FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

353 TOWNLINE ROAD

TOWN OF NIAGARA-ON-THE-LAKE
REGION OF NIAGARA

PREPARED FOR:

KANEFF GROUP

PREPARED BY:

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2800 HIGH POINT DRIVE, SUITE 100
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CROZIER
CONSULTING ENGINEERS

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Kaneff Group to prepare a Functional Servicing and Stormwater Management Report. This report will support the Draft Plan of Subdivision required to permit the industrial development at 353 Townline Road in the Town of Niagara-on-the-Lake, Region of Niagara (proposed development/site).

This report will demonstrate how the proposed development servicing and stormwater management will integrate with the area's existing water, sanitary, and stormwater infrastructure.

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

- Niagara-on-the-Lake – Municipal Engineering Standards (November 2020)
- Niagara Region Stormwater Management Guidelines (December 2022)
- Niagara Region – Glendale Secondary Plan Update (December 2022)
- Niagara Peninsula Conservation Authority - Stormwater Management Guidelines
- Ministry of the Environment - Stormwater Management Planning and Design Manual (March 2003)
- Fire Underwriters Survey - Water Supply for Public Fire Protection (2020)

Additional background and supporting information used to inform this functional servicing and stormwater management report also includes:

- Draft Plan of Subdivision, Part of Lot 180 and 181 (Geographic Township of Niagara) now in the Town of Niagara on the Lake, Regional Municipality of Niagara, by Kaneff, dated December 5, 2023.
- Scoped Environmental Impact Study, by Colville Consulting Inc, dated December 2023.
- Slope Stability Assessment, by Soil Engineers Ltd, dated December 13, 2023.
- Preliminary Slope Stability Assessment, by Bendigo Consulting Inc, dated February 12, 2021.
- Geotechnical Investigation Report, by Bendigo Consulting Inc, dated December 22, 2020.

2.0 Site Description

The existing site is approximately 11.34 ha of vacant greenfield. The property is located in a mixed-use industrial and residential neighbourhood and is bounded by residential properties to the north, a Niagara Peninsula Conservation Authority (NPCA) regulated watercourse to the east, industrial properties to the south, and Townline Road to the west. The site also contains a smaller watercourse which receives stormwater flows from the development immediately to the south and conveys runoff northward through the adjacent residential.

The elements envisioned for this development per the Draft Plan include:

- 4 Industrial Blocks (Blocks 1, 2, 3, 4)
- 20.0m ROW – Northwood Court including cul-de-sac bulb.
- A stormwater management (SWM) pond (Block 5)
- Additional blocks to delineate Natural Heritage Systems (NHS), associated buffers, and reserves (Blocks 6-9)

The Site is located within the Glendale District Plan area. Therefore, the Niagara Region – Glendale Secondary Plan Update (December 2022) design criteria was used to determine the equivalent population estimate for the proposed development. Table 1 summarizes the proposed development population.

Table 1: Equivalent Population Estimate

Blocks	Area (ha)	Pop. Density (persons and jobs/ha)	Population
Block 1	1.51	100	164
Block 2	2.19	100	242
Block 3	2.51	100	251
Block 4	1.52	100	166
Blocks 5-9 + ROW	3.61	0	0
Total	**11.34**	**-**	**773**

The proposed site is estimated to generate a population of approximately 773 persons/jobs. This population estimate will be utilized for the calculation of water and sanitary demand generated by the individual blocks and overall development.

3.0 Water Servicing

3.1 Existing Water Servicing

A review of the available Niagara-on-the-Lake record drawings indicates that:

- There is an existing 300 mm diameter PVC DR18 watermain on the east boulevard of Townline Road.
- An existing hydrant on the east boulevard of Townline Road.
- There is an existing 200 mm diameter PVC DR 18 on Westwood Court

Refer to Appendix A for applicable record drawings.

3.2 Design Water Demand

The estimated water demand for the proposed development was calculated using an average daily water demand of 270 L/employee/day, a maximum day factor of 2.0, and a peak hour factor of 3.0 per the Niagara Region – Glendale Secondary Plan Update (December 2022) design criteria.

Table 2 summarizes the estimated domestic water demand and Appendix A contains detailed water demand calculations.

Table 2: Estimated Domestic Water Demand

Blocks	Average Daily Demand (L/d)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Block 1	40,770	0.9	1.4
Block 2	59,130	1.4	2.1
Block 3	67,770	1.6	2.4
Block 4	41,040	1.0	1.4
Total	**208,710**	**4.8**	**7.2**

Using Niagara Region design criteria for water demand, the peak hour domestic demand for the entire site is 7.2 L/s.

3.3 Fire Flow Demand

Based on the Niagara Region – Glendale Secondary Plan Update (December 2022) design criteria, the fire line for proposed development is required to accommodate a minimum fire flow of 250 L/s. Please note that the Mechanical Engineer will prepare the detailed fire protection calculations for the proposed building concepts.

3.4 Proposed Water Servicing

Block 1 of the development is proposed to be serviced by direct service connection to the existing 300 mm diameter watermain within Townline Road. Blocks 2-4 will be serviced by a new 200mm diameter PVC watermain constructed in the proposed Northwood Court ROW. It will connect to the existing 200mm diameter watermain in Westwood Court to the south.

The Servicing Plan (C103) illustrates the location of the existing and proposed water services and connections.

4.0 Sanitary Servicing

4.1 Existing Sanitary Servicing

A review of the available Niagara-on-the-Lake record drawings indicates that:

- There is an existing 525 mm diameter PVC sanitary sewer within Townline Road.
- There is an existing 250 mm diameter PVC sanitary sewer within Westwood Court.

Refer to Appendix A for applicable record drawings.

4.2 Design Sanitary Flow

The sanitary flow for the proposed development was calculated with reference to the Niagara Region – Glendale Secondary Plan Update (December 2022) design criteria and the equivalent population estimate described in Section 4.3. Region of Peel design criteria unit sewage flow of 270 L/person/day was used to determine the average daily flow. Infiltration flow into the sanitary sewer and a peaking factor were applied to the unit sewage flow to obtain the total estimated design sewage flow.

A summary of the results is presented in Table 3 and detailed calculations are provided in Appendix B.

Table 3: Estimated Sanitary Design Flows

Blocks	**Average Daily Flows** (L/d)	**Peak Flow** (L/s)	**Infiltration** (L/s)	**Total Sanitary Flow** (L/s)
Block 1	41,525	1.9	0.43	2.3
Block 2	60,225	2.7	0.63	3.3
Block 3	69,025	3.1	0.72	3.8
Block 4	41,800	1.9	0.43	2.3
ROW	0	0.0	0.17	0.2
Total	**212575**	**9.5**	**2.2**	**11.9**

Using Niagara Region design criteria for sanitary demand, the peak sanitary flow for the entire site is 11.9 L/s.

4.3 Proposed Sanitary Servicing

Sanitary servicing for Block 1 will be provided by a 200 mm diameter sanitary service connecting to the existing 525 mm diameter sanitary sewer on Townline Road. Sanitary servicing for Blocks 2-4 will be provided by a 200 mm diameter sanitary sewer constructed in proposed Northwood Court ROW. It will connect to the existing 250 mm diameter sanitary sewer on Westwood Court to the south.

The Servicing Plan (C103) illustrates the location of the existing and proposed sanitary services.

5.0 Grading and Drainage Conditions

The drainage patterns for pre-development and post-development conditions are outlined in the following sections.

5.1 Existing Drainage Conditions

There are two outlets to the site, identified as:

1. Unnamed Tributary – located in the central/western portion of the site which conveys stormwater runoff from the property immediately to the south. Traverses from south to north crossing Queenston Road via 600 mm x 600 mm box culvert and eventually discharging into Six Mile Creek.

2. Six Mile Creek – located along the eastern limit of the site, travelling from south to north and crossing Queenston Road via 3600 mm x 2400 mm box culvert.

The site is split between two catchments that convey runoff to each of these outlets. The majority of the existing Site sheet flows northwest to the Unnamed Tributary. A smaller portion of the Site sheet flows easterly to the Six Mile Creek watercourse. These two catchments are identified as Catchment 101 and 102. Refer to Table 4 below and Figure 1 for Pre-development drainage catchment plan.

