FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

25 Hillcrest Avenue and 3154 Hurontario Street

City of Mississauga

Prepared for

33HC TAS LP, 33HC Corp., 3168 HS LP and 3168 HS Corp.

Project #: 20-252

May 2022

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 905.829.8818

urbantech.com

Table of Contents

List of Tables

Appendices

Appendix A – Figures and Drawings

- Drawing 101 Servicing Plan
- Drawing 201 Grading Plan
- Drawing 301 Sanitary Drainage Plan
- Drawing 302 Existing Storm Drainage Plan
- Drawing 303 Proposed Storm Drainage Plan
- Drawing 401 Details
- Drawing 1001 Erosion and Sediment Control Plan and Removals

Appendix B – Stormwater (SWM) Calculations
Appendix C – Wastewater Servicing
Appendix D – Water Servicing

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

1. INTRODUCTION

Urbantech has been retained as consulting engineers by TAS to complete a Functional Servicing Report in support of a zoning bylaw amendment for the proposed 2.14 ha development located at 25 Hillcrest Avenue and 3154 Hurontario Street in the City of Mississauga.

The site is bounded:

- To the north by John Steet and the Cooksville GO Station
- To the south by Hillcrest Avenue
- To the east by Hurontario
- To the west by the GO Access Road

The legal description of the site is Block 4, Plan 4M-501 and Part of Lot 16, Concession 1, north of Dundas of Street as shown on R-PE Surveying Sketch Showing Elevations, dated October 9th, 2020.

The site is currently occupied by commercial businesses and surface parking.

The subject development lies within the limits of the Cooksville Creek subwatershed, under the Credit Valley Conservation Authority (CVC) jurisdiction. The site falls within the City of Mississauga Hurontario/Main Street Corridor Master Plan area.

1.1 Study Purpose

The objective of this study is to outline the servicing requirements of the subject lands at a functional design level. This study will:

1. Recommend site grading, water supply and wastewater servicing strategies for the site.
2. Demonstrate compliance with City, Conservation and MECP design criteria for municipal services and stormwater management (SWM) measures.

The functional servicing design has been prepared in accordance with design criteria and requirements of the City of Mississauga, Region of Peel and Credit Valley Conservation Authority. The information in this report is intended to assist the regulatory agencies in their review of the planning applications for the proposed development.

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

2. DEVELOPMENT CONCEPT

Refer to the development concept plan prepared by SvN. The development plan consists of:

1. 43-storey building with 491 units.
2. 43-storey building with 482 units.
3. 46-storey building with 444 units.
4. 39-storey building with 440 units.
5. 34-storey building with 367 units.
6. 4 levels of underground parking.
7. 0.62 ha of community centre.
8. 0.62 ha of retail space.
9. 0.87 ha of commercial space.
10. Outdoor amenity space.

The proposed development will connect to both Go Access Road, John Street and Hillcrest Avenue via private driveways.

2.1 Phasing

The proposed development is broken up into two phases where the west portion of the subject property (1.51 ha) will be developed first (building A, B, E and the internal road from Hillcrest Avenue and John Street), and the east portion of the site (0.63 ha) will be developed as phase 2 (building C and D).

2.2 Background Studies

The servicing and development concepts presented within this report are an extension of the information contained in the following reports:

1. Phase One and Two Environmental Site Assessment (March 2021) by Terrapex
2. Hydrogeological Review (May 2022) by Terrapex
3. Cooksville Creek Flood Evaluation Master Plan EA (July 2012) by Aquafor Beech
4. Hurontario/Main Street Corridor Master Plan (October 2010) by MMM Group

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

3. EXISTING CONDITIONS

3.1 Land Use

The site is fully developed under existing conditions and consists of commercial businesses and surface parking.

3.2 Geotechnical and Hydrogeology

In support of the rezoning application, a site specific groundwater investigation was prepared by Terrapex.

The hydrogeological investigation report states that the site's soil stratigraphy is generally characterized by the following:

- The parking lot was found to consist of approximately 0.1 m of asphaltic concrete with a granular base.
- Fill material consisting of various crusher run limestone, silty sand, sand, gravelly sand, and clayey silt soils was found beneath the granular base course from 1.2 to 4 meters below the ground surface.
- Clayey silt was present below the fill material ranging in thickness from 0.3 to 4.0 m.
- Shale bedrock was encountered below the clayey silt positioned below 2.2 to 4.4 meters below the ground surface.

The hydrogeological review indicated the following:

- Average ground water levels were found to be 3.8 meters below the ground surface with the shallowest water table observed was 2.8 meters below the ground surface.
- Groundwater quality was acceptable with respect to the criteria for discharge to sanitary/combined sewers.
- Dewatering during construction would require a maximum daily dewatering rate of 477,500 L/day so an PTTW will be required.

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

4. GRADING DESIGN

4.1 Design Standards

The proposed grading design for the site takes into consideration the following requirements and constraints:

1. Conforms to the City of Mississauga design criteria.
2. Match existing boundary lot and road grading conditions to be compatible with abutting properties.
3. Provides overland flow conveyance for major storm conditions.
4. Provides appropriate cover on proposed servicing.
5. Ensures compatibility of driveway access to surrounding public streets.

4.2 Grading Design

A grading plan for the subject property has been prepared in conjunction with the storm, sanitary, and water servicing system design for the subject development. Retaining walls and ramps may be required internal to the site to mitigate grade differentials.

Due to perimeter grading constraints a portion of the subject property (approximately 0.2 ha) will drain uncontrolled to the boundary roads. The storage tanks have been oversized to account for these uncontrolled flows.

Drawings 201 illustrate the proposed grading plan for the site.

5. STORM DRAINAGE AND STORMWATER MANAGEMENT

5.1 Drainage Criteria

The City of Mississauga and Credit Valley Conservation outline the following design criteria for the site as follows:

1. Meeting Cooksville Creek Subwatershed quantity control criteria of 100-year post development to 2-year predevelopment control.
2. Pre-development runoff coefficients are to not exceed 0.5 for a site that is already developed.
3. Ensure minimum 80% TSS removal on site for quality control.
4. First 5 mm of runoff to be retained on-site.
5. Provide safe overland flow conveyance of the 100-year event.

5.2 Storm Sewer Design

Storm sewers within the site will be sized to convey the 10-year storm in accordance with the City of Mississauga standards. The site is full coverage with underground parking. All surface drainage will be collected by area drains and catchbasins that are connected to the building plumbing system. Each phase of the site will have its own dedicated storm sewer system and tank. Routing of the storm sewers within the building will be determined at a later date as the building design is advanced. Flows from 0.2 ha of the site along the site boundary are not able to be captured by area drains and will flow uncontrolled towards the boundary roads.

All stormwater within phase 1 is conveyed to the storage tank 1 via area drains, which is situated in the south east corner of the phase 1 site within the P1 level of the underground parkade. Flow from the tank will be conveyed to the 600 mm concrete storm sewer on Hillcrest Avenue with a 375 mm connection to proposed MH 1.

All stormwater within phase 2 is conveyed to the storage tank 2 via area drains, which is situated in the south west corner of the phase 2 site within the P1 level of the underground parkade. Flow from the tank will be conveyed to the existing MH4 on Hillcrest Avenue with a 300 mm connection to proposed MH2.

5.3 Quality Control

As identified in section 5.1 above, the site is required to meet a minimum of 80% TSS removal on site for quality control. To achieve the required TSS removal an Oil Grit Separator (OGS) will be used upstream of the proposed storage tanks within the parking garage. **Table 1** below outlines preliminary sizing for the OGS devices. Sizing specifications are to be verified by the manufacturer during detailed design.

Table 1: OGS Parameters

OGS #	Size	Area (ha)	Efficiency (%)
1	EFO6	1.51	80
2	EFO4	0.63	82

Refer to **Appendix B** for the Stormceptor Sizing Report.

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818

urbantech.com

5.4 Quantity Control

A Visual Otthymo model was created to model the drainage from the site to determine the pre-development two-year flow. A 24-hour Chicago rainfall Distribution was used to simulate the rainfall on the site using the Pearson International Airport IDF parameters. As the site is fully developed under existing conditions, a runoff coefficient of 0.5 was used as prescribed by the City of Mississauga standards. **Table 2** below outlines the pre-development 2-year flow.

Table 2 - 2-year Pre-development Target

Phase	Area (ha)	Runoff Coefficient	2-year Target (m^3/s)
1	1.51	0.5	0.177
2	0.63	0.5	0.077

Refer to **Drawing 302** for the existing storm drainage plan.

Storm water quantity control for each phase is achieved by using a storage tank. The tank for the first phase will be located in the southeast corner of the phase and will likely require a pump to discharge flows to the public storm sewer system. The tank for phase two will be located in the southwest corner of the phase and may also require a pump. As the design progresses, opportunities to discharge a portion of the tank flows by gravity will be investigated. Details of the pumps will also be provided at detailed design.

