADD TOTAL DRAINAGE TO CLEARVIEW
02768> ------------------------
02769> | ADD HYD (CLEARVIEW ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02770> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02771>                       ID1 01:OVF-TANK       .00     .000     .00    .00    .000
02772>                      +ID2 02:201MJR         .00     .000     .00    .00    .000
02773>                      +ID3 07:205            .02     .003    1.33  23.36    .000
02774>                       ========================================================
02775>                       SUM 04:CLEARVIEW      .02     .003    1.33  23.36    .000
02776>
02777>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02778>
02779> --------------------------------------------------------------------------------
02780> 100:0018--------------------------------------------------------------------------
02781> *ADD TOTAL DRAINAGE FROM SITE
02782> ------------------------
02783> | ADD HYD (PROP      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02784> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02785>                       ID1 03:MASONRY        .61     .054    1.33  66.55    .000
02786>                      +ID2 04:CLEARVIEW      .02     .003    1.33  23.36    .000
02787>                      +ID3 05:ST.MATT        .00     .000     .00    .00    .000
02788>                       ========================================================
02789>                       SUM 09:PROP           .63     .058    1.33  65.17    .000
02790>
02791>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02792>
02793> --------------------------------------------------------------------------------
02794> 100:0019--------------------------------------------------------------------------
02795> *AREA CHECK
```

```
02796> ------------------------
02797> | ADD HYD (CHECK     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02798> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
02799>                       ID1 09:PROP          .63     .058    1.33  65.17    .000
02800>                      +ID2 10:EX            .63     .209    1.33  56.85    .000
02801>                       ============================================================
02802>                       SUM 08:CHECK         1.26     .267    1.33  61.01    .000
02803>
02804>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02805>
02806> ---------------------------------------------------------------------------
02807> 100:0020-----------------------------------------------------------------
02808> * RUN REMAINING DESIGN STORMS (City of Burlington 4-hour duration 5 TO 100-YR)
02809> *
02810> ---------------------------------------------------------------------------
02811> 100:0002-----------------------------------------------------------------
02812> ---------------------------------------------------------------------------
02813> 100:0002-----------------------------------------------------------------
02814> ---------------------------------------------------------------------------
02815> 100:0002-----------------------------------------------------------------
02816> ---------------------------------------------------------------------------
02817> 100:0002-----------------------------------------------------------------
02818> ---------------------------------------------------------------------------
02819> 100:0002-----------------------------------------------------------------
02820>       FINISH
02821> ---------------------------------------------------------------------------
```

(2) The part of the *fixture outlet pipe* that is common to three compartments of a sink shall be one *size* larger than the largest *fixture outlet pipe* of the compartments that it serves.

(3) Where clothes washers do not drain to a laundry tray, the *trap* inlet shall be fitted with a vertical standpipe that is not less than 600 mm long measured from the *trap weir* and the top of the standpipe shall terminate above the *flood level rim* of the clothes washer it serves.

7.4.9.4. Minimum Size of Building Drains and Sewers

(1) Every *sanitary building drain* and every *sanitary building sewer* shall be at least 4 in. in *size*.

(2) Every *storm building drain* and every *storm building sewer* shall be at least 4 in. in *size*.

7.4.10. Hydraulic Loads

7.4.10.1. Total Load on a Pipe

(1) The hydraulic load on a pipe is the total load from,

(a) every *fixture* that is connected to the system upstream of the pipe,

(b) every *fixture* for which provision is made for future connection upstream of the pipe, and

(c) all roofs and paved surfaces that drain into the system upstream of the pipe.

7.4.10.2. Hydraulic Loads for Fixtures

(1) The hydraulic load from a *fixture* that is listed in Table 7.4.9.3. is the number of *fixture units* set forth in the Table.

(2) Except as provided in Sentence (1), the hydraulic load from a *fixture* that is not listed in Table 7.4.9.3. is the number of *fixture units* set forth in Table 7.4.10.2. for the *trap* of the *size* that serves the *fixture*.

Table 7.4.10.2.
Permitted Hydraulic Load from a Fixture Based on Size of Trap

Forming Part of Sentence 7.4.10.2.(2)

Item	*Column 1*	Column 2
	***Size* of *Trap*, in.**	**Hydraulic Load, *fixture units***
1.	1 ¼	1
2.	1 ½	2
3.	2	3
4.	2 ½	4
5.	3	5
6.	4	6

7.4.10.3. Hydraulic Loads from Fixtures with Continuous or Semi-continuous Flow

(1) Except as provided in Sentence (2), the hydraulic load from a *fixture* that produces a continuous flow, such as a pump or an air-conditioning *fixture*, is 31.7 *fixture units* for each litre per second of flow.

(2) Where a *fixture* or equipment that produces a continuous or semi-continuous flow drains to a *storm drainage system*, the hydraulic load from the *fixture* is 900 litres for each litre per second of flow.

(3) The hydraulic load from a *fixture* or equipment that produces a semi-continuous flow shall conform to Table 7.4.10.3.

Table 7.4.10.3.
Maximum Permitted Hydraulic Load from Fixtures with Semi-continuous Flows

Forming Part of Sentence 7.4.10.3.(3)

Item	*Column 1*	Column 2	Column 3
	Maximum Permitted Flows by *Trap Size*		
	***Trap Size*, in.**	**Flow, L/s**	**Hydraulic Load, *fixture units***
1.	1 ½	0.00 - 0.090	3
2.	2	0.091 - 0.190	6
3.	3	0.191 - 0.850	27
4.	4	0.851 - 5.700	180

7.4.10.4. Hydraulic Loads from Roofs or Paved Surfaces

(1) Except as provided in Sentence (2), the hydraulic load in litres from a roof or paved surface is the maximum 15 min rainfall determined in conformance with MMAH Supplementary Standard SB-1, "Climatic and Seismic Data", multiplied by the sum of,

(a) the area in square metres of the horizontal projection of the surface drained, and

(b) one-half the area in square metres of the largest adjoining vertical surface.