Table 4: Pre-development Drainage Summary

Catchment ID	**Area** (ha)	Outlet	Description
101 – Unnamed Tributary	7.56	Unnamed Tributary	Grassy meadow, vacant
102 – Six Mile Creek	1.67	Six Mile Creek	Grassy meadow, vacant
Total	**9.23**	-	-

It is noted that the NHS buffer line along Six Mile Creek watercourse is used as the catchment limit of area 102. This is because in post-development, no area east of this buffer limit is intended to be developed and will remain 'as-is', which is why the Total catchment area of 9.23 ha is less than the total Site area of 11.34 ha.

5.2 Proposed Drainage Conditions

The proposed drainage conditions for the site generally follow the strategy identified in Figure 4-1 in the Glendale Industrial Area Stormwater Management Master Plan (Town of Niagara-on-the-Lake, 2011). Based on Figure 4-1 (refer to Appendix C), a proposed Stormwater Management Pond shall provide quantity control for the majority subject site.

Mimicking the existing drainage conditions, two outlets are proposed: the Six Mile Creek and the Unnamed Tributary. Block 1 will outlet independently to the unnamed tributary. Blocks 2-4 and the proposed ROW will outlet to the Six Mile Creek via SWM Pond. Storm sewers In the ROW are designed to convey the minor 5-year storm event based on Niagara-on-the-Lake engineering standards. The ROW itself is designed to convey major runoff from events up to the 100-year to the SWM Pond.

All proposed buildings will implement rooftop storage to minimize the public SWM pond and storm sewer sizing requirements. There is also a portion of perimeter at-grade areas which will effectively be landscaped (ie: primarily pervious area) that cannot be captured, and will therefore drain uncontrolled to their respective outlets based on the predevelopment condition.

Table 5 summarizes the post-development drainage catchments.

Table 5: Post-development Drainage Summary

Catchment ID	Area (ha)	Outlet	Description
201	1.25	Unnamed Tributary	Block 1: building with rooftop controls and captured at-grade area. Direct outlet to unnamed tributary.
UC01	0.78		Watercourse and perimeter portions of Block 1 and 2, uncaptured and uncontrolled. Direct overland flow to unnamed tributary.
202	2.75	Six Mile Creek	Block 2 and Block 3A: buildings with rooftop controls and captured at-grade areas. Including portion of Northwood Court ROW. All draining to SWM Pond.
203	3.27		Block 3B and Block 4: buildings with rooftop controls and captured at-grade areas. Including portion of Northwood Court ROW. All draining to SWM Pond.
204	0.68		Public SWM Pond Block. Outlet to Six Mile Creek.
UC02	0.50		Perimeter portions of Block 2 and 4, uncaptured and uncontrolled. Direct overland flow to Six Mile Creek.
Total	**9.23**		

Refer to the Site Servicing Plan (C102), Site Grading Plan (C103) and the Post-development Drainage Plan (Figure 2).

It is also noted that through coordination and discussion with the Town and NPCA, the proposed SWM pond will not provide quantity control for the external/off-site drainage areas (3.90 ha and 10.7 ha) which was originally identified in Figure 4-1. The external drainage area has already been designed, developed, and implemented with stormwater management strategies since the 2011 Glendale Industrial Area Stormwater Management Master Plan was published.

6.0 Stormwater Management

The stormwater management strategy for the site shall adhere to the design guidelines for the Town of Niagara-on-the-Lake, the NPCA, and the Ministry of the Environment, Conservation and Parks. Stormwater management design criteria for the proposed development are established in accordance with the following documents:

- Municipal Engineering Standard, Niagara-on-the-Lake (January 2018)
- Stormwater Management Guidelines, Niagara Peninsula Conservation Authority (Jan 2020)
- Stormwater Management Planning and Design Manual, MOE (Mar 2003)
- Glendale Industrial Area Stormwater Management Master Plan, Town of Niagara-on-the-Lake (June 2021)
- Pre-consultation meeting Comment per Pre-consultation meeting (January 6, 2022)
- Engineering Review Meeting with the Town, Region, and NPCA (June 21, 2023)
- Engineering Review Meeting with the NPCA (August 9, 2023)
- Slope Stability Assessment completed by Soil Engineers Ltd. (December 2023)

The stormwater management design criteria for the site are summarized below:

- Stormwater Conveyance System: Stormwater conveyance within the site must be designed to meet the Town standards. According to the Town criteria, the storm sewer (minor) system must be designed to provide conveyance of runoff from the 10-year design storm for systems.
- Stormwater Quantity Control: Post-development peak flows to be attenuated to the pre-development levels for 2-year up to and including the 100-year design storm event, per Region requirement identified in the pre-consultation meeting.
- Stormwater Quality Control: "Normal" protection level (Stormwater Management Planning and Design Manual, Ministry of the Environment dated March 2003) for the developed portion of the site (70% total suspended solids removals), per Region requirement identified in the pre-consultation meeting.
- Erosion Control: Capture and release stormwater runoff from 25mm design storm event over a period of 24 hours, per Region requirement identified in the pre-consultation meeting.

A description of the design approach to satisfy these criteria is included in the following sections.

6.1 Quantity Control

Pre and Post-development storm catchments are identified in Figure 1 and Figure 2 at the end of this report. Runoff Coefficients are assigned to each catchment per Niagara-on-the-Lake Municipal Engineering Standards. These are summarized in Table 6.

Table 6: Summary of Storm Catchments

Catchment ID	Description	Total Area (ha)	Runoff Coefficient
Predevelopment			
101	Landscape	7.56	0.25
102	Landscape	1.67	0.25
Total		9.23	0.25
Postdevelopment			
201	Industrial Block	1.25	0.70
202	Industrial Block	2.75	0.70
203	Industrial Block	3.27	0.70
204	SWM Pond	0.68	0.50
UC01	Landscape	0.78	0.25
UC02	Landscape	0.50	0.25
Total		9.23	0.62

A Visual Otthymo (VO) model was developed to quantify the peak flows from the site based on the above catchments. Parameters were assigned to each catchment based on the existing soil type, percent of impervious cover, and grading for the site. Block catchments were also combined based on outlet (for model simplicity) or split based on roof vs. at-grade areas. The following Table 7 summarizes the VO model catchment parameters.

Table 7: Summary of VO Model Parameters

Catchment ID	Description	Total Area (ha)	Pervious Area (ha)	Impervious Area (ha)	CN	TIMP	XIMP	IA (mm)	Tp (hr)
Existing Drainage									
101		7.56	7.56	0.00	71	-	-	8.0	0.43
102		1.67	1.67	0.00	65.8	-	-	9.7	0.53
Proposed Drainage									
201A	At-Grade	0.58	0.12	0.46	80	80	60	5.0	-
201B	Roofs	0.67	0.67	0.00	99	99	99	1.0	-
202/203A	At-Grade	2.77	0.55	2.22	80	80	60	5.0	-
202/203B	Roofs	3.25	3.25	0.00	99	99	99	1.0	-
204	SWM Pond	0.68	0.34	0.34	71	50	50	5.0	-
UC01		0.78	0.78	0.00	70.7	-	-	8.1	0.31
UC02		0.50	0.50	0.00	65	-	-	10.0	0.24

Notes: Roof areas are preliminary estimates at 55% of total block area.
Block at-grade areas %IMP of 80% is more conservative than C=0.70 per Table 6.

The VO model was run using 3-hour Chicago design storms based on the Niagara-on-the-Lake IDF equations to calculate the pre-development and post-development (without quantity controls) peak flows of the site. A schematic of the pre-development and post-development VO model can be found in Appendix C.

Table 8 and Table 9 summarize the flow results when no quantity controls are implemented.

Table 8: Unnamed Tributary Flow Summary

Return Period	Predevelopment (Allowable) Rate (m^3/s)	Post-Development Uncontrolled (m^3/s)
2-year	0.0749	0.1990
5-year	0.1133	0.2497
10-year	0.1462	0.2841
25-year	0.2004	0.3351
50-year	0.2461	0.3755
100-year	0.2983	0.4172

Table 9: Six Mile Creek Flow Summary

Return Period	Predevelopment (Allowable) Rate (m^3/s)	Post-Development Uncontrolled (m^3/s)
2-year	0.0104	1.0302
5-year	0.0162	1.2890
10-year	0.0213	1.4645
25-year	0.0299	1.7232
50-year	0.0372	1.9275
100-year	0.0456	2.1375

As can be seen by the results of both outlets, the uncontrolled post-development rates exceed the predevelopment (allowable) rates in all scenarios for both outlets. Therefore, quantity controls will be required for both outlets to reduce the post-development rates to the predevelopment allowable.

Stormwater quantity controls will be implemented in the form of:

i) Rooftop storage and rooftop controls in each private Block, and
ii) A public stormwater management (SWM) pond facility.