As noted in **Section 5.2** above, a 0.2 ha portion of the site drains uncontrolled to Hillcrest Avenue, to account for this uncontrolled flow, the tank flows are overcontrolled to ensure that the 2-year predevelopment target is not exceeded during the 100-year event. **Table 3** summarizes the flow and storage values required based on the VO6 calculations.

Table 3: Flow and Required Storage Volume Results

Outlet	Area (ha)	Runoff Coefficient	Post Development Flows m^3/s	Required Volume (m^3)
Phase 1 – Tank 1	1.368	0.9	0.083	489
Phase 1 - Uncontrolled	0.142	0.9	0.095	-
		Total	0.177	489
Phase 2 – Tank 2	0.572	0.9	0.039	200
Phase 2 - Uncontrolled	0.058	0.9	0.039	-
		Total	0.077	200

Refer to SWM Calculations in **Appendix B** for supporting calculations and **Drawing 303** for post development storm drainage plan.

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

5.5 Water Balance/Water Re-use

As identified in **Section 5.1** above, the first 5 mm of a rain event are required to be retained onsite. For the site of 2.14 ha this results in a total volume of 107 m^3. As the majority of the site is dominated by underground parking, infiltration is not feasible. As indicated by SvN approximately 0.24 ha (with 1 m of associated planting media) of the site will consist of landscaped areas on the on top of underground parking garage with an additional 0.54 ha (with ~0.15 m of soil depth). Assuming a porosity of 0.3 for the planting media this will result in 963 m^3 of storage available to temporarily retain stormwater in the soil and provide the opportunity for evapotranspiration. For the remaining 1.36 ha of the site that cannot be directed to the landscaped areas, the stormwater will be directed to the 68 m^3 of sump storage within the storage tanks. The water in the sumps will be re-used for irrigation or by other re-use measures. Details of the re-use design will be provided at detailed design.

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

6. WASTEWATER SERVICING

6.1 Design Criteria

Wastewater sewers will be designed in accordance with Region of Peel standards and specifications. The following criteria were used:

- 3 people/unit for large apartments
- 1.6 people/unit for small apartments
- 50 people/ha for commercial/retail/community centre areas
- 0.2 L/s/ha for infiltration
- 302.8 L/person/day for domestic sewage flow

6.2 Existing Conditions

The existing sanitary sewer in proximity to the site is as follows:

1. 250 mm diameter located within Kirwin Avenue flowing northeast.
2. 300 mm diameter located within Hurontario Street flowing southeast.
3. 16 m of 250 mm diameter sewer and private manhole on John Street to the northeast of the subject property.

The location of the existing is sewer is shown on **Drawing 101**.

6.3 Local Wastewater Design

The estimated sanitary flow from the subject lands for phase 1 and 2 is 33.16 L/s and 22.79 L/s respectively. Refer to Wastewater Demand Calculations in **Appendix C** for calculations.

Sanitary servicing within the site will be designed by the project mechanical engineer as the building design advances. Proposed sanitary flows from the site will be conveyed via two new 250 mm service connections to Hillcrest Avenue (one per phase). Refer to **Drawings 101 and 301** for the anticipated connection location and drainage areas.

The estimated flow was provided to the Region of Peel to verify sewer capacity using their model. The Region of Peel has advised on March 21st, 2022, that there is no sanitary sewer capacity available for the proposed development. The Region also noted that there will be an internal discussion regarding the capacity constraints as there are other development proposals in the area.

Further discussions with the Region of Peel will be required to determine the extent of offsite sewer upgrades required. Design and installation of the works on Hurontario would require coordination with the Region's LRT project.

7. WATER SERVICING

7.1 Existing Conditions

The existing water network, which falls under the jurisdiction of the Region of Peel, in the vicinity of the site includes:

1. A 500 mm local watermain on Hurontario Street
2. A 300 mm local watermain on Hillcrest Avenue

7.2 Design Criteria

The proposed watermain design will comply with the Region of Peel design criteria as follows:

- Residential Consumption = 280 l/c/day, max day = 3
- ICI Consumption = 300 l/employee/day, max day = 1.4
- Residential and Commercial Peak Hour = 3
- Minimum operating pressure = 40 psi
- Maximum operating pressure = 100 psi

7.3 Local Watermains

Each phase of the development will have its own domestic water connection and two fire service connections as shown on **Drawing 101**. The water service sizes are estimated to be 250 mm which will be confirmed as the project advances. The development will be serviced by connecting to the existing 300 mm watermain on Hillcrest Avenue. The onsite water supply system will be designed by the project mechanical engineer as the building design advances.

Table 4 below outlines the water demand calculations for both phases of the development.

Table 4: Water Demand

Phase	Fire Flow (L/s)	Domestic (L/s)	
		Max Daily Demand	Max Peak Hour
1	116.7	17.6	26.5
2	100	11.7	17.8

A hydrant flow test was conducted on the hydrants adjacent to the site on Hurontario Street as well as on Hillcrest Avenue. The results of the test are shown in **Table 5**.

Table 5: Fire Flow Tests

Pressure (psi)	Flow (USGPM)
Hillcrest	
59	1289
46	2276
20	7941
Hurontario	
64	1342
50	2373
20	8116

Water demand, results of the hydrant flow test, internal servicing and proposed connection points are to be provided to the Region of Peel to identify if there are any water capacity constraints.

Refer to **Appendix D** for water demand calculation and hydrant flow test results.

8. EROSION AND SEDIMENT CONTROL AND CONSTRUCTION DEWATERING

Erosion and sediment controls measures as follows:

1. Installing heavy duty silt control fencing along the perimeter of the site at strategic locations.
2. Installing a temporary mud mat at the construction site entrance.
3. Wrapping the tops of all inlet structures with filter fabric and using install silt sacks.
4. Inspecting all sediment and erosion control controls to maintain them in good repair until such time as the Engineer or the City approves their removal.
5. Safe discharge of construction water in accordance with City and provincial guidelines.

Refer to **Drawing 1001 for** site-specific erosion and sediment control measures for the property.

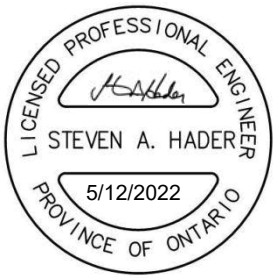
Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

9. CONCLUSIONS

This report has demonstrated that:

- The proposed site will be graded to match to existing elevations at all property lines.
- Building Storm drains will be designed by the project mechanical engineer at the building permit stage.
- Water quality will be provided through the use of two OGS devices upstream of the stormwater tanks.
- Storm water quantity control estimated to be 489 m^3 for phase 1 and 200 m^3 for phase 2 and will be required to control flows from the post development 100-year storm to the predevelopment 2-year storm in accordance with Mississauga standards.
- Storage will be provided with two tanks integrated into the parking garage, one for each phase. The phase 1 tank will be located at the south-east corner of the phase and the phase 2 tank will be integrated with the building parking structure.
- The site will utilize two new storm sewer connections to the existing MH4 and 600 mm storm sewer on Hillcrest Avenue.
- Water balance objectives will be met by retaining the first 5 mm of rain events onsite within the proposed landscaped areas as well as in the storage tank. Retained water from the storage tank will be re-used.
- Wastewater servicing to the site will be provided by new 250 mm diameter connections to the sewer on Hurontario Street.
- Peel Region has indicated that some of the existing sanitary sewers in the vicinity if the site may require capacity augmentation.
- Water servicing to the site will be provided by the existing 300 mm watermain on Hillcrest Avenue.
- Erosion and sediment control and groundwater control measures will be implemented during construction in accordance with City and Provincial requirements.

Report Prepared by:



Janna Ormond B.Eng., EIT
Municipal Design Assistant

Steven Hader, P. Eng.
Senior Project Manager

APPENDIX A
Drawings and Figures

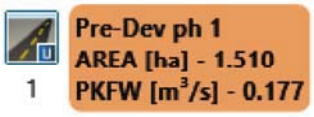
Drawing 101 Servicing Plan
Drawing 201 Grading Plan
Drawing 301 Sanitary Drainage Plan
Drawing 302 Existing Storm Drainage Plan
Drawing 303 Proposed Storm Drainage Plan
Drawing 401 Details
Drawing 1001 Erosion and Sediment Control Plan and Removals

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

APPENDIX B
SWM Calculations

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

Pre-Development



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

       V    V   I    SSSSS  U   U    A    L              (v 6.1.2003)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2020 Smart City Water Inc
All rights reserved.