(2) *Flow control roof drains* may be installed provided,

(a) the maximum drain down time does not exceed 24 h,

(b) the roof structure is designed to carry the load of the stored water,

(c) one or more scuppers are installed not more than 30 m apart along the perimeter of the *building* so that,

(i) the scuppers are designed to handle at least 200% of the 15-minute rainfall intensity, and

(ii) the maximum depth of controlled water is limited to 150 mm,

(d) they are located not more than 15 m from the edge of the roof and not more than 30 m from adjacent drains, and

(e) there is at least one drain for each 900 m^2.

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Effective Date: January 1, 2015

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Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Elevation, m	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
		January		July 2.5%										1/10	1/50					
		2.5%, °C	1%, °C	Dry, °C	Wet, °C							S_s	S_r			$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Burlington	80	-17	-19	31	23	3740	23	103	770	850	160	0.9	0.4	0.36	0.46	0.320	0.170	0.064	0.022	0.180
Cambridge	295	-18	-20	29	23	4100	25	113	800	890	160	1.6	0.4	0.28	0.36	0.180	0.100	0.060	0.019	0.073
Campbellford	150	-23	-26	30	23	4280	25	97	730	850	160	1.7	0.4	0.32	0.41	0.230	0.150	0.085	0.027	0.084
Cannington	255	-24	-26	30	23	4310	25	108	740	950	120	2.2	0.4	0.28	0.36	0.170	0.120	0.070	0.023	0.048
Carleton Place	135	-25	-27	30	23	4600	25	97	730	850	160	2.5	0.4	0.32	0.41	0.490	0.250	0.120	0.039	0.230
Cavan	200	-23	-25	30	23	4400	25	97	740	850	140	2.0	0.4	0.34	0.44	0.190	0.130	0.076	0.024	0.061
Centralia	260	-17	-19	30	23	3800	25	103	820	1000	180	2.3	0.4	0.38	0.49	0.130	0.080	0.052	0.016	0.041
Chapleau	425	-35	-38	27	21	5900	20	97	530	850	80	4.0	0.4	0.23	0.30	0.095	0.057	0.037	0.013	0.036
Chatham	180	-16	-18	31	24	3470	28	103	800	850	180	1.0	0.4	0.33	0.43	0.160	0.092	0.050	0.015	0.088
Chesley	275	-19	-21	29	22	4320	28	103	810	1125	140	2.8	0.4	0.37	0.48	0.120	0.082	0.053	0.018	0.037