In Block 1, rooftop storage/control alone will provide the required attenuation and storage to meet predevelopment (allowable) release rates. In Blocks 2-4, rooftop storage/controls will minimize the peak runoff rate discharging from each Block, thereby minimizing both the size of public storm sewers in Northwood Court and the area and volume of the SWM Pond facility.

The SWM Pond is proposed to provide quantity control, quality control, and erosion mitigations for the catchments 202, 203, and 204 (Blocks 2-5)and will outlet to Six Mile Creek. It will be sized with controls to meet the predevelopment (allowable) release rate to the Six Mile Creek.

Table 10 summarizes the preliminary rooftop controls provided for each Block. Detailed calculations are provided in Appendix C.

Table 10: Rooftop Controls Summary

Block ID	Building ID	Roof Area (ha)	Provided Roof Storage Volume (ha-m)	Max Discharge Rate (m^3/s)
Block 1	1	0.67	0.070	0.004
Block 2	2	0.97	0.102	0.008
Block 3	3A	0.62	0.065	0.004
Block 3	3B	0.62	0.065	0.004
Block 4	4	1.04	0.110	0.008

Notes: Roof areas are preliminary estimates at 55% of total block area.
Roof volumes are based on a maximum ponding depth of 0.15m and 70% roof area usage.

Table 11 summarizes the SWM Pond storage provided and associated discharge rate. A total volume of 3937 m^3 is provided before the emergency spillway elevation is reached.

Table 11: SWM Pond Stage-Storage Discharge Summary

Elevation	Datum	Provided Storage (ha-m)	Discharge Rate (m^3/s)
115.00	Permanent Pool	0.0000	0.0000
115.30		0.0452	0.0009
115.50	Extended Detention	0.0810	0.0050
115.75		0.1322	0.0180
116.00	100-yr HWL	0.1908	0.0420
116.25		0.2567	0.0470
116.70	Emergency Spillway	0.3937	0.0560

Table 12 ands Table 13 summarize the post-development flows and storage requirements for each outlet based on the VO model results. Refer to Appendix C for full model output and details.

Table 12: Unnamed Tributary Post-Development Controlled Flows and Storage Summary

Return Period	Target (Allowable) Rate (m^3/s)	Post-Development (Controlled) Peak Discharge Rate (m^3/s)	Roof Storage Required (ha-m)	Roof Storage Provided (ha-m)
2-yr	0.0749	0.0733	0.022	0.070
5-yr	0.1133	0.0983	0.026	0.070
10-yr	0.1462	0.1137	0.029	0.070
25-yr	0.2004	0.1370	0.034	0.070
50-yr	0.2461	0.1557	0.037	0.070
100-yr	0.2983	0.1754	0.041	0.070

Table 13: Six Mile Creek Post-Development Controlled Flows and Storage Summary

Return Period	Target (Allowable) Rate (m^3/s)	Post-Development (Controlled) Peak Discharge Rate (m^3/s)	Roof Storage Required (ha-m)	Roof Storage Provided (ha-m)	SWM Pond Storage Required (ha-m)	SWM Pond Storage Provided (ha-m)
2-yr	0.0104	0.0077	0.1044	0.3410	0.0935	0.3937
5-yr	0.0162	0.0129	0.1244	0.3410	0.1120	0.3937
10-yr	0.0213	0.0170	0.1398	0.3410	0.1264	0.3937
25-yr	0.0299	0.0240	0.1626	0.3410	0.1473	0.3937
50-yr	0.0372	0.0308	0.1796	0.3410	0.1624	0.3937
100-yr	0.0456	0.0381	0.1980	0.3410	0.1786	0.3937

As can be seen from the tables above, by incorporating rooftop storage and controls within each Block, and providing a minimum of 1786m^3 of storage within the SWM Pond, peak flows from the proposed development can be attenuated to predevelopment rates.

The SWM Pond outlet structure will be provided and designed in the detailed design stage. Refer to preliminary pond drawings C104 and C105. The outlet structure will typically consist of a submerged reverse-flow pipe for extended detention control and an elevated larger pipe for outlet of storm events up to the 100-year. The emergency inlet and outlet spillways are designed for 100-year peak flows for emergency conditions such as storms beyond 100-year storm events, sewer blockage, or outlet failures.

6.2 Stormwater Quality Control

The stormwater quality controls are required to provide "normal level protection", (i.e. 70% total suspended solids removal) for the site.

For drainage areas outletting to the Six Mile Creek (catchment 202, 203, 204), the quality control will be achieved through the permanent pool and forebay component of the proposed SWM pond. Detailed permanent pool sizing calculations are provided in Appendix C. Results are summarized in Table 14.

Table 14: SWM Facility Water Quality Storage Volume

SWM Component	Values
Total Contributing Drainage Area (ha)	7.27
Percent Imperviousness of Drainage Area (%)	85
Required PP Storage Volume[1,2] (m^3/ha)	110
Required PP Storage Volume[2] (m^3)	800
Provided PP Storage Volume[2] (m^3)	**1,338**

Note:
1. Required PP storage volumes interpolated from Table 3.2 of MECP SWM Planning and Design Manual (2003) based on upstream impervious area.
2. PP denotes Permanent Pool.

As demonstrated in Table 14, the provided permanent pool storage volume exceed the required storage volume, meeting the stormwater quality control requirements. Table 15 summarizes the forebay design for the proposed SWM pond to meet the criteria outlined by the MECP.

Table 15: SWM Facility Forebay Sizing Summary - Six Mile Creek

Design Criteria	Target	Provided
Forebay Length (Settling Calculation)	Minimum 7.6 m	25 m
Forebay Length (Dispersion Calculation)	Minimum 11 m	25 m
Forebay Bottom Width	Minimum 1.4 m	11.6 m
Length to Width Ratio	Minimum 2:1	3 : 1
Average Forebay velocity	Maximum 0.50 m/s	0.09

Note: The provided forebay length is measured from the forebay berm to the closest inlet to be conservative.

For Block 1 outletting to the unnamed tributary (catchment 201), incorporation of a treatment-train and oil-grit separator will be provided and further detailed at the detailed design stage.

6.3 Erosion Control

Based on the Region's requirement identified in the pre-consultation meeting, the erosion control criteria is to capture and release stormwater runoff from a 25 mm design storm event over 24 hours.

For the drainage areas outletting to the Six Mile Creek (catchments 202, 203, and 204), the erosion control will be achieved through the extended detention component of the proposed SWM pond. Table 16 summarizes the extended detention requirements of the SWM pond.

Table 16: SWM Facility Erosion Control Storage Volume

SWM Component	Storage Volume
Required ED Storage Volume[1] (m^3/ha)	40
Required ED Storage Volume[1] (m^3)	291
Required ED Storage Volume[2] (m^3)	821
Provided ED Storage Volume (m^3)	821

Notes: 1. Volume based on MECP SWM Planning and Design Manual (2003).
2. Volume calculated based on 25mm runoff from VO model.

Regarding the discharge location of the SWM pond to the Six Mile Creek, the primary outlet has been designed as a spillway at 2% slope to match into the existing watercourse bank. The spillway is intended to distribute/spread out runoff over a width of approximately 5m before matching to the existing watercourse bank. Runoff will then flow over the existing watercourse bank which is at a 3:1 slope – refer to drawing C105. This existing slope has been reviewed by Soil Engineers Ltd in their Slope Stability Assessment and has been deemed acceptable and meets the minimum required Factor of Safety.

Vegetative silt socks are proposed along the spillway and other erosion protection measures can be reviewed at the detailed design stage. Also refer to the Slope Stability Assessment for further discussion of 'Risk Management of the Slope'.

For Block 1 outletting to the unnamed tributary (catchment 201), erosion control can be achieved through the first 5 mm runoff on-site retention or 25 mm extended detention over 24 hours. The on-site retention can be achieved via infiltration, rooftop storage, green roof, water reuse, etc.

Table 17: Erosion Control for Unnamed Tributary Catchment

Catchment 201 Imp Area (ha)	**Required Volume based on 5 mm storm event** (m^3)	**Required Volume on 25 mm storm event** (m^3)
1.25	62.5	312.5

7.0 Erosion and Sediment Control During Construction

Erosion and sediment controls (ESC) will be installed prior to the start of any construction activities and will be maintained until the proposed development is stabilized or as directed by the Site Engineer or the Town of Niagara-on-the-Lake. The Removals, Erosion & Sediment Control Plan (C101) identifies the location of the recommended control features.