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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1-New\VO2\voin.dat

  Output  filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
79ae7f1f-c450-4599-8731-e1fe84d8cf00\
  Summary filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
79ae7f1f-c450-4599-8731-e1fe84d8cf00\


DATE: 03/28/2022                          TIME: 11:28:19

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
------------------------
  ********************************************
  ** SIMULATION : 100-year chicago - 24 hour -  **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1450.000
| Ptotal=119.37 mm |                          B=   4.900
--------------------                          C=   0.780
```

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

Duration of storm = 24.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	1.12	6.08	3.49	12.08	3.29	18.08	1.59
0.17	1.13	6.17	3.62	12.17	3.24	18.17	1.58
0.25	1.14	6.25	3.76	12.25	3.18	18.25	1.57
0.33	1.15	6.33	3.92	12.33	3.14	18.33	1.56
0.42	1.16	6.42	4.09	12.42	3.09	18.42	1.55
0.50	1.17	6.50	4.27	12.50	3.04	18.50	1.54
0.58	1.18	6.58	4.48	12.58	3.00	18.58	1.53
0.67	1.19	6.67	4.72	12.67	2.95	18.67	1.53
0.75	1.20	6.75	4.98	12.75	2.91	18.75	1.52
0.83	1.21	6.83	5.28	12.83	2.87	18.83	1.51
0.92	1.22	6.92	5.62	12.92	2.83	18.92	1.50
1.00	1.23	7.00	6.02	13.00	2.79	19.00	1.49
1.08	1.24	7.08	6.49	13.08	2.76	19.08	1.48
1.17	1.26	7.17	7.05	13.17	2.72	19.17	1.47
1.25	1.27	7.25	7.72	13.25	2.69	19.25	1.46
1.33	1.28	7.33	8.57	13.33	2.65	19.33	1.45
1.42	1.29	7.42	9.66	13.42	2.62	19.42	1.45
1.50	1.31	7.50	11.12	13.50	2.59	19.50	1.44
1.58	1.32	7.58	13.17	13.58	2.56	19.58	1.43
1.67	1.33	7.67	16.30	13.67	2.53	19.67	1.42
1.75	1.35	7.75	21.69	13.75	2.50	19.75	1.41
1.83	1.36	7.83	33.28	13.83	2.47	19.83	1.40
1.92	1.38	7.92	76.62	13.92	2.44	19.92	1.40
2.00	1.39	8.00	242.53	14.00	2.41	20.00	1.39
2.08	1.41	8.08	98.69	14.08	2.39	20.08	1.38
2.17	1.42	8.17	54.64	14.17	2.36	20.17	1.37
2.25	1.44	8.25	37.73	14.25	2.33	20.25	1.37
2.33	1.46	8.33	28.91	14.33	2.31	20.33	1.36
2.42	1.47	8.42	23.53	14.42	2.29	20.42	1.35
2.50	1.49	8.50	19.90	14.50	2.26	20.50	1.35
2.58	1.51	8.58	17.30	14.58	2.24	20.58	1.34
2.67	1.53	8.67	15.34	14.67	2.22	20.67	1.33
2.75	1.55	8.75	13.80	14.75	2.20	20.75	1.32
2.83	1.57	8.83	12.57	14.83	2.17	20.83	1.32
2.92	1.59	8.92	11.55	14.92	2.15	20.92	1.31
3.00	1.61	9.00	10.71	15.00	2.13	21.00	1.30
3.08	1.63	9.08	9.98	15.08	2.11	21.08	1.30
3.17	1.65	9.17	9.36	15.17	2.09	21.17	1.29
3.25	1.68	9.25	8.82	15.25	2.07	21.25	1.28
3.33	1.70	9.33	8.35	15.33	2.05	21.33	1.28
3.42	1.72	9.42	7.92	15.42	2.04	21.42	1.27
3.50	1.75	9.50	7.55	15.50	2.02	21.50	1.27

3.58	1.78	9.58	7.21	15.58	2.00	21.58	1.26
3.67	1.80	9.67	6.90	15.67	1.98	21.67	1.25
3.75	1.83	9.75	6.62	15.75	1.97	21.75	1.25
3.83	1.86	9.83	6.37	15.83	1.95	21.83	1.24
3.92	1.89	9.92	6.13	15.92	1.93	21.92	1.24
4.00	1.92	10.00	5.92	16.00	1.92	22.00	1.23
4.08	1.96	10.08	5.72	16.08	1.90	22.08	1.22
4.17	1.99	10.17	5.54	16.17	1.89	22.17	1.22
4.25	2.02	10.25	5.37	16.25	1.87	22.25	1.21
4.33	2.06	10.33	5.21	16.33	1.86	22.33	1.21
4.42	2.10	10.42	5.06	16.42	1.84	22.42	1.20
4.50	2.14	10.50	4.92	16.50	1.83	22.50	1.20
4.58	2.18	10.58	4.78	16.58	1.81	22.58	1.19
4.67	2.23	10.67	4.66	16.67	1.80	22.67	1.19
4.75	2.27	10.75	4.54	16.75	1.79	22.75	1.18
4.83	2.32	10.83	4.43	16.83	1.77	22.83	1.18
4.92	2.37	10.92	4.33	16.92	1.76	22.92	1.17
5.00	2.42	11.00	4.23	17.00	1.75	23.00	1.16
5.08	2.48	11.08	4.14	17.08	1.73	23.08	1.16
5.17	2.54	11.17	4.05	17.17	1.72	23.17	1.15
5.25	2.60	11.25	3.96	17.25	1.71	23.25	1.15
5.33	2.67	11.33	3.88	17.33	1.70	23.33	1.14
5.42	2.74	11.42	3.80	17.42	1.68	23.42	1.14
5.50	2.81	11.50	3.73	17.50	1.67	23.50	1.14
5.58	2.89	11.58	3.66	17.58	1.66	23.58	1.13
5.67	2.97	11.67	3.59	17.67	1.65	23.67	1.13
5.75	3.06	11.75	3.53	17.75	1.64	23.75	1.12
5.83	3.16	11.83	3.46	17.83	1.63	23.83	1.12
5.92	3.26	11.92	3.40	17.92	1.62	23.92	1.11
6.00	3.37	12.00	3.35	18.00	1.61	24.00	1.11

CALIB STANDHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 1.51 Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.65	0.86
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	100.33	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)	=	242.53	107.89
over (min)		5.00	10.00
Storage Coeff. (min)	=	1.80 (ii)	8.64 (ii)
Unit Hyd. Tpeak (min)	=	5.00	10.00
Unit Hyd. peak (cms)	=	0.32	0.12

```
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.18          0.524 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.08           8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54          92.82
     TOTAL RAINFALL   (mm)=     119.37       119.37         119.37
     RUNOFF COEFFICIENT   =       0.99         0.62           0.78

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  43.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.27         0.36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      64.81        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.53       107.89
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.38 (ii)    8.23 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.18         0.08          0.224 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.08           8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54          92.81
     TOTAL RAINFALL   (mm)=     119.37       119.37         119.37
     RUNOFF COEFFICIENT   =       0.99         0.62           0.78

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
================================================================================
```

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

       V    V   I    SSSSS  U   U    A    L              (v 6.1.2003)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2020 Smart City Water Inc
All rights reserved.


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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1-New\VO2\voin.dat

  Output  filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
b6d0b131-f954-4918-88c3-77aa66cec202\
  Summary filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
b6d0b131-f954-4918-88c3-77aa66cec202\


DATE: 03/28/2022                          TIME: 11:28:19

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
------------------------
  ***********************************************
  ** SIMULATION : 2 year - 24 hour chicago - mi **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 610.000
| Ptotal= 50.23 mm |                          B=   4.600
--------------------                          C=   0.780
                       used in:   INTENSITY =  A / (t + B)^C
```