Clinton	280	-17	-19	29	23	4150	25	103	810	1000	160	2.6	0.4	0.38	0.49	0.120	0.078	0.050	0.016	0.038
Coboconk	270	-25	-27	30	23	4500	25	108	740	950	120	2.5	0.4	0.27	0.35	0.180	0.130	0.074	0.025	0.055
Cobourg	90	-21	-23	29	23	3980	23	94	760	825	160	1.2	0.4	0.38	0.49	0.220	0.140	0.079	0.025	0.096
Cochrane	245	-34	-36	29	21	6200	20	92	575	875	80	2.8	0.3	0.27	0.35	0.180	0.098	0.054	0.018	0.094
Colborne	105	-21	-23	29	23	3980	23	94	760	850	160	1.6	0.4	0.38	0.49	0.230	0.140	0.081	0.026	0.098
Collingwood	190	-21	-23	29	23	4180	28	97	720	950	160	2.7	0.4	0.30	0.39	0.130	0.097	0.060	0.020	0.040
Cornwall	35	-23	-25	30	23	4250	25	103	780	960	180	2.2	0.4	0.32	0.41	0.620	0.310	0.140	0.046	0.310
Corumna	185	-16	-18	31	24	3600	25	100	760	800	180	1.0	0.4	0.36	0.47	0.120	0.074	0.047	0.015	0.040
Deep River	145	-29	-32	30	22	4900	23	92	650	850	100	2.5	0.4	0.27	0.35	0.630	0.300	0.130	0.043	0.320
Deseronto	85	-22	-24	29	23	4070	23	92	760	900	160	1.9	0.4	0.33	0.43	0.270	0.170	0.092	0.029	0.110
Dorchester	260	-18	-20	30	24	3900	28	103	850	950	180	1.9	0.4	0.36	0.47	0.160	0.096	0.056	0.017	0.081
Dorion	200	-33	-35	28	21	5950	20	103	550	725	160	2.8	0.4	0.30	0.39	0.095	0.057	0.026	0.008	0.036
Dresden	185	-16	-18	31	24	3750	28	97	760	820	180	1.0	0.4	0.33	0.43	0.150	0.088	0.050	0.015	0.078
Dryden	370	-34	-36	28	22	5850	25	97	550	700	120	2.4	0.3	0.23	0.30	0.095	0.057	0.026	0.008	0.036
Dundalk	525	-22	-24	29	22	4700	28	108	750	1080	150	3.4	0.4	0.33	0.42	0.130	0.091	0.058	0.019	0.043
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

1085 Clearview Avenue
City of Burlington
STORMWATER MANAGEMENT

Project Number: 44795-100
Date: May 17, 2019
File: Q:\44795\100\SWM\44795-100 SWM Calculations.xlsx

Ponding Calculations		
Catchment	**Flow**	**Description**
201 203	0.051 0.038	WATTS Area Drain

STAGE-STORAGE-DISCHARGE RELATIONSHIP FOR OVERFLOW TO CLEARVIEW AVENUE

Description	Stage	Area	Incremental Volume	Cumulative Volume
	m	m^2	m^3	m^3
T/G AD2,3	104.45	0.00	0.0	0.0
T/G AD4	104.55	73.19	3.7	3.7
T/G AD1	104.65	412.62	24.3	28.0