Sediment Control Fencing

Sediment control fencing will be installed on the perimeter of the proposed development to intercept sheet flow. Based on field decisions, the Site Engineer and the Owner may add additional sediment control fencing prior to, during, and following construction.

Rock Mud Mat

A rock mud mat will be installed at the entrance to the construction zone in order to prevent mud tracking from the proposed development onto the surrounding lands and perimeter roadway network. All construction traffic will be restricted to this access only.

Sediment Control for Catchbasins

Sediment control silt sacks will be installed in the existing nearby storm sewer catch basins. The silt sacks will provide sediment control to prevent silt and sediment from entering the stormwater system.

8.0 Conclusion and Recommendations

The proposed development consists of four industrial blocks, a stormwater management pond, and a 20m ROW (Northwood Court) with connection to existing Westwood Court. Based on the information provided in this report, the proposed development can be feasibly serviced and meet the stormwater management criteria of the Town of Niagara-on-the-Lake, Niagara Region, and Niagara Peninsula Conservation Authority.

The following is a summary of the proposed functional servicing and stormwater management concepts for the site:

- A new 200mm watermain will be constructed in Northwood Court from the existing 200mm watermain in Westwood Court to service Blocks 2-4. Block 1 will be provided with a direct water service connection to the existing 300mm watermain in Townline Road.

- A new 200mm sanitary sewer will be constructed in Northwood Court and connect to the existing 250mm sanitary sewer in Westwood Court to service Blocks 2-4. Block 1 will be provided with a direct sanitary service connection to the existing 525mm sanitary sewer in Townline Road.

- Storm drainage from the site is split between two watercourse outlets. The post-development condition will mimic the predevelopment drainage pattern and utilize both outlets. Block 1 will discharge directly to the Unnamed Outlet watercourse. Blocks 2-4 will discharge to Northwood Court ROW storm sewers which will outlet to the SWM Pond (Block 5) which will discharge to Six Mile Creek watercourse.

- Stormwater quantity will be achieved through implementation of rooftop controls in each of Blocks 1-4 and a public SWM Pond facility (Block 5). Post-development peak discharge rates will be restricted to pre-development rates based on each outlet.

- Stormwater quality will be achieved for Block 1 through use of train-treatment method and Low Impact Development practices (such as infiltration, swales, oil-grit separator, etc). Runoff from Blocks 2-4 will be treated for quality by the SWM pond prior to discharge to the Six Mile Creek watercourse.

Based on the above conclusions, we recommend the approval of the proposed industrial development Draft Plan for the from the perspective of servicing and stormwater management.

Respectfully submitted,

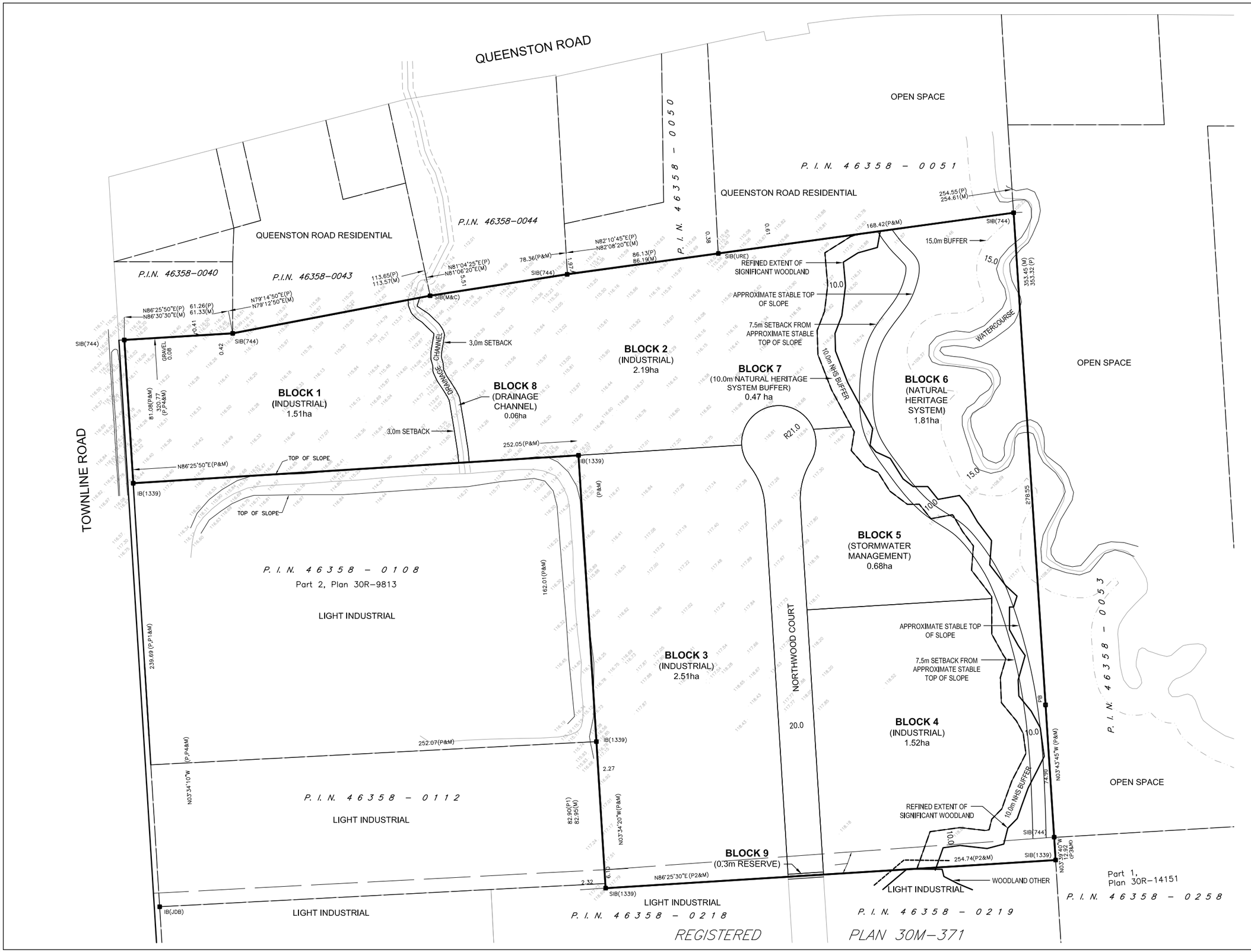
C.F. CROZIER & ASSOCIATES INC.

Rob Babic, P.Eng.
Project Manager

J:\300\369 - Kaneff\6730 - 353 Townline Road\Reports\2023.12.12_(0369-6730) FSR SWM Report.docx

APPENDIX A

Background Information



DRAFT PLAN OF SUBDIVISION

PART OF LOT 180 AND 181,
(GEOGRAPHIC TOWNSHIP OF NIAGARA)
NOW IN THE
TOWN OF NIAGARA ON THE LAKE
REGIONAL MUNICIPALITY OF NIAGARA

KEY MAP:

Subject Lands

OWNER'S AUTHORIZATION

I HEREBY AUTHORIZE KEVIN FREEMAN TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF NIAGARA ON THE LAKE FOR APPROVAL.

SIGNED _____ DATE _____
Kristina Kaneff, Vice President
Kaneff Group

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE CORRECTLY AND ACCURATELY SHOWN.
THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS UNDER THEM

SIGNED _____ DATE _____
Alec S. Mantha, Ontario Land Surveyor
J. D. Barnes Limited

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT

(a), (e), (f), (g), (j), (l) AS SHOWN ON THE DRAFT PLAN
(b), (c) AS SHOWN ON THE DRAFT AND KEY PLAN
(d) LAND TO BE USED IN ACCORDANCE WITH THE SCHEDULE OF LAND USE
(i) SOIL IS SILTY CLAY
(h), (k) FULL MUNICIPAL SERVICES TO BE PROVIDED

LAND USE SCHEDULE

Land Use	Blocks	Lot / Block Totals	Area (ha)
Industrial Blocks	1 - 4	4	7.73
Stormwater Management	5	1	0.68
Natural Heritage System (NHS)	6	1	1.81
10.0m Natural Heritage System Buffer	7	1	0.47
Drainage Channel	8	1	0.06
0.3m Reserve	9	1	0.00
20.0m ROW (243.5 m)			0.59
Totals	9	9	11.34

NOTE: SOME NUMBERS MAY NOT ADD UP DUE TO ROUNDING

DATE [D.M.Y]	REVISION	DWG	BY
05/12/2023	ISSUED FOR DRAFT SUBDIVISION PLAN		

NOTES:

KANEFF

SCALE 1:2000 Dec. 5, 2023

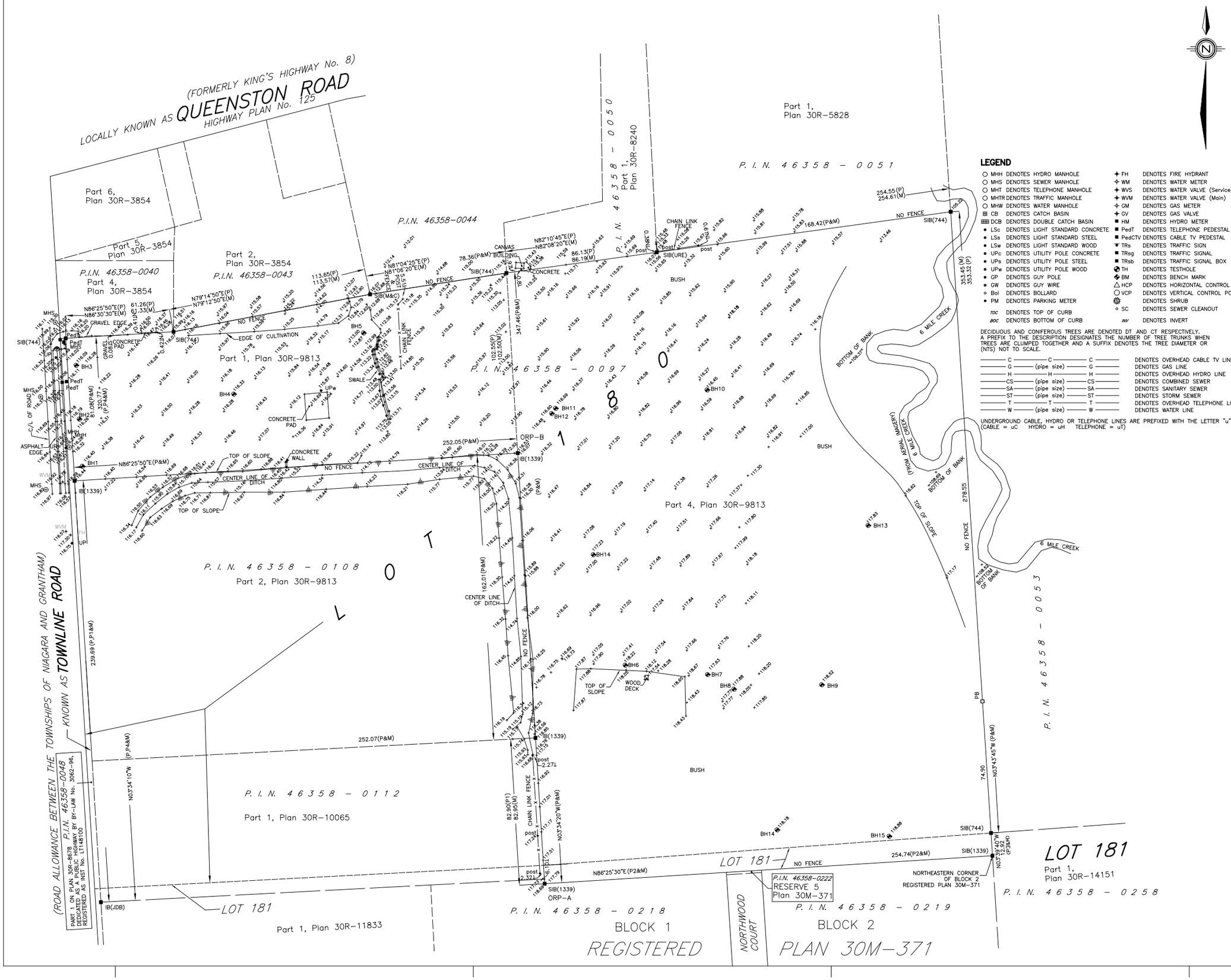
Revision Date:

Subdivision File Number:

SURVEYOR'S REAL PROPERTY REPORT
PART 1 OF 2 PARTS – THE PLAN

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SURVEY
V-33

THIS PLAN IS NOT VALID UNLESS IT IS AN ORIGINAL OR A COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)



LEGEND

○ MH	DENOTES HYDRO MANHOLE	✦ FH	DENOTES FIRE HYDRANT
○ MHS	DENOTES SEWER MANHOLE	✧ WM	DENOTES WATER METER
○ MHT	DENOTES TELEPHONE MANHOLE	✦ WVS	DENOTES WATER VALVE (Service)
○ MHTR	DENOTES TRAFFIC MANHOLE	✦ WVM	DENOTES WATER VALVE (Main)
○ MHW	DENOTES WATER MANHOLE	✧ GM	DENOTES GAS METER
⊞ CB	DENOTES CATCH BASIN	✦ GV	DENOTES GAS VALVE
▦ DCB	DENOTES DOUBLE CATCH BASIN	■ HM	DENOTES HYDRO METER
• LSc	DENOTES LIGHT STANDARD CONCRETE	■ PedT	DENOTES TELEPHONE PEDESTAL
• LSs	DENOTES LIGHT STANDARD STEEL	■ PedCTV	DENOTES CABLE TV PEDESTAL
• LSw	DENOTES LIGHT STANDARD WOOD	■ TRs	DENOTES TRAFFIC SIGN
• UPc	DENOTES UTILITY POLE CONCRETE	■ TRsg	DENOTES TRAFFIC SIGNAL
• UPs	DENOTES UTILITY POLE STEEL	■ TRsb	DENOTES TRAFFIC SIGNAL BOX
• UPw	DENOTES UTILITY POLE WOOD	◑ TH	DENOTES TESTHOLE
• GP	DENOTES GUY POLE	◆ BM	DENOTES BENCH MARK
• GW	DENOTES GUY WIRE	△ HCP	DENOTES HORIZONTAL CONTROL POINT
○ Bol	DENOTES BOLLARD	○ VCP	DENOTES VERTICAL CONTROL POINT
• PM	DENOTES PARKING METER	✲	DENOTES SHRUB
toc	DENOTES TOP OF CURB	○ SC	DENOTES SEWER CLEANOUT
boc	DENOTES BOTTOM OF CURB	*INV*	DENOTES INVERT

DECIDUOUS AND CONIFEROUS TREES ARE DENOTED DT AND CT RESPECTIVELY.
A PREFIX TO THE DESCRIPTION DESIGNATES THE NUMBER OF TREE TRUNKS WHEN TREES ARE CLUMPED TOGETHER AND A SUFFIX DENOTES THE TREE DIAMETER OR (NTS) NOT TO SCALE.

C — (pipe size) — C	DENOTES OVERHEAD CABLE TV LINE
G — (pipe size) — G	DENOTES GAS LINE
H — (pipe size) — H	DENOTES OVERHEAD HYDRO LINE
CS — (pipe size) — CS	DENOTES COMBINED SEWER
SA — (pipe size) — SA	DENOTES SANITARY SEWER
ST — (pipe size) — ST	DENOTES STORM SEWER
T — T — T	DENOTES OVERHEAD TELEPHONE LINE
W — (pipe size) — W	DENOTES WATER LINE

UNDERGROUND CABLE, HYDRO OR TELEPHONE LINES ARE PREFIXED WITH THE LETTER "u" (CABLE = uC HYDRO = uH TELEPHONE = uT)

PLAN OF SURVEY
OF
PART OF LOT 180 AND 181
GEOGRAPHIC TOWNSHIP OF NIAGARA
NOW IN THE
TOWN OF NIAGARA–ON–THE–LAKE
REGIONAL MUNICIPALITY OF NIA

© J.D. BARNES LIMITED.

SCALE = 1:1000

0 10.00 20.00 40.00 60.00 100.00 METRES

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

INTEGRATION DATA

OBSERVED REFERENCE POINTS (ORPs): UTM ZONE 17 NAD83 (CSRS) (2010.0).
COORDINATES TO URBAN ACCURACY PER SECTION 14 (2) OF O.REG 216/10.

POINT ID	NORTHING	EASTING
ORP–A	4780271.89	650048.11
ORP–B	4780516.33	650032.83

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

FOR BEARING COMPARISONS THE FOLLOWING ROTATIONS WERE APPLIED TO CONVERT TO GRID BEARINGS

PLAN	COUNTER CLOCKWISE
P	01°17'10"
P2	01°15'00"

LEGEND AND NOTES

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS)(2010.0).