Duration of storm = 24.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	0.47	6.08	1.47	12.08	1.38	18.08	0.67
0.17	0.47	6.17	1.52	12.17	1.36	18.17	0.67
0.25	0.48	6.25	1.58	12.25	1.34	18.25	0.66
0.33	0.48	6.33	1.64	12.33	1.32	18.33	0.66
0.42	0.49	6.42	1.71	12.42	1.30	18.42	0.65
0.50	0.49	6.50	1.79	12.50	1.28	18.50	0.65
0.58	0.49	6.58	1.88	12.58	1.26	18.58	0.65
0.67	0.50	6.67	1.98	12.67	1.24	18.67	0.64
0.75	0.50	6.75	2.09	12.75	1.22	18.75	0.64
0.83	0.51	6.83	2.21	12.83	1.21	18.83	0.63
0.92	0.51	6.92	2.36	12.92	1.19	18.92	0.63
1.00	0.52	7.00	2.52	13.00	1.17	19.00	0.63
1.08	0.52	7.08	2.72	13.08	1.16	19.08	0.62
1.17	0.53	7.17	2.95	13.17	1.14	19.17	0.62
1.25	0.53	7.25	3.23	13.25	1.13	19.25	0.61
1.33	0.54	7.33	3.59	13.33	1.11	19.33	0.61
1.42	0.54	7.42	4.04	13.42	1.10	19.42	0.61
1.50	0.55	7.50	4.65	13.50	1.09	19.50	0.60
1.58	0.55	7.58	5.50	13.58	1.07	19.58	0.60
1.67	0.56	7.67	6.80	13.67	1.06	19.67	0.60
1.75	0.57	7.75	9.03	13.75	1.05	19.75	0.59
1.83	0.57	7.83	13.85	13.83	1.04	19.83	0.59
1.92	0.58	7.92	32.04	13.92	1.02	19.92	0.59
2.00	0.59	8.00	104.51	14.00	1.01	20.00	0.58
2.08	0.59	8.08	41.36	14.08	1.00	20.08	0.58
2.17	0.60	8.17	22.75	14.17	0.99	20.17	0.58
2.25	0.61	8.25	15.69	14.25	0.98	20.25	0.57
2.33	0.61	8.33	12.03	14.33	0.97	20.33	0.57
2.42	0.62	8.42	9.80	14.42	0.96	20.42	0.57
2.50	0.63	8.50	8.29	14.50	0.95	20.50	0.57
2.58	0.63	8.58	7.21	14.58	0.94	20.58	0.56
2.67	0.64	8.67	6.40	14.67	0.93	20.67	0.56
2.75	0.65	8.75	5.76	14.75	0.92	20.75	0.56
2.83	0.66	8.83	5.25	14.83	0.91	20.83	0.55
2.92	0.67	8.92	4.83	14.92	0.90	20.92	0.55
3.00	0.68	9.00	4.47	15.00	0.90	21.00	0.55
3.08	0.69	9.08	4.17	15.08	0.89	21.08	0.55
3.17	0.69	9.17	3.92	15.17	0.88	21.17	0.54
3.25	0.70	9.25	3.69	15.25	0.87	21.25	0.54
3.33	0.71	9.33	3.49	15.33	0.86	21.33	0.54
3.42	0.72	9.42	3.32	15.42	0.86	21.42	0.53
3.50	0.74	9.50	3.16	15.50	0.85	21.50	0.53
3.58	0.75	9.58	3.02	15.58	0.84	21.58	0.53

3.67	0.76	9.67	2.89	15.67	0.83	21.67	0.53
3.75	0.77	9.75	2.77	15.75	0.83	21.75	0.52
3.83	0.78	9.83	2.67	15.83	0.82	21.83	0.52
3.92	0.79	9.92	2.57	15.92	0.81	21.92	0.52
4.00	0.81	10.00	2.48	16.00	0.81	22.00	0.52
4.08	0.82	10.08	2.40	16.08	0.80	22.08	0.51
4.17	0.84	10.17	2.32	16.17	0.79	22.17	0.51
4.25	0.85	10.25	2.25	16.25	0.79	22.25	0.51
4.33	0.87	10.33	2.18	16.33	0.78	22.33	0.51
4.42	0.88	10.42	2.12	16.42	0.77	22.42	0.51
4.50	0.90	10.50	2.06	16.50	0.77	22.50	0.50
4.58	0.92	10.58	2.01	16.58	0.76	22.58	0.50
4.67	0.94	10.67	1.95	16.67	0.76	22.67	0.50
4.75	0.95	10.75	1.91	16.75	0.75	22.75	0.50
4.83	0.97	10.83	1.86	16.83	0.74	22.83	0.49
4.92	1.00	10.92	1.82	16.92	0.74	22.92	0.49
5.00	1.02	11.00	1.77	17.00	0.73	23.00	0.49
5.08	1.04	11.08	1.74	17.08	0.73	23.08	0.49
5.17	1.07	11.17	1.70	17.17	0.72	23.17	0.49
5.25	1.09	11.25	1.66	17.25	0.72	23.25	0.48
5.33	1.12	11.33	1.63	17.33	0.71	23.33	0.48
5.42	1.15	11.42	1.60	17.42	0.71	23.42	0.48
5.50	1.18	11.50	1.57	17.50	0.70	23.50	0.48
5.58	1.21	11.58	1.54	17.58	0.70	23.58	0.48
5.67	1.25	11.67	1.51	17.67	0.69	23.67	0.47
5.75	1.29	11.75	1.48	17.75	0.69	23.75	0.47
5.83	1.33	11.83	1.45	17.83	0.68	23.83	0.47
5.92	1.37	11.92	1.43	17.92	0.68	23.92	0.47
6.00	1.41	12.00	1.40	18.00	0.67	24.00	0.47

CALIB		
STANDHYD (0001)	Area (ha)=	1.51
ID= 1 DT= 5.0 min	Total Imp(%)=	43.00 Dir. Conn.(%)= 43.00

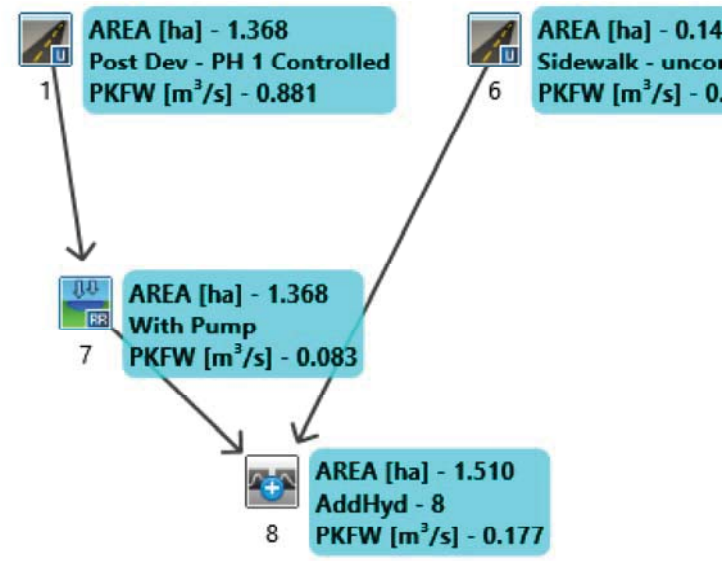
		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.65	0.86
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	100.33	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		104.51	19.91
over (min)		5.00	20.00
Storage Coeff. (min)=		2.51 (ii)	15.98 (ii)
Unit Hyd. Tpeak (min)=		5.00	20.00
Unit Hyd. peak (cms)=		0.29	0.07

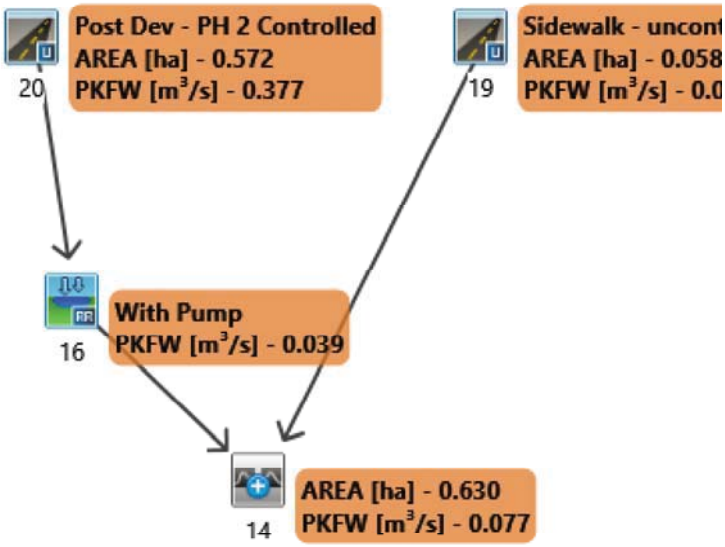
TOTALS

```
     PEAK FLOW       (cms)=       0.17         0.03          0.177 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.25           8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81          31.89
     TOTAL RAINFALL   (mm)=      50.23        50.23          50.23
     RUNOFF COEFFICIENT   =       0.98         0.37           0.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  43.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.27         0.36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      64.81        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     104.51        19.91
               over (min)         5.00        20.00
     Storage Coeff.  (min)=       1.93 (ii)   15.40 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.31         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.01          0.077 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.25           8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81          31.88
     TOTAL RAINFALL   (mm)=      50.23        50.23          50.23
     RUNOFF COEFFICIENT   =       0.98         0.37           0.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

 FINISH
```

==========
==========

Post Development





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

       V    V   I    SSSSS  U   U    A    L              (v 6.1.2003)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2020 Smart City Water Inc
All rights reserved.