Max 0.3m ponding	104.75	1069.47	74.1	102.1

STAGE-STORAGE-DISCHARGE RELATIONSHIP FOR OVERFLOW TO ST MATTHEWS AVE

Description	Stage	Area	Incremental Volume	Cumulative Volume
	m	m^2	m^3	m^3
T/G AD5	104.58	0.00	0.0	0.0
	104.68	23.49	1.2	1.2
	104.78	90.82	5.7	6.9
Max 0.3m ponding	104.88	200.25	14.6	21.4

Detailed Stormceptor Sizing Report – 1085 Clearview Avenue

Project Information & Location			
Project Name	1085 Clearview Avenue	**Project Number**	44795-100
City	Burlington	**State/ Province**	Ontario
Country	Canada	**Date**	12/3/2018
Designer Information		**EOR Information (optional)**	
Name	Alexandra Porco	**Name**	
Company	MTE Consultants Inc.	**Company**	
Phone #	519-743-6500	**Phone #**	
Email	aporco@mte85.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	1085 Clearview Avenue
Recommended Stormceptor Model	STC 1000
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	80
PSD	Fine Distribution
Rainfall Station	HAMILTON A

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 300	70
STC 750	79
STC 1000	80
STC 1500	81
STC 2000	84
STC 3000	85
STC 4000	88
STC 5000	89
STC 6000	90
STC 9000	93
STC 10000	93
STC 14000	95
StormceptorMAX	Custom

Stormceptor
The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology
Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:
• Site parameters
• Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
• Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
• TSS load
• Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	3863
Rainfall Station Name	HAMILTON A	**Total Rainfall (mm)**	20907.2
Station ID #	3194	**Average Annual Rainfall (mm)**	614.9
Coordinates	43°10'N, 79°56'W	**Total Evaporation (mm)**	1538.9
Elevation (ft)	77	**Total Infiltration (mm)**	3532.9
Years of Rainfall Data	34	**Total Rainfall that is Runoff (mm)**	15835.4

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (ha)	0.56
Imperviousness %	83.0

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000
0.000	0.079
0.000	0.081
0.002	0.082
0.005	0.084

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	1085 Clearview Avenue