DISTANCES ON THIS PLAN ARE GROUND AND CAN BE CONVERTED TO GRID BY MU BY THE COMBINED SCALE FACTOR OF 0.999863

ALL MONUMENTS SHOWN THUSLY □ ARE IRON BARS (IB) UNLESS OTHERWISE NOTE

SIB	DENOTES 25mm X 25mm X 1.22m STANDARD IRON BAR
SSIB	DENOTES 25mm X 25mm X 0.61m SHORT STANDARD IRON BAR
IB	DENOTES 16mm X 16mm X 0.61m IRON BAR
IB ø	DENOTES 19mm diameter X 0.61m ROUND IRON BAR
CC	DENOTES CUT–CROSS
CP	DENOTES 5mm X 50mm STEEL PIN
PB	DENOTES PLASTIC BAR
■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT SET AND MARKED 1744
WIT.	DENOTES WITNESS ⊥ DENOTES PERPENDICULAR
(S)	DENOTES SET (M) DENOTES MEASURED (D) DENOTES INST. No
ORP	DENOTES OBSERVED REFERENCE POINT

ALL SET SSIB AND PB MONUMENTS WERE USED DUE TO LACK OF OVERBURDEN AND/OR PROXIMITY OF UNDERGROUND UTILITIES IN ACCORDANCE WITH SECTION 11(4) OF O.REG. 525/91.

(NI)	DENOTES NOT IDENTIFIABLE (OU) DENOTES ORIGIN UNKNOWN
(S/P)	DENOTES SET PROPORTIONALLY ◆ DENOTES BOREHOLE
(1339)	DENOTES W.A. MASCOE, O.L.S.
(744)	DENOTES MATTHEWS, CAMERON, HEYWOOD & HOWE, SURVEYING LTD. O.L.S.
(URE)	DENOTES D.G. URE, O.L.S.
(JDB)	DENOTES J.D. BARNES LIMITED, O.L.S.
(P)	DENOTES PLAN 30R–9813
(P1)	DENOTES PLAN 30R–10065
(P2)	DENOTES PLAN 30M–371
(P3)	DENOTES PLAN 30R–14151
N,E,S,W	DENOTES NORTH, EAST, SOUTH AND WEST

THIS PLAN MUST BE READ IN CONJUNCTION WITH PART 2 AS SHOWN BELOW
THIS REPORT WAS PREPARED FOR KANEFF GROUP

SURVEYOR'S REAL PROPERTY REPORT PART 2 OF 2 PARTS

Please note the following:
1. Iron Survey Monuments mark all corners of the parcel.
2. The parcel has an Area of 11.338 Hectares.
3. The fence along the west boundary and north boundary of property.
4. The location of the concrete pads along the north property line.
5. The location of 6 mile creek was plotted as per aerial imagery.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVE THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THIS SURVEY WAS COMPLETED ON THE 8th DAY OF SEPTEMBER, 2022

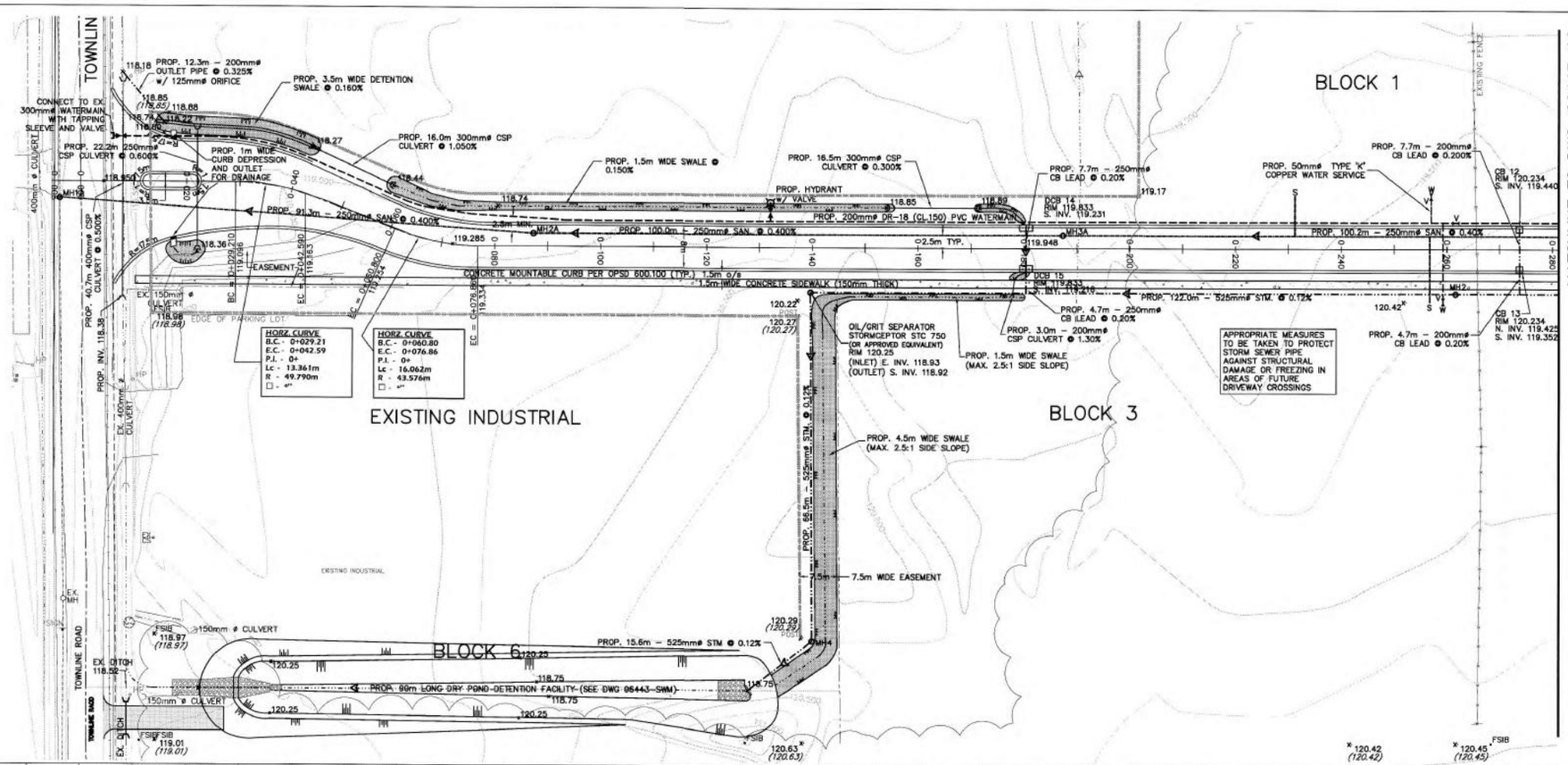
DATE SEPTEMBER 9th, 2022

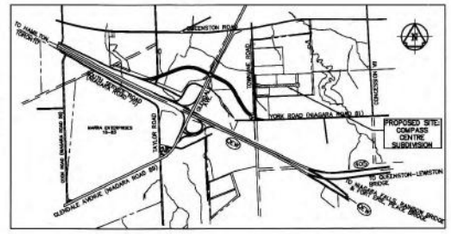
ALEC S. MANTHA
ONTARIO LAND SURVEYOR

J.D.BARNES LIMITED
LAND INFORMATION SPECIALISTS
4318 PORTAGE ROAD - UNIT 2, NIAGARA FALLS, ON L2E 6A4
T: (905) 358-3693 F: (905) 358-6224 www.jdbarnes.com