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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1-New\VO2\voin.dat

  Output  filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
16b15c6d-0ab7-4a46-a54b-8296511a8be1\
  Summary filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
16b15c6d-0ab7-4a46-a54b-8296511a8be1\


DATE: 04/08/2022                          TIME: 03:49:21

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
------------------------
  ********************************************
  ** SIMULATION : 100-year chicago - 24 hour -  **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1450.000
| Ptotal=119.37 mm |                          B=   4.900
--------------------                          C=   0.780
```

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

Duration of storm = 24.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	1.12	6.08	3.49	12.08	3.29	18.08	1.59
0.17	1.13	6.17	3.62	12.17	3.24	18.17	1.58
0.25	1.14	6.25	3.76	12.25	3.18	18.25	1.57
0.33	1.15	6.33	3.92	12.33	3.14	18.33	1.56
0.42	1.16	6.42	4.09	12.42	3.09	18.42	1.55
0.50	1.17	6.50	4.27	12.50	3.04	18.50	1.54
0.58	1.18	6.58	4.48	12.58	3.00	18.58	1.53
0.67	1.19	6.67	4.72	12.67	2.95	18.67	1.53
0.75	1.20	6.75	4.98	12.75	2.91	18.75	1.52
0.83	1.21	6.83	5.28	12.83	2.87	18.83	1.51
0.92	1.22	6.92	5.62	12.92	2.83	18.92	1.50
1.00	1.23	7.00	6.02	13.00	2.79	19.00	1.49
1.08	1.24	7.08	6.49	13.08	2.76	19.08	1.48
1.17	1.26	7.17	7.05	13.17	2.72	19.17	1.47
1.25	1.27	7.25	7.72	13.25	2.69	19.25	1.46
1.33	1.28	7.33	8.57	13.33	2.65	19.33	1.45
1.42	1.29	7.42	9.66	13.42	2.62	19.42	1.45
1.50	1.31	7.50	11.12	13.50	2.59	19.50	1.44
1.58	1.32	7.58	13.17	13.58	2.56	19.58	1.43
1.67	1.33	7.67	16.30	13.67	2.53	19.67	1.42
1.75	1.35	7.75	21.69	13.75	2.50	19.75	1.41
1.83	1.36	7.83	33.28	13.83	2.47	19.83	1.40
1.92	1.38	7.92	76.62	13.92	2.44	19.92	1.40
2.00	1.39	8.00	242.53	14.00	2.41	20.00	1.39
2.08	1.41	8.08	98.69	14.08	2.39	20.08	1.38
2.17	1.42	8.17	54.64	14.17	2.36	20.17	1.37
2.25	1.44	8.25	37.73	14.25	2.33	20.25	1.37
2.33	1.46	8.33	28.91	14.33	2.31	20.33	1.36
2.42	1.47	8.42	23.53	14.42	2.29	20.42	1.35
2.50	1.49	8.50	19.90	14.50	2.26	20.50	1.35
2.58	1.51	8.58	17.30	14.58	2.24	20.58	1.34
2.67	1.53	8.67	15.34	14.67	2.22	20.67	1.33
2.75	1.55	8.75	13.80	14.75	2.20	20.75	1.32
2.83	1.57	8.83	12.57	14.83	2.17	20.83	1.32
2.92	1.59	8.92	11.55	14.92	2.15	20.92	1.31
3.00	1.61	9.00	10.71	15.00	2.13	21.00	1.30
3.08	1.63	9.08	9.98	15.08	2.11	21.08	1.30
3.17	1.65	9.17	9.36	15.17	2.09	21.17	1.29
3.25	1.68	9.25	8.82	15.25	2.07	21.25	1.28
3.33	1.70	9.33	8.35	15.33	2.05	21.33	1.28
3.42	1.72	9.42	7.92	15.42	2.04	21.42	1.27
3.50	1.75	9.50	7.55	15.50	2.02	21.50	1.27

3.58	1.78	9.58	7.21	15.58	2.00	21.58	1.26
3.67	1.80	9.67	6.90	15.67	1.98	21.67	1.25
3.75	1.83	9.75	6.62	15.75	1.97	21.75	1.25
3.83	1.86	9.83	6.37	15.83	1.95	21.83	1.24
3.92	1.89	9.92	6.13	15.92	1.93	21.92	1.24
4.00	1.92	10.00	5.92	16.00	1.92	22.00	1.23
4.08	1.96	10.08	5.72	16.08	1.90	22.08	1.22
4.17	1.99	10.17	5.54	16.17	1.89	22.17	1.22
4.25	2.02	10.25	5.37	16.25	1.87	22.25	1.21
4.33	2.06	10.33	5.21	16.33	1.86	22.33	1.21
4.42	2.10	10.42	5.06	16.42	1.84	22.42	1.20
4.50	2.14	10.50	4.92	16.50	1.83	22.50	1.20
4.58	2.18	10.58	4.78	16.58	1.81	22.58	1.19
4.67	2.23	10.67	4.66	16.67	1.80	22.67	1.19
4.75	2.27	10.75	4.54	16.75	1.79	22.75	1.18
4.83	2.32	10.83	4.43	16.83	1.77	22.83	1.18
4.92	2.37	10.92	4.33	16.92	1.76	22.92	1.17
5.00	2.42	11.00	4.23	17.00	1.75	23.00	1.16
5.08	2.48	11.08	4.14	17.08	1.73	23.08	1.16
5.17	2.54	11.17	4.05	17.17	1.72	23.17	1.15
5.25	2.60	11.25	3.96	17.25	1.71	23.25	1.15
5.33	2.67	11.33	3.88	17.33	1.70	23.33	1.14
5.42	2.74	11.42	3.80	17.42	1.68	23.42	1.14
5.50	2.81	11.50	3.73	17.50	1.67	23.50	1.14
5.58	2.89	11.58	3.66	17.58	1.66	23.58	1.13
5.67	2.97	11.67	3.59	17.67	1.65	23.67	1.13
5.75	3.06	11.75	3.53	17.75	1.64	23.75	1.12
5.83	3.16	11.83	3.46	17.83	1.63	23.83	1.12
5.92	3.26	11.92	3.40	17.92	1.62	23.92	1.11
6.00	3.37	12.00	3.35	18.00	1.61	24.00	1.11

CALIB STANDHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 1.37 Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.35	0.01
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	95.50	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=	over (min)	242.53 5.00	107.89 5.00
Storage Coeff.	(min)=	1.74 (ii)	2.53 (ii)
Unit Hyd. Tpeak	(min)=	5.00	5.00
Unit Hyd. peak	(cms)=	0.32	0.29

```
                                                                *TOTALS*
     PEAK FLOW       (cms)=       0.88         0.00          0.881 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00           8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54         117.92
     TOTAL RAINFALL   (mm)=     119.37       119.37         119.37
     RUNOFF COEFFICIENT   =       0.99         0.62           0.99

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0007)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0830      0.0491
                          0.0810     0.0010   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      1.368      0.881      8.00     117.92
   OUTFLOW: ID= 1 (  0007)      1.368      0.083      8.50     117.93

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.42
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0489

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.77        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.53       107.89
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.88 (ii)    1.67 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
```

```
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.00           0.095 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00            8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54          117.92
     TOTAL RAINFALL   (mm)=     119.37       119.37          119.37
     RUNOFF COEFFICIENT   =       0.99         0.62            0.99

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):     0.14   0.095     8.00   117.92
      + ID2= 2 (  0007):     1.37   0.083     8.50   117.93
        ================================================
        ID = 3 (  0008):     1.51   0.177     8.00   117.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   0.06
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.06         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      19.66        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.53       107.89
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.68 (ii)    1.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.33
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00           0.039 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00            8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54          117.92
```

```
     TOTAL RAINFALL   (mm)=     119.37       119.37         119.37
     RUNOFF COEFFICIENT   =       0.99         0.62           0.99

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.57
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.57         0.01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      61.75        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.53       107.89
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.34 (ii)    2.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.31
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.00          0.377 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00          8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54        117.92
     TOTAL RAINFALL   (mm)=     119.37       119.37        119.37
     RUNOFF COEFFICIENT   =       0.99         0.62          0.99

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

```
                          0.0000     0.0000   |   0.0390      0.0200
                          0.0370     0.0010   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0020)      0.572      0.377      8.00     117.92
   OUTFLOW: ID= 1 (  0016)      0.572      0.039      8.42     117.92

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.33
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0200

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

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0016):     0.57   0.039     8.42   117.92
      + ID2= 2 (  0019):     0.06   0.039     8.00   117.92
        ================================================
        ID = 3 (  0014):     0.63   0.077     8.00   117.92

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

       V    V   I    SSSSS  U   U    A    L              (v 6.1.2003)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2020 Smart City Water Inc
All rights reserved.


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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1-New\VO2\voin.dat

  Output  filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
```

ab815f58-46ee-46f9-b259-d5a4b4fbaa44\
  Summary filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
ab815f58-46ee-46f9-b259-d5a4b4fbaa44\