Site Details

Drainage Area

Total Area (ha)	0.59
Imperviousness %	83.0

Surface Characteristics

Width (m)	154.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

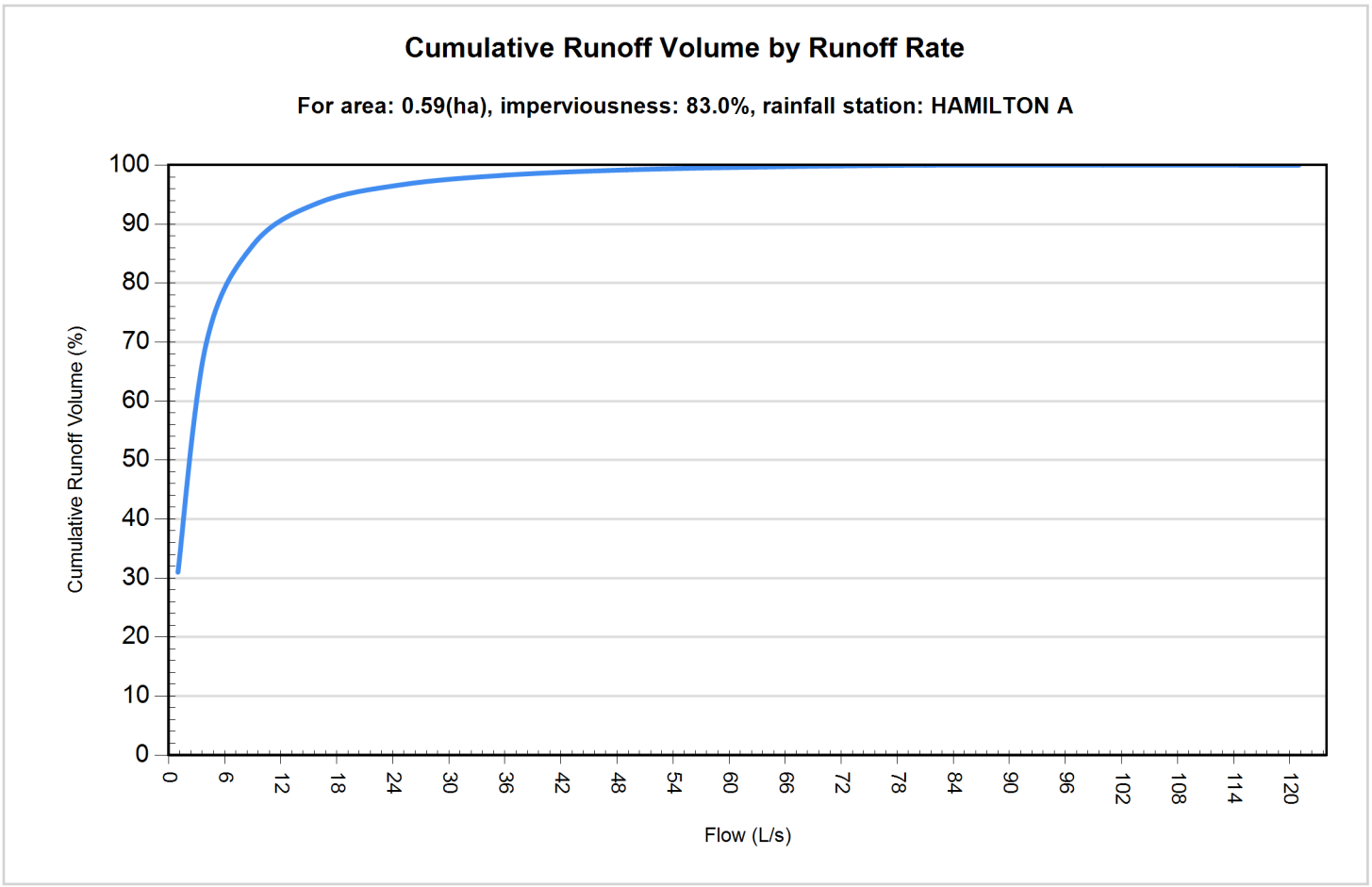
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

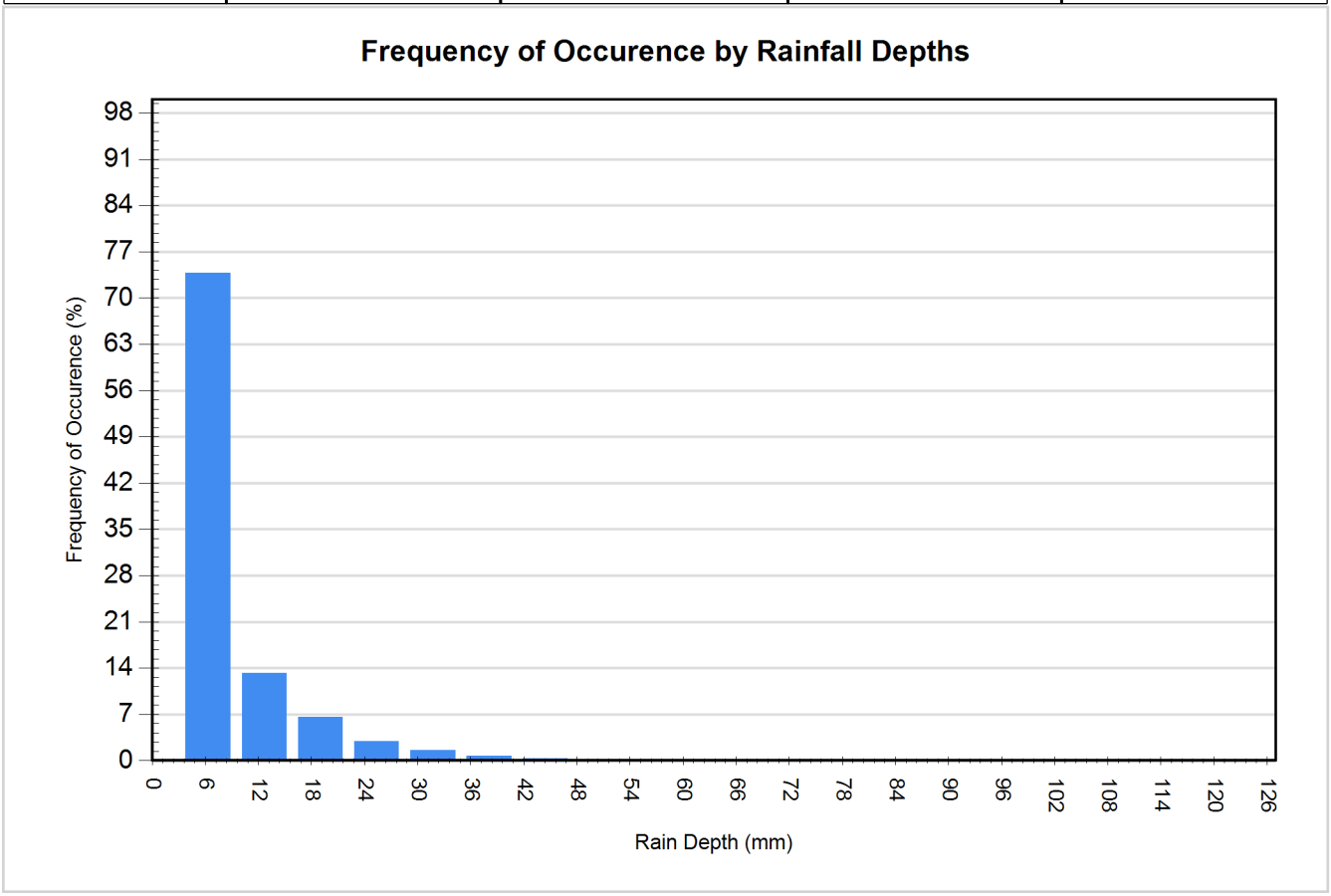
TSS Availability Parameters

Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	Runoff Volume (m^3)	Volume Over (m^3)	Cumulative Runoff Volume (%)
1	29175	64821	31.0
4	65435	28549	69.6
9	81237	12754	86.4
16	87932	6056	93.6
25	90928	3061	96.7
36	92418	1571	98.3
49	93210	779	99.2
64	93685	304	99.7
81	93980	9	100.0
100	93989	0	100.0
121	93989	0	100.0



Rainfall Event Analysis				
Rainfall Depth (mm)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (mm)**	**Percentage of Annual Volume (%)**
6.35	2852	73.8	4781	22.9
12.70	515	13.3	4749	22.7
19.05	254	6.6	3943	18.9
25.40	112	2.9	2471	11.8
31.75	61	1.6	1736	8.3
38.10	28	0.7	985	4.7
44.45	11	0.3	461	2.2
50.80	9	0.2	417	2.0
57.15	9	0.2	493	2.4
63.50	8	0.2	489	2.3
69.85	0	0.0	0	0.0
76.20	0	0.0	0	0.0
82.55	0	0.0	0	0.0
88.90	0	0.0	0	0.0
95.25	2	0.1	181	0.9
101.60	1	0.0	97	0.5
107.95	1	0.0	106	0.5
114.30	0	0.0	0	0.0
120.65	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

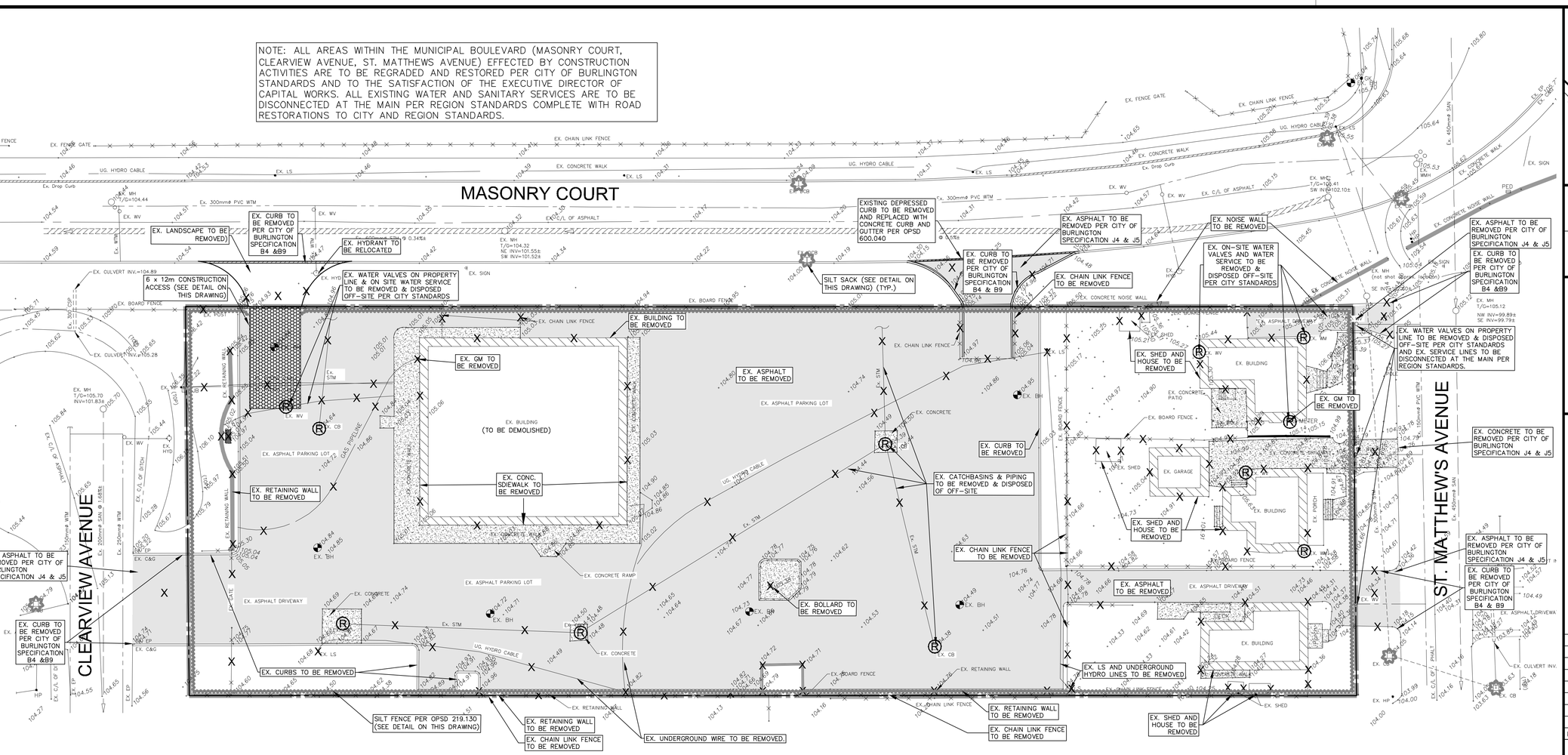
DRAWINGS

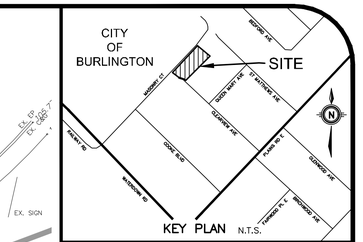
MTE FILE No: 44795-100-C1.1

EXISTING CONDITIONS, REMOVALS & ESC PLAN

P:\P\44795\100\44795-100-C1

NOTE: ALL AREAS WITHIN THE MUNICIPAL BOULEVARD (MASONRY COURT, CLEARVIEW AVENUE, ST. MATTHEWS AVENUE) EFFECTED BY CONSTRUCTION ACTIVITIES ARE TO BE REGRADED AND RESTORED PER CITY OF BURLINGTON STANDARDS AND TO THE SATISFACTION OF THE EXECUTIVE DIRECTOR OF CAPITAL WORKS. ALL EXISTING WATER AND SANITARY SERVICES ARE TO BE DISCONNECTED AT THE MAIN PER REGION STANDARDS COMPLETE WITH ROAD RESTORATIONS TO CITY AND REGION STANDARDS.





GEODETIC BM ELEV. = 97.055m
CITY OF BURLINGTON BENCHMOARK NO. 203.

GEODETIC BM ELEV. = 97.915m
CITY OF BURLINGTON BENCHMARK NO. 278.