DATE: 04/08/2022 TIME: 03:49:21

USER:

COMMENTS: _____

  ****
  ** SIMULATION : 2 year - 24 hour chicago - mi **
  ****

| CHICAGO STORM |
| Ptotal= 50.23 mm |

IDF curve parameters: A= 610.000
B= 4.600
C= 0.780
used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	0.47	6.08	1.47	12.08	1.38	18.08	0.67
0.17	0.47	6.17	1.52	12.17	1.36	18.17	0.67
0.25	0.48	6.25	1.58	12.25	1.34	18.25	0.66
0.33	0.48	6.33	1.64	12.33	1.32	18.33	0.66
0.42	0.49	6.42	1.71	12.42	1.30	18.42	0.65
0.50	0.49	6.50	1.79	12.50	1.28	18.50	0.65
0.58	0.49	6.58	1.88	12.58	1.26	18.58	0.65
0.67	0.50	6.67	1.98	12.67	1.24	18.67	0.64
0.75	0.50	6.75	2.09	12.75	1.22	18.75	0.64
0.83	0.51	6.83	2.21	12.83	1.21	18.83	0.63
0.92	0.51	6.92	2.36	12.92	1.19	18.92	0.63
1.00	0.52	7.00	2.52	13.00	1.17	19.00	0.63
1.08	0.52	7.08	2.72	13.08	1.16	19.08	0.62
1.17	0.53	7.17	2.95	13.17	1.14	19.17	0.62
1.25	0.53	7.25	3.23	13.25	1.13	19.25	0.61
1.33	0.54	7.33	3.59	13.33	1.11	19.33	0.61
1.42	0.54	7.42	4.04	13.42	1.10	19.42	0.61

1.50	0.55	7.50	4.65	13.50	1.09	19.50	0.60
1.58	0.55	7.58	5.50	13.58	1.07	19.58	0.60
1.67	0.56	7.67	6.80	13.67	1.06	19.67	0.60
1.75	0.57	7.75	9.03	13.75	1.05	19.75	0.59
1.83	0.57	7.83	13.85	13.83	1.04	19.83	0.59
1.92	0.58	7.92	32.04	13.92	1.02	19.92	0.59
2.00	0.59	8.00	104.51	14.00	1.01	20.00	0.58
2.08	0.59	8.08	41.36	14.08	1.00	20.08	0.58
2.17	0.60	8.17	22.75	14.17	0.99	20.17	0.58
2.25	0.61	8.25	15.69	14.25	0.98	20.25	0.57
2.33	0.61	8.33	12.03	14.33	0.97	20.33	0.57
2.42	0.62	8.42	9.80	14.42	0.96	20.42	0.57
2.50	0.63	8.50	8.29	14.50	0.95	20.50	0.57
2.58	0.63	8.58	7.21	14.58	0.94	20.58	0.56
2.67	0.64	8.67	6.40	14.67	0.93	20.67	0.56
2.75	0.65	8.75	5.76	14.75	0.92	20.75	0.56
2.83	0.66	8.83	5.25	14.83	0.91	20.83	0.55
2.92	0.67	8.92	4.83	14.92	0.90	20.92	0.55
3.00	0.68	9.00	4.47	15.00	0.90	21.00	0.55
3.08	0.69	9.08	4.17	15.08	0.89	21.08	0.55
3.17	0.69	9.17	3.92	15.17	0.88	21.17	0.54
3.25	0.70	9.25	3.69	15.25	0.87	21.25	0.54
3.33	0.71	9.33	3.49	15.33	0.86	21.33	0.54
3.42	0.72	9.42	3.32	15.42	0.86	21.42	0.53
3.50	0.74	9.50	3.16	15.50	0.85	21.50	0.53
3.58	0.75	9.58	3.02	15.58	0.84	21.58	0.53
3.67	0.76	9.67	2.89	15.67	0.83	21.67	0.53
3.75	0.77	9.75	2.77	15.75	0.83	21.75	0.52
3.83	0.78	9.83	2.67	15.83	0.82	21.83	0.52
3.92	0.79	9.92	2.57	15.92	0.81	21.92	0.52
4.00	0.81	10.00	2.48	16.00	0.81	22.00	0.52
4.08	0.82	10.08	2.40	16.08	0.80	22.08	0.51
4.17	0.84	10.17	2.32	16.17	0.79	22.17	0.51
4.25	0.85	10.25	2.25	16.25	0.79	22.25	0.51
4.33	0.87	10.33	2.18	16.33	0.78	22.33	0.51
4.42	0.88	10.42	2.12	16.42	0.77	22.42	0.51
4.50	0.90	10.50	2.06	16.50	0.77	22.50	0.50
4.58	0.92	10.58	2.01	16.58	0.76	22.58	0.50
4.67	0.94	10.67	1.95	16.67	0.76	22.67	0.50
4.75	0.95	10.75	1.91	16.75	0.75	22.75	0.50
4.83	0.97	10.83	1.86	16.83	0.74	22.83	0.49
4.92	1.00	10.92	1.82	16.92	0.74	22.92	0.49
5.00	1.02	11.00	1.77	17.00	0.73	23.00	0.49
5.08	1.04	11.08	1.74	17.08	0.73	23.08	0.49
5.17	1.07	11.17	1.70	17.17	0.72	23.17	0.49
5.25	1.09	11.25	1.66	17.25	0.72	23.25	0.48
5.33	1.12	11.33	1.63	17.33	0.71	23.33	0.48
5.42	1.15	11.42	1.60	17.42	0.71	23.42	0.48
5.50	1.18	11.50	1.57	17.50	0.70	23.50	0.48
5.58	1.21	11.58	1.54	17.58	0.70	23.58	0.48

5.67	1.25	11.67	1.51	17.67	0.69	23.67	0.47
5.75	1.29	11.75	1.48	17.75	0.69	23.75	0.47
5.83	1.33	11.83	1.45	17.83	0.68	23.83	0.47
5.92	1.37	11.92	1.43	17.92	0.68	23.92	0.47
6.00	1.41	12.00	1.40	18.00	0.67	24.00	0.47

CALIB STANDHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 1.37 Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.35	0.01	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	95.50	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		104.51	24.78	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.44 (ii)	3.55 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.30	0.26	
				TOTALS
PEAK FLOW	(cms)=	0.36	0.00	0.358 (iii)
TIME TO PEAK	(hrs)=	8.00	8.00	8.00
RUNOFF VOLUME	(mm)=	49.23	18.81	48.92
TOTAL RAINFALL	(mm)=	50.23	50.23	50.23
RUNOFF COEFFICIENT	=	0.98	0.37	0.97

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0007) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0830	0.0491
0.0810	0.0010	0.0000	0.0000

	AREA	QPEAK	TPEAK	R.V.

```
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      1.368      0.358      8.00      48.92
   OUTFLOW: ID= 1 (  0007)      1.368      0.082      8.17      48.92

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.78
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0134

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.77        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     104.51        24.78
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.24 (ii)    2.34 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.30
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.040 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00           8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81          48.92
     TOTAL RAINFALL   (mm)=      50.23        50.23          50.23
     RUNOFF COEFFICIENT   =       0.98         0.37           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):     0.14   0.040     8.00    48.92
      + ID2= 2 (  0007):     1.37   0.082     8.17    48.92
        ================================================
```

```
        ID = 3 (  0008):     1.51   0.122     8.00    48.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   0.06
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.06         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      19.66        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     104.51        24.78
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       0.95 (ii)    2.05 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.31
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.017 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00           8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81          46.26
     TOTAL RAINFALL   (mm)=      50.23        50.23          50.23
     RUNOFF COEFFICIENT   =       0.98         0.37           0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.57
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.57         0.01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      61.75        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     104.51        24.78
```

```
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.88 (ii)    2.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.28
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.00          0.157 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00           8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81          48.92
     TOTAL RAINFALL   (mm)=      50.23        50.23          50.23
     RUNOFF COEFFICIENT   =       0.98         0.37           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0390      0.0200
                          0.0370     0.0010   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0020)      0.572      0.157      8.00       48.92
   OUTFLOW: ID= 1 (  0016)      0.572      0.037      8.17       48.92

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.93
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0057

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

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0016):     0.57   0.037     8.17    48.92
      + ID2= 2 (  0019):     0.06   0.017     8.00    46.26
        ================================================
        ID = 3 (  0014):     0.63   0.054     8.00    48.67

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

FINISH
==========
==========

APPENDIX C
Wastewater Servicing

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105・Oakville・ON・L6H 0H2 | 905.829.8818
urbantech.com

URBANTECH

WASTEWATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H
Last Revised: 12-May-22

Phase 1

Proposed Conditions

Total Site Area = 1.51 ha

Residential

A	B	E	Total # of Units	PPU	
136	142	102	380	3	> 750 m2
355	340	265	960	1.6	< 750 m2

Population = 2676 persons

Harmon Peak Factor for Site, Me = $(1+14/(4+P^{0.5})$ = 3.48
Unit Sewage Flow = 303 L/person/day
Domestic Sewage Flow = 32.68 L/s

Non-Residential

Population Density = 50 p/ha
Building A Area = 0.12 ha
Building B Area = 0.23 ha
Building E Area = 0.66 ha
Population = 51 persons
Unit Sewage Flow = 303 L/person/day
Domestic Sewage Flow = 0.18 L/s

Site Area = 1.51 ha
Infiltration Allowance = 0.20 L/s/ha
Total Infiltration = 0.30 L/s

Total wastewater flow = 33.16 L/s

URBANTECH

WASTEWATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H
Last Revised: 12-May-22

Phase 2

Proposed Conditions

Total Site Area =	0.63	ha	

Residential

C	D	Total # of Units	PPU	
128	124	252	3	> 750 m2
316	316	632	1.6	< 750 m2

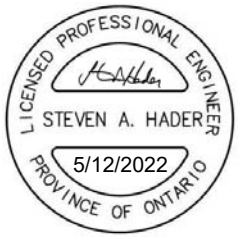
Population =	1768	persons
Harmon Peak Factor for Site, Me =	$(1+14/(4+P^{0.5})$	
	3.63	
Unit Sewage Flow =	303	L/person/day
Domestic Sewage Flow =	22.47	L/s

Non-Residential

Population Density =	50	p/ha
Building C Area =	0.98	ha
Building D Area =	0.13	ha
Population =	56	persons
Unit Sewage Flow =	303	L/person/day
Domestic Sewage Flow =	0.20	L/s

Site Area =	0.63	ha
Infiltration Allowance =	0.20	L/s/ha
Total Infiltration =	0.13	L/s

Total wastewater flow =	22.79	L/s



Connection Single Use Demand Table

WATER CONNECTION

Connection point [3]							
Hillcrest Avenue							
Pressure zone of connection point			Zone 2				
Total equivalent population to be serviced [1]			2727 - phase 1	1824 - phase 2			
Total lands to be serviced			1.51 ha	0.63 ha			
Hydrant flow test							
	Hydrant flow test location		HIllcrest Avenue		Hurontario Street north of Hillcrest and Hurontario Intersection		
		Pressure (kPa)	Flow (in l/s)	Time	Pressure (kPa)	Flow (in l/s)	Time
	Minimum water pressure	317	143.59	12:00	345	149.71	12:30
	Maximum water pressure	406	81.32	12:00	441	84.67	12:30

No.	Water demands	Phase 1		Phase 2	
	Demand type	**Demand**	**Units**	**Demand**	**Units**
1	Average day flow	8.9	l/s	5.7	l/s
2	Maximum day flow	17.6	l/s	11.7	l/s
3	Peak hour flow	26.5	l/s	17.8	l/s
4	Fire flow [2]	116.7	l/s	100.0	l/s
Analysis					
5	Maximum day plus fire flow	134.3	l/s	111.7	l/s

WASTEWATER CONNECTION

Connection point [4]		Hillcrest Avenue	
Total equivalent population to be serviced [1]		2727	1824
Total lands to be serviced		1.51 ha	0.63 ha
6	Wastewater sewer effluent (in l/s)	33.16 L/s	22.79 L/s

[1] The calculations should be based on the development estimated population (employment or residential).

[2] Please reference the Fire Underwriters Survey Document

[3] Please specify the connection point ID

[4] Please specify the connection point (wastewater line or manhole ID)
Also, the "total equivalent popopulation to be serviced" and the "total lands to be serviced" should reference the connection point. (The FSR should contain one copy of Site Servicing Plan)