NOTE TO CONTRACTOR :

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No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.	REISSUED FOR ZBA/OPA	KRR	MAY. 17/19
1.	ISSUED FOR ZBA/OPA	KRR	JAN. 11/19

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LICENSED PROFESSIONAL ENGINEER K.R.RAMSEWAK 100109928 MAY 17/19 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

OWNER
LIV COMMUNITIES
1005 SKYVIEW DRIVE SUITE 301 BURLINGTON

PROJECT
6 STOREY RESIDENTIAL BUILDING
1085 CLEARVIEW AVENUE BURLINGTON

DRAWING
EXISTING CONDITIONS, REMOVALS & ESC PLAN

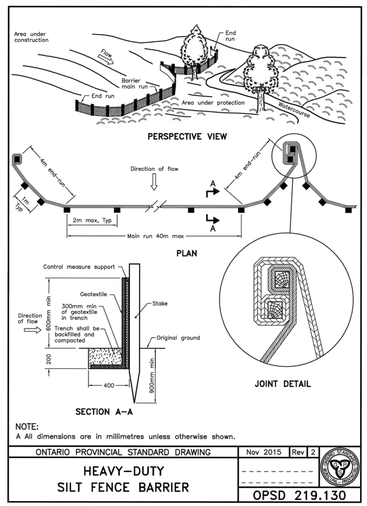
Project Manager K.RAMSEWAK	Project No. 44795-100
Design By ALP	Checked By KRR
Drawn By ALP	Checked By KRR
Surveyed By OTHERS	Drawing No. C1.1
Date Dec.10/18	
Scale 1:250	Sheet 1 of 3

LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- 326.00 EXISTING SPOT ELEVATIONS/CONTOURS
- Ex. 200mmø WTM / Ex. HYD. SET / EXISTING WATERMAIN
- Ex. 375mmø STM / Ex. MH / EXISTING STORM SEWER
- Ex. Drop Curb / EXISTING CURB
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING RETAINING WALL
- EXISTING BOLLARD
- EXISTING MAN DOOR
- EXISTING DIRECTION OF DRAINAGE/SWALE

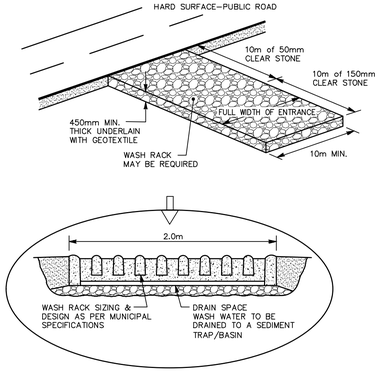
LEGEND OF PROPOSED REMOVALS

- X ® REMOVALS
- SEDIMENT CONTROL FENCE (SEE DETAIL)
- SILT SACK (SEE DETAIL)
- CONSTRUCTION ACCESS (SEE DETAIL)
- ASPHALT SURFACE REMOVALS
- CONCRETE SURFACE REMOVALS

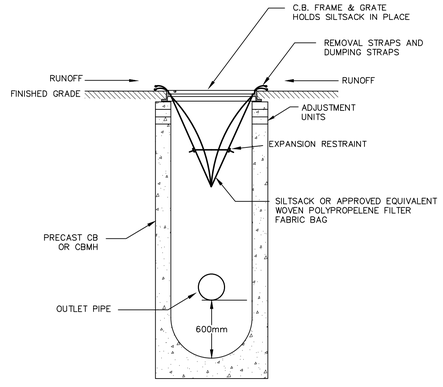


NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
HEAVY–DUTY SILT FENCE BARRIER		OPSD 219.130



CONSTRUCTION ACCESS DETAIL
N.T.S.



MAINTENANCE SCHEDULE

–INSPECT AFTER EVERY MAJOR RAIN EVENT.
–INSPECT EVERY 3 WEEKS MINIMUM.
–SILTSACK SHOULD NEVER BE OVER HALF FULL.
–FULL BAG CAN BE REMOVED, DUMPED, CLEANED AND REUSED (TO REMOVE INSERT 25mm REBAR INTO REMOVAL FLAP POCKETS) (TO DUMP INSERT 25mm REBAR INTO BOTH DUMPING STRAPS)

TEMPORARY SILTSACK SILTATION CONTROL IN CB
N.T.S.

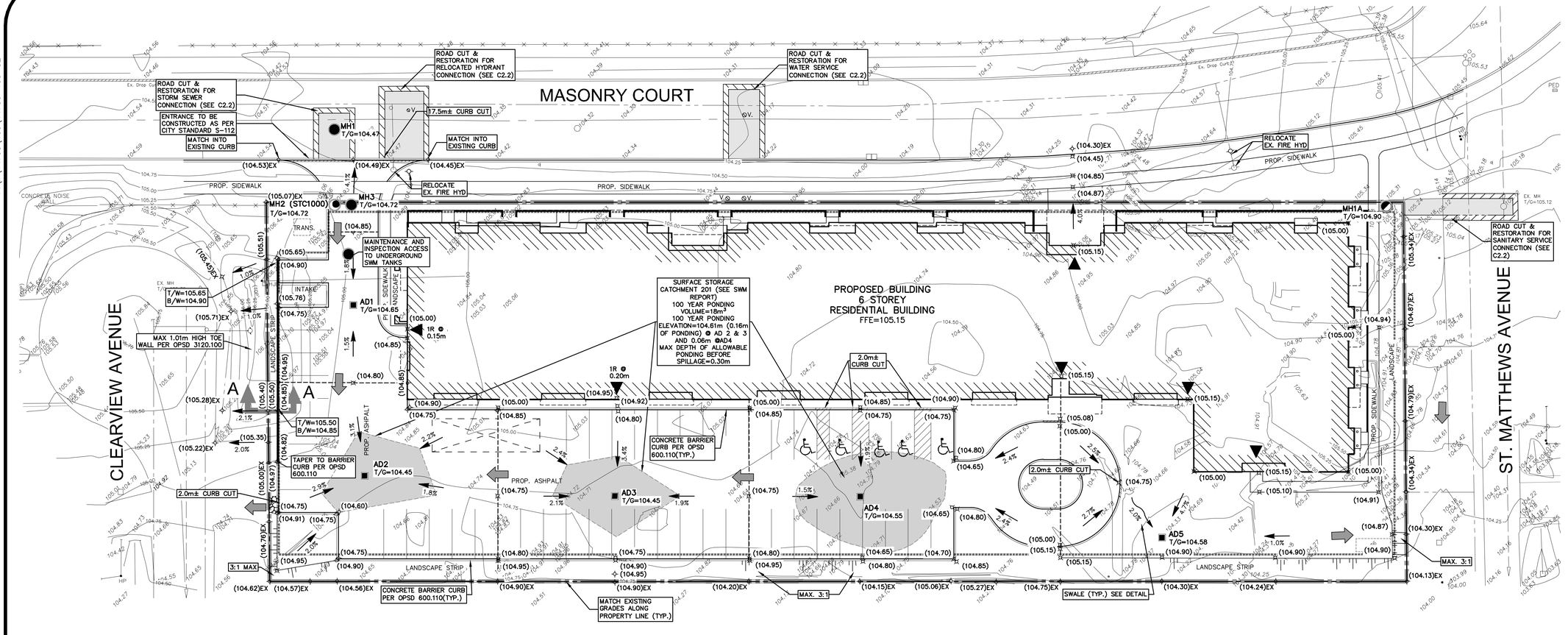
May 17, 2019 – 3:50 p.m. – Plotted By: jaszlaos

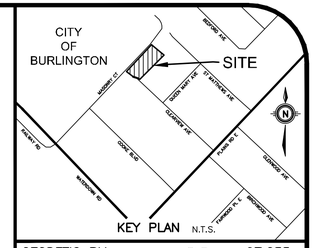
44795-100-C2.1

MTE FILE No:

PRELIMINARY GRADING PLAN

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GEODETIC BM ELEV. = 97.055m
CITY OF BURLINGTON BENCHMOARK NO. 203.