Please include the graphs associated with the hydrant flow test information table
Please provide Professional Engineer's signature and stamp on the demand table
All required calculations must be submitted with the demand table submission.

APPENDIX D
Water Servicing

Urbantech® Consulting, A Division of Leighton-Zec West Ltd. | 2030 Bristol Circle, Suite 105 • Oakville • ON • L6H 0H2 | 905.829.8818
urbantech.com

Hydrant Flow Test Report

SITE NAME:

SITE ADDRESS / MUNICIPALITY: **25 - 30 Hillcrest Ave , Mississauga, ON**

TEST HYDRANT LOCATION : 2nd Hydrant Southwest of Hurontarin Street on Hillcrest Ave

BASE HYDRANT LOCATION: 1st Hydrant Southwest of Hurontarin Street on Hillcrest Ave

TEST BY: Luzia Wood

TEST DATE: September 02 2021

TEST TIME: 12:00PM

TEST DATA

FLOW HYDRANT — Pipe Diam. (in / mm): 12mm D.T

	PITOT 1	PITOT 2
SIZE OPENING (inches):	2.5	2.5
COEFFICIENT (**note 1**):	0.90	0.90
PITOT READING (psi):	59	46 / 46
FLOW (usgpm):	**1289**	**2276**

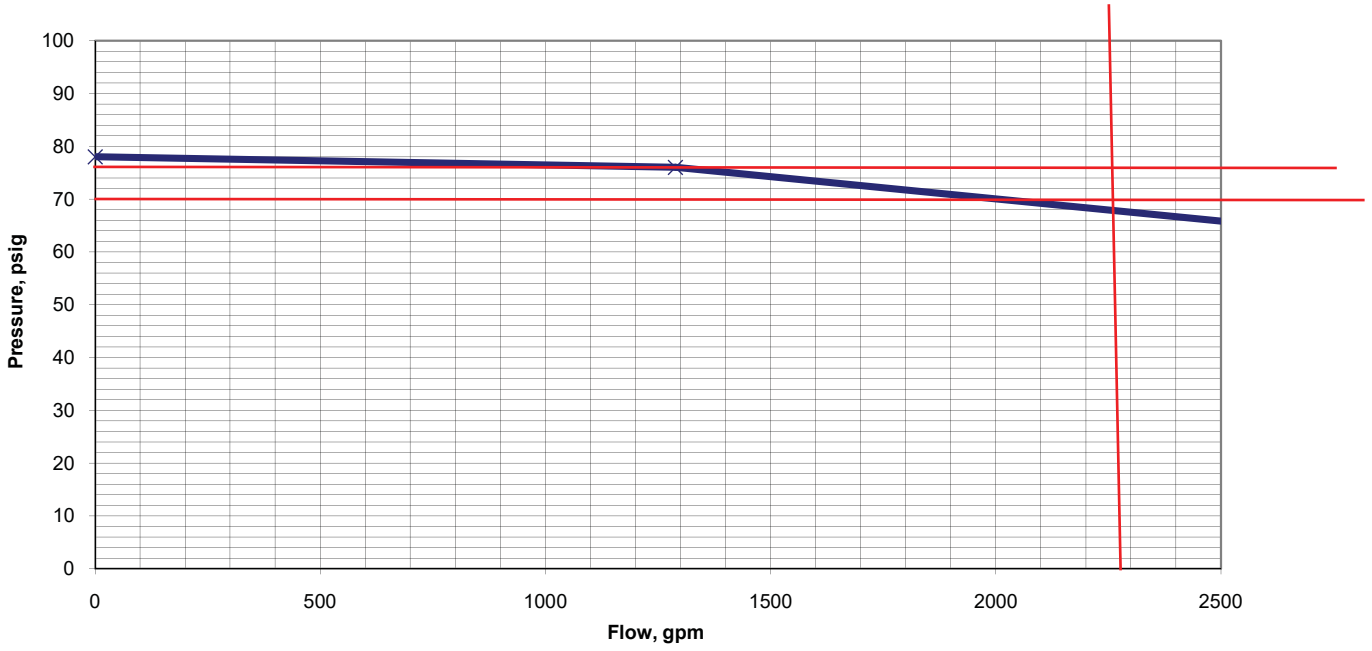
THEORETICAL FLOW @ 20 PSI 7941

BASE HYDRANT — Pipe Diam. (in / mm): 12mm D.T

STATIC READING (psi): 78 RESIDUAL 1 (psi): 76 RESIDUAL 2 (psi): 70

REMARKS:

NOTE 1: Conversion factor of .90 used for flow calculation based on rounded and flush internal nozzle configuration. No appreciable difference in pipe invert between flow and base hydrants.



J & D Waterworks Inc
491 Port Maitland Rd
Dunnville, ON N1A 2W6

Hydrant Flow Test Report

SITE NAME:

SITE ADDRESS / MUNICIPALITY: **3154 & 3168 Hurontario Street , Mississauga**

TEST HYDRANT LOCATION : 1st Hydrant Northwest of Kirwin Ave on Hurontarin Street

BASE HYDRANT LOCATION: 1st Hydrant Northeast of Kirwin Ave on Hurontarin Street

TEST BY: Luzia Wood

TEST DATE: September 02 2021

TEST TIME: 12:30PM

TEST DATA

FLOW HYDRANT — Pipe Diam. (in / mm): 500

	PITOT 1	PITOT 2
SIZE OPENING (inches):	2.5	2.5
COEFFICIENT (**note 1**):	0.90	0.90
PITOT READING (psi):	64	50 / 50
FLOW (usgpm):	**1342**	**2373**

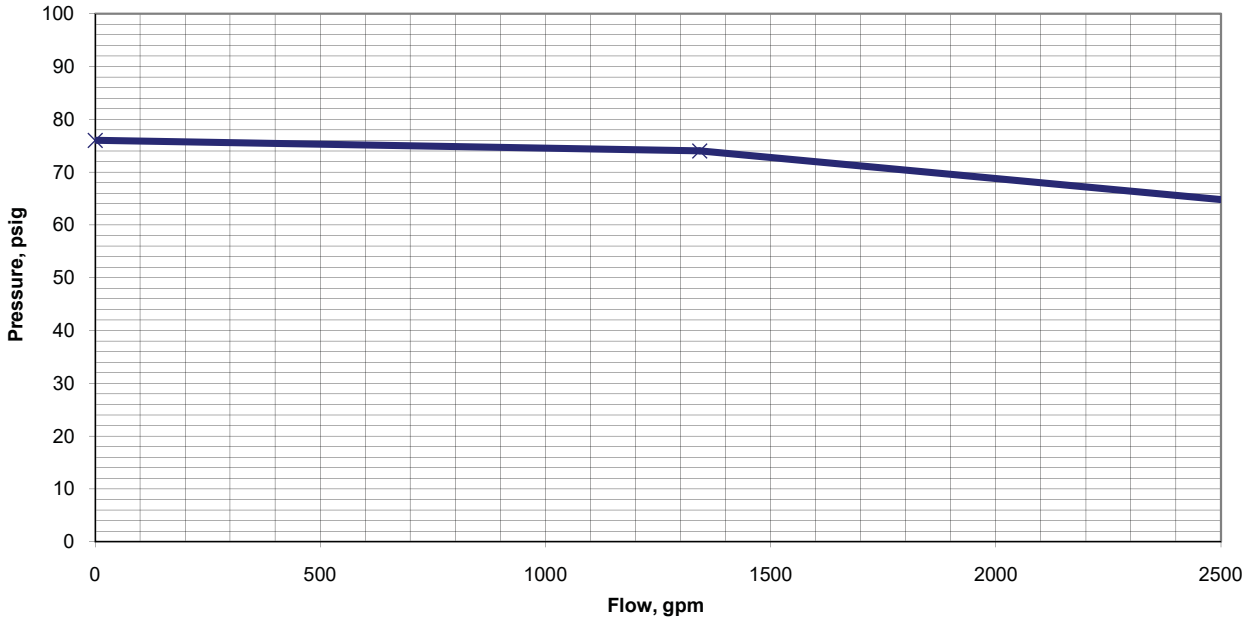
THEORETICAL FLOW @ 20 PSI 8116

BASE HYDRANT — Pipe Diam. (in / mm): 500

STATIC READING (psi): 76 RESIDUAL 1 (psi): 74 RESIDUAL 2 (psi): 70

REMARKS:

NOTE 1: Conversion factor of .90 used for flow calculation based on rounded and flush internal nozzle configuration. No appreciable difference in pipe invert between flow and base hydrants.



491 Port Maitland Rd
Dunnville, ON N1A 2W6

WATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H.
Last Revised: 12-May-22

Phase 1

Fire Flow Calculations

Based on the *Water Supply for Public Fire Protection, 1999* by Fire Underwriters Survey

1 Estimate of Fire Flow

F = 220 C (A)1/2

F = Fire Flow (L/min)
C = Construction Type Coefficient
= 0.6 ,for fire-resistive construction (fully protected frame, floors, roof)

A = Total flow area (m^2)
= If vertical openings and exterior vertical communications are properly protected (one hour rating), Largest Floor + 25% of two immediately adjoining floors

Building E

Floor	Area (m^2)	%
Ground	2,624	25%
Floor 1	3,450	100%
Floor 2	1,282	25%

= 4427 m^2

F = 8782 L/min
= 9000 L/min, rounded to the nearest 1000 L/min

URBANTECH®

WATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H.
Last Revised: 12-May-22

2 Occupancy Reduction

15% for low hazard occupancies (apartments)

F = 7650 L/min

3 Sprinkler Reduction

30% for adequately designed sprinkler protection conforming to NFPA 13 and other NFPA sprinkler standards

F = 5355 L/min

4 Separation Charge

Direction	Separation (m)	Charge
North	14.9	15%
West		
South		
East		

Total Charge = 15%

F = 1148 L/min

Required Fire Flow

F = 6503 L/min

= 7000 L/min, rounded to the nearest 1000 L/min

Fire Flow Demand =	116.7	L/s
=	1849	USGPM

URBANTECH®

WATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H.
Last Revised: 12-May-22

Domestic Flow Calculations

Residential Population =	2676	persons,	from Sanitary Calculations
Average Day Demand =	280	L/person/day,	from Region of Peel design criteria
=	8.7	L/s	
Non-Residential Population =	51	persons,	from Sanitary Calculations
Average Day Demand =	300	L/person/day,	from Region of Peel design criteria
=	0.2	L/s	

Use Peaking Factor the Greater of

Max Daily Demand PF Commercial =	1.4	,	from Region of Peel design criteria
Max Daily Demand PF Residential =	2	,	from Region of Peel design criteria
Max Daily Demand =	17.6	L/s	

or

Max Peak Hour PF =	3	,	from Region of Peel design criteria
Max Peak Hour Demand =	26.5	L/s	

Domestic Flow Demand =	26.5	L/s
=	421	USGPM

URBANTECH®

WATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H.
Last Revised: 12-May-22

Phase 2

Fire Flow Calculations

Based on the *Water Supply for Public Fire Protection, 1999* by Fire Underwriters Survey

1 Estimate of Fire Flow

F = 220 C (A)1/2

F = Fire Flow (L/min)
C = Construction Type Coefficient
= 0.6 ,for fire-resistive construction (fully protected frame, floors, roof)

A = Total flow area (m^2)
= If vertical openings and exterior vertical communications are properly protected (one hour rating), Largest Floor + 25% of two immediately adjoining floors

Building C

Floor	Area (m^2)	%
Ground	2,242	100%
Floor 1	2,049	25%
Floor 2	2,022	25%

= 3260 m^2

F = 7536 L/min
= 8000 L/min, rounded to the nearest 1000 L/min

URBANTECH®

WATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H.
Last Revised: 12-May-22

2 Occupancy Reduction

15% for low hazard occupancies (apartments)

F = 6800 L/min

3 Sprinkler Reduction

30% for adequately designed sprinkler protection conforming to NFPA 13 and other NFPA sprinkler standards

F = 4760 L/min

4 Separation Charge

Direction	Separation (m)	Charge
North		
West	21.0	10%
South	15.0	15%
East		

Total Charge = 25%

F = 1700 L/min

Required Fire Flow

F = 6460 L/min

= 6000 L/min, rounded to the nearest 1000 L/min

Fire Flow Demand =	100.0 L/s
=	1585 USGPM

WATER DEMAND CALCULATIONS

Project Name: 33 Hillcrest
Municipality: City of Mississauga
Project No.: 20-252

Prepared by: J.P.O
Checked by: S.H.
Last Revised: 12-May-22

Domestic Flow Calculations

Residential Population =	1768	persons,	from Sanitary Calculations
Average Day Demand =	280	L/person/day,	from Region of Peel design criteria
=	5.7	L/s	
Non-Residential Population =	56	persons,	from Sanitary Calculations
Average Day Demand =	300	L/person/day,	from Region of Peel design criteria
=	0.2	L/s	

Use Peaking Factor the Greater of

Max Daily Demand PF Commercial =	1.4	,	from Region of Peel design criteria
Max Daily Demand PF Residential =	2	,	from Region of Peel design criteria
Max Daily Demand =	11.7	L/s	

or

Max Peak Hour PF =	3	,	from Region of Peel design criteria
Max Peak Hour Demand =	17.8	L/s	

Domestic Flow Demand =	17.8	L/s
=	282	USGPM