GEODETIC BM ELEV. = 97.915m
CITY OF BURLINGTON BENCHMARK NO. 278.

NOTE TO CONTRACTOR :

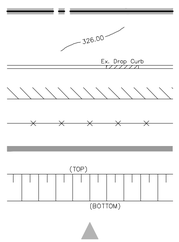
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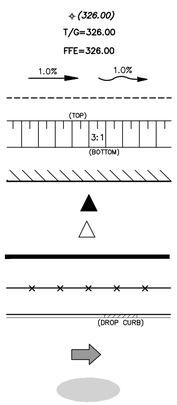
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LEGEND OF EXISTING FEATURES

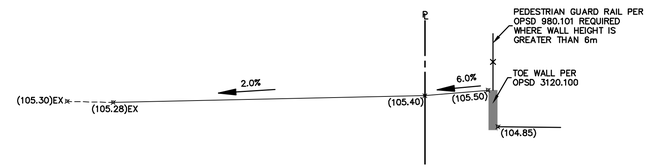


SITE BOUNDARY
EXISTING SPOT ELEVATIONS/CONTOURS
EXISTING CURB
EXISTING BUILDING
EXISTING FENCE
EXISTING RETAINING WALL
EXISTING EMBANKMENT (SLOPE AS NOTED)
EXISTING MAN DOOR

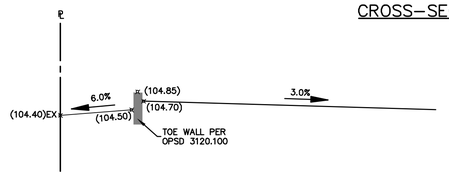
LEGEND OF PROPOSED FEATURES



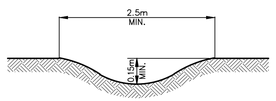
PROPOSED SPOT ELEVATIONS
EX =MAINTAIN EXISTING
T/G =TOP OF CASTING/GRATE
INV =INVERT ELEVATION
FFE =FINISHED FLOOR ELEVATION
DIRECTION OF DRAINAGE/SWALE
DRAINAGE SPLIT (RIDGE)
EMBANKMENT (SLOPE AS NOTED)
PROPOSED BUILDING
MAN DOOR
OVERHEAD DOOR
RETAINING WALL
FENCE
CONCRETE CURB
OVERLAND FLOW ROUTE (MAJOR STORM)
100 YEAR PONDING LIMIT (ELEVATION AS NOTED)



CROSS-SECTION A-A
SCALE: 1:50



CROSS-SECTION B-B
SCALE: 1:50



TYPICAL DRAINAGE SWALE
N.T.S.

No.	REVISION	BY	DATE
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2.	REISSUED FOR ZBA/OPA	KRR	MAY. 17/19
1.	ISSUED FOR ZBA/OPA	KRR	JAN. 11/19

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LICENSED PROFESSIONAL ENGINEER K.R.RAMSEWAK 100100928 MAY 17/19 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

OWNER
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1005 SKYVIEW DRIVE SUITE 301 BURLINGTON

PROJECT
6 STOREY RESIDENTIAL BUILDING
1085 CLEARVIEW AVENUE BURLINGTON

DRAWING
PRELIMINARY GRADING PLAN

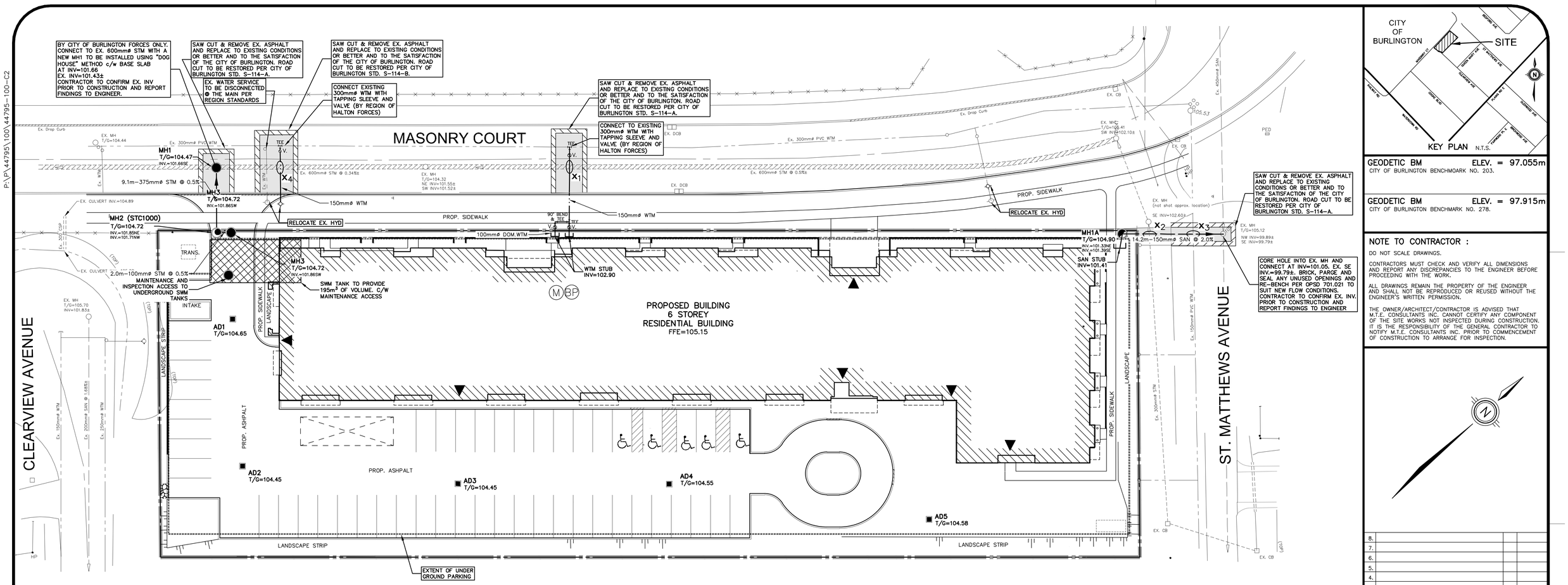
Project Manager: K.RAMSEWAK	Project No.: 44795-100
Design By: ALP	Checked By: KRR
Drawn By: AJT	Checked By: KRR
Surveyed By: OTHERS	Drawing No.: C2.1
Date: Dec.11/18	
Scale: 1:250	Sheet 2 of 3

May 17, 2019 – 3:45 p.m. – Plotted By: jaaztalos

MTE FILE No: 44795-100-C2.2

PRELIMINARY SERVICING PLAN

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LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- EXISTING SPOT ELEVATIONS/CONTOURS (326.00)
- EXISTING CURB (Ex. Drop Curb)
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING RETAINING WALL
- EXISTING EMBANKMENT (SLOPE AS NOTED) (TOP) / (BOTTOM)
- EXISTING MAN DOOR
- EXISTING SANITARY SEWER (Ex. 300mmø SAN, Ex. MH)
- EXISTING WATERMAIN (Ex. 200mmø WTM, Ex. HYD. SET)
- EXISTING STORM SEWER (Ex. 375mmø STM, Ex. MH)

LEGEND OF PROPOSED FEATURES

- EMBANKMENT (SLOPE AS NOTED) (TOP) 3:1 (BOTTOM)
- PROPOSED BUILDING
- MAN DOOR
- OVERHEAD DOOR
- RETAINING WALL
- CONCRETE CURB (DROP CURB)
- SANITARY SEWER (MH, 14.6m-200mmø SAN @ 1.5%)
- STORM SEWER (MH, 21.3m-300mmø STM @ 1.3%)
- WATERMAIN (200mmø WTM, HYD. SET, TEE)
- SEWER CROSSING (REFER TO CROSSING CHART) X1
- SAW CUT c/w GLASS GRID (SEE DETAIL)
- UNDERGROUND PARKING EXTENTS
- WATER METER (M)
- BACKFLOW PREVENTER (BP)

SEWER CROSSING CHART

NOTE:
1) Maintain minimum 0.5m vertical clearance between all watermains and sewers. Where watermain is deflected, ensure 2.0m cover is achieved or watermain is insulated.
2) Maintain vertical clearance at all other crossings.
3) Existing and proposed watermain depths are approximate only. Notify Design Engineer of any discrepancies.
4) Contractor to verify all existing inverts prior to product ordering. Notify Design Engineer of any discrepancies.

CROSSING #	SEWER TYPE	SEWER SIZE (mmø)	CROSSING ELEVATION	NOTES
X1	WTM	150	INV=102.45±	MAINTAIN MIN 0.15m OF VERTICAL SEPARATION
	EX. STM	600	OBV=102.25±	
X2	EX. STM	300	INV=102.61±	
	SAN	150	OBV=101.15±	
X3	EX. WTM	150	INV=102.58±	MAINTAIN MIN 0.15m OF VERTICAL SEPARATION
	SAN	150	OBV=101.09	
x4	EX. STM	600	OBV=102.22	MAINTAIN MIN 0.5m OF VERTICAL SEPARATION
	SAN	150	INV=102.72	

NOTES TO CONTRACTOR:

1. INSPECTION
   CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.
2. CONFIRMATION OF EXISTING INVERTS
   72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS AND REPORT FINDINGS TO MTE. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.
3. SHOP DRAWINGS
   CONTRACTOR TO PROVIDE SHOP DRAWINGS TO THE ENGINEER FOR REVIEW AND APPROVAL FOR ALL CHAMBERS AND STRUCTURES PRIOR THE START OF CONSTRUCTION AND PRIOR TO ORDERING ANY STRUCTURES AND PARTS.

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CITY OF BURLINGTON BENCHMOARK NO. 203.

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LICENSED PROFESSIONAL ENGINEER K.R.RAMSEWAK 100100928 MAY 17/19 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

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1005 SKYVIEW DRIVE SUITE 301 BURLINGTON

PROJECT
6 STOREY RESIDENTIAL BUILDING
1085 CLEARVIEW AVENUE BURLINGTON

DRAWING
PRELIMINARY SERVICING PLAN

Project Manager: K.RAMSEWAK	Project No.: 44795-100
Design By: ALP	Checked By: KRR
Drawn By: AJT	Checked By: KRR
Surveyed By: OTHERS	Drawing No.: C2.2
Date: Dec.11/18	
Scale: 1:250	Sheet 3 of 3

May 17, 2019 - 3:45 p.m. - Plotted By: jaxtalos