DRAWN BY:	CHECKED BY:	REFERENCE NO.:
SP	AM	22-16

PLOTTED: 2022-09-

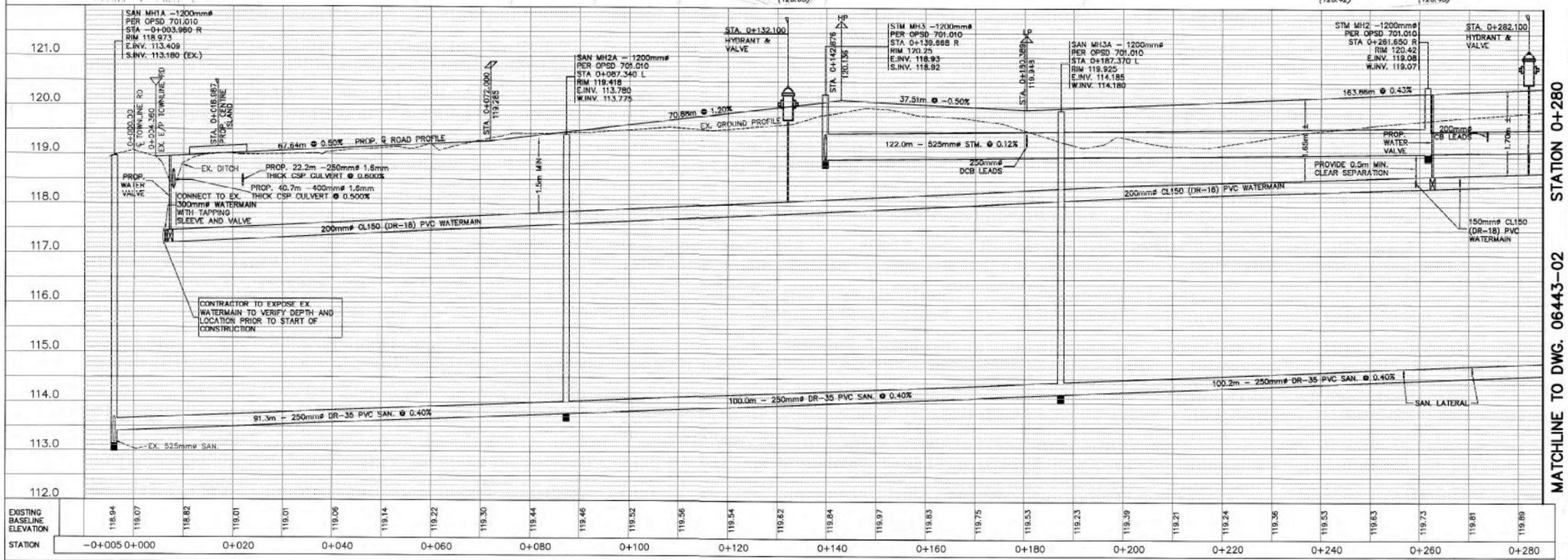


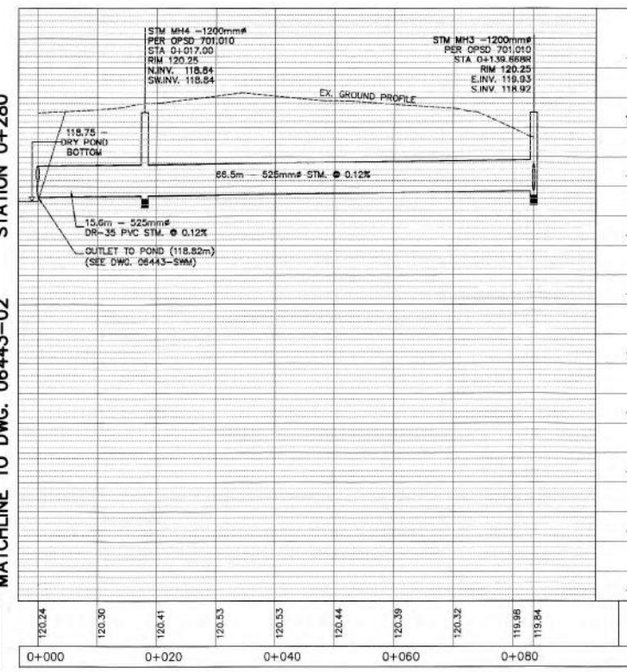


KEY PLAN

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED FIREROUTE
- EXISTING CURB
- PROPOSED CURB
- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED SUBDRAIN
- PROPOSED SWALE
- EASEMENT/ ROAD ALLOWANCE
- EXISTING SURFACE CONTOUR
- PROP. CATCHBASIN AND DOUBLE CATCHBASIN
- PROP. STORM MAINTENANCE HOLE
- PROP. SANITARY MAINTENANCE HOLE
- DIRECTION OF PIPE FLOW
- DIRECTION OF MAJOR OVERLAND FLOW
- PROPOSED WATER VALVE
- PROPOSED HYDRANT
- PROPOSED CURB STOP
- PROPOSED WATER SERVICE
- PROPOSED SANITARY SERVICE
- PROP. CUT IN TEE
- PROP. M.J CAP
- EXISTING TREES
- EX. SANITARY MAINTENANCE HOLE
- EX. STORM MAINTENANCE HOLE
- EXISTING BELL MAINTENANCE HOLE
- EXISTING WATER VALVE
- EXISTING HYDRANT
- EXISTING HYDRO POLE
- EXISTING LAMP POST
- EXISTING BELL PEDESTAL
- EXISTING STANDARD IRON BAR
- 93.58 (93.58) PROPOSED GROUND ELEVATION EXISTING GROUND ELEVATION





MATCHLINE TO DWG. 06443-02 STATION 0+280

NO.	REVISION	DATE	INIT.
0	INCREASED SANITARY SIZE, ISSUED FOR CONSTRUCTION	07 AUG 2007	DKP
G	RE-ISSUED FOR APPROVAL	25 JUL 2007	HEK
F	RE-ISSUED FOR APPROVAL	04 JUN 2007	HEK
E	ISSUED FOR TENDER	24 APR 2007	DP
D	ISSUED FOR APPROVALS	23 FEB 2007	DP
C	ISSUED FOR DRAFT PLAN APPLICATION	23 MAY 2006	DP

cad file: 06443-BP

plot scale: 1:1

BENCHMARK:

TOP OF CONCRETE MONUMENT LOCATED SOUTH OF THE CENTRELINE OF YORK ROAD, EAST OF THE INTERSECTION OF GRANTHAM-NIAGARA TOWNLINE ROAD AND YORK ROAD.

ELEVATION: 120.892 m

Do not scale drawings. Report any discrepancies to Quartek Group Inc. before proceeding.

Drawings must be sealed by the Architect and / or Engineer prior to the use for any building permit applications and / or government approval. Seals must be signed by the Architect and / or Engineer before drawings are used for any construction.

All construction to be in accordance with the Building Code, Ontario Regulation (403/97).

All drawings and related documents remain the property of Quartek Group Inc., all drawings are protected under copyright and under contract.

drawn by: RCS
design by: DP
approved by:
date: 28 MAR 2006

· architects
· engineers
· planners
· project managers

phone: (905) 984-8676
fax: (905) 682-5896
contact@quartekgroup.com

Quartek Group Inc.

PLAN APPROVED BY

DIRECTOR OF PUBLIC WORKS _____ DATE

drawing title: SERVICES PLAN/PROFILE TOWNLINE ROAD TO STA 0+280

project title: COMPASS CENTRE BUSINESS PARK Townline Road Niagara-on-the-Lake

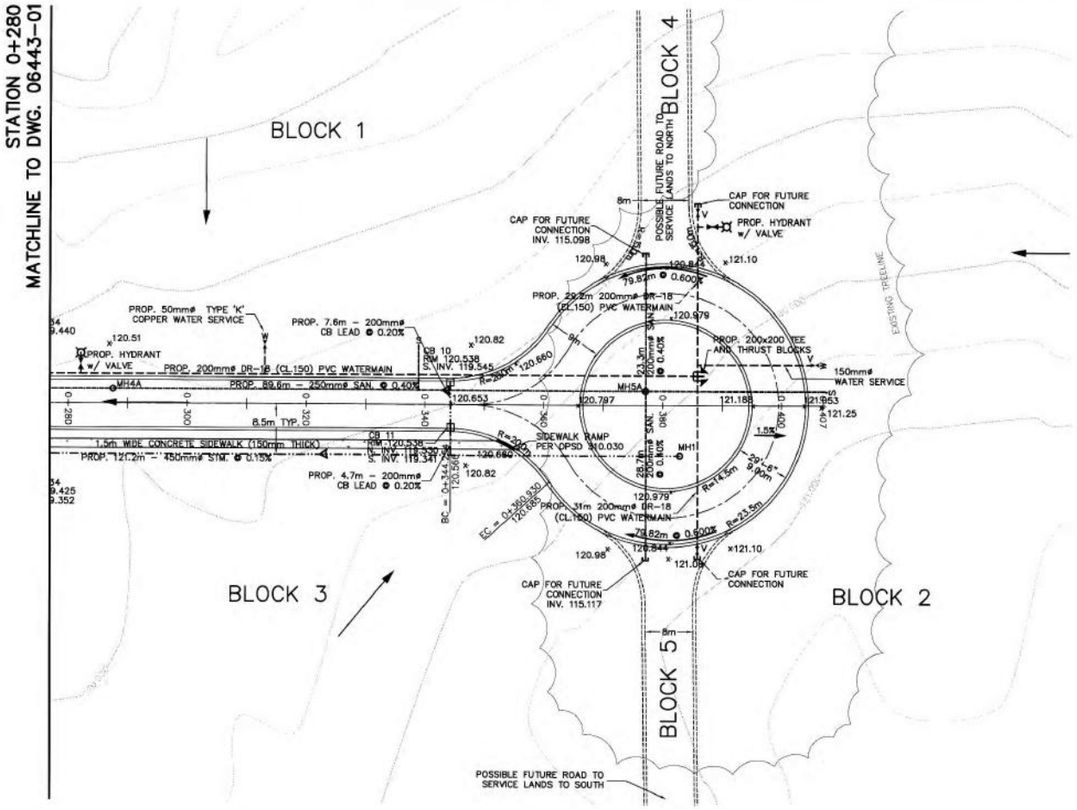
scale: 1:500 H 1:

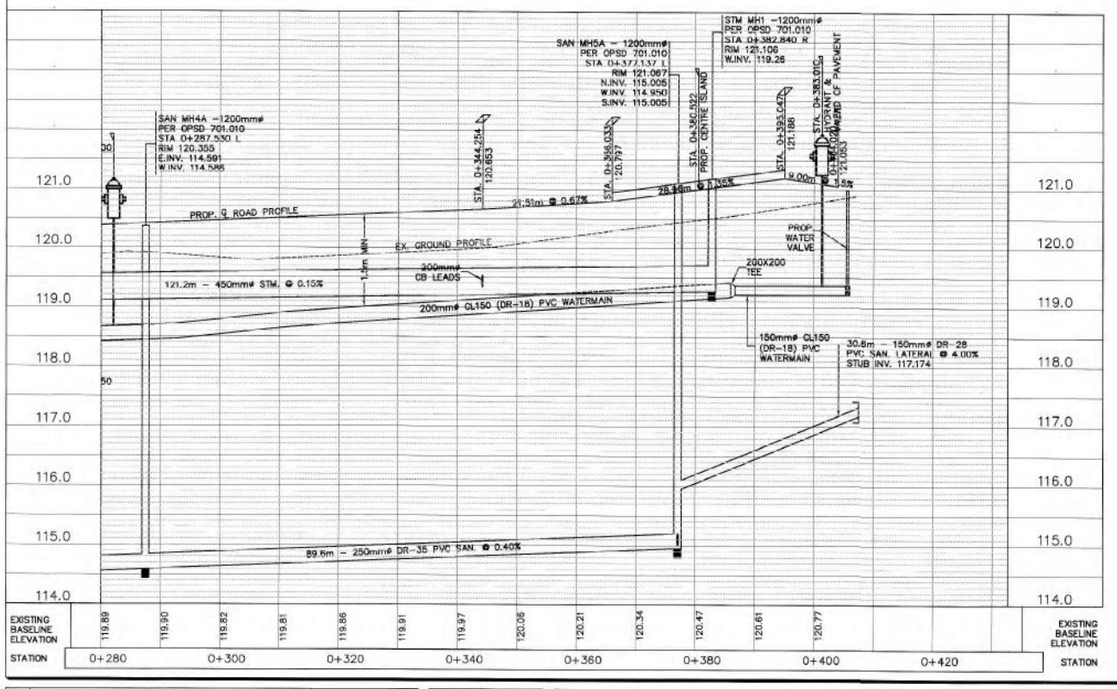
job # 06443

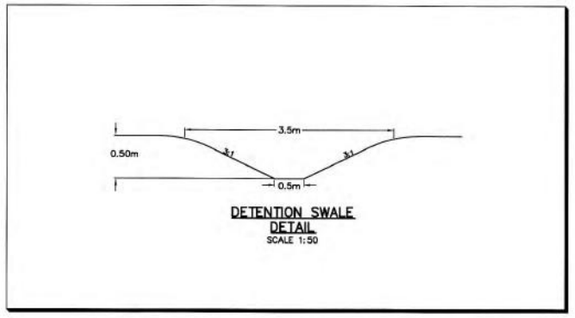
drawing number 06443-01

P:\2006\06443 Calamvar Inc. Rubic Bonning\Drawings\Civil\06443-BP.dwg drawing tab: 06443-01

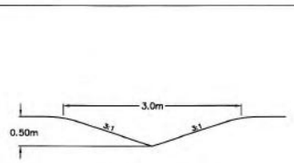
plotted by: aradzikoski on Oct 05,2007-11:00am



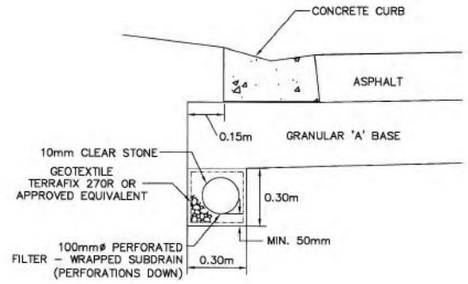




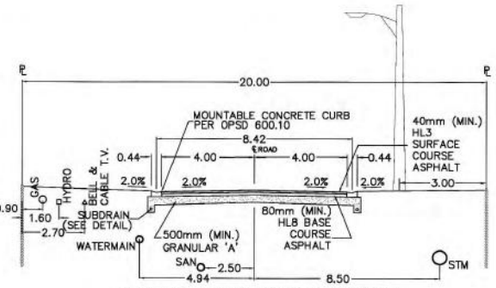
DETENTION SWALE DETAIL
SCALE 1:50



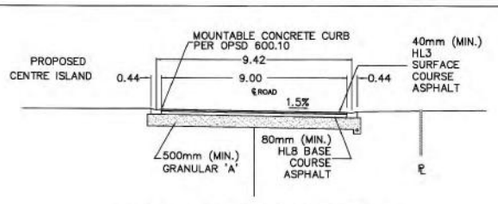
3m WIDE SWALE DETAIL
SCALE 1:50



TYPICAL SUBDRAIN DETAIL
N.T.S.



TYPICAL ROAD CROSS-SECTION
N.T.S.



TYPICAL ROAD CROSS-SECTION AT CUL-DE-SAC
N.T.S.

NOTES

1) THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN AND, WHERE SHOWN, THE ACCURACY OF THE LOCATION SHOWN OF SUCH UTILITIES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL CONTACT ALL SUCH UTILITIES INVOLVED AND INFORM HIMSELF AS TO THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME LIABILITY FOR DAMAGE TO THEM.
2) ALL MEASUREMENTS ARE IN METRES UNLESS OTHERWISE NOTED.
3) ALL WORK SHALL BE IN ACCORDANCE WITH THE RELEVANT SECTIONS OF THE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS AND THE NIAGARA PENINSULA STANDARD CONTRACT DOCUMENT UNLESS OTHERWISE NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS.
4) COMPUTER DRAWING FILE CO-ORDINATES FOR THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION LAYOUT UNLESS SPECIFICALLY DIRECTED BY THE ENGINEER.
5) ALL GRANULAR MATERIAL SHALL BE COMPACTED TO 100% STANDARD PROCTOR DENSITY AND ALL NATIVE BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY UNLESS OTHERWISE NOTED. FOR THE UPPER 0.6m BELOW ANY PAVEMENT OR RIGID STRUCTURE, MIN. COMPACTION SHALL BE 98% SPD.
6) ALL SEWERS, LEADS AND LATERALS SHALL HAVE CLASS 'B' BEDDING, GRANULAR 'A' COVER MATERIAL AND NATIVE BACKFILL UNLESS OTHERWISE NOTED.
7) STORM SEWERS TO BE CONCRETE PIPE, CLASS III PER CSA A257.2 WITH CLASS B BEDDING TO OPSD 802.031 AND 802.033 OR RIBBED PVC PIPE PER CSA B182.2 WITH GRANULAR 'A' BEDDING TO OPSD 802.010 AND 802.013 UNLESS OTHERWISE NOTED. CATCHBASIN LEADS TO BE 200mmø DR-35 PVC AT 1.0% GRADE UNLESS OTHERWISE NOTED. SUMP PUMP DISCHARGE TO BE 50mmø SERIES 160 PVC PIPE. CATCHBASINS TO BE PER OPSD 705.010 WITH GRATE PER OPSD 400.020. CATCHBASIN MANHOLES TO BE PER OPSD 701.010 WITH GRATE PER OPSD 400.020 AND NO SUMP.
8) ALL SANITARY SEWERS SHALL BE DR-35 PVC PIPE. ALL SANITARY LATERALS SHALL BE 150mmø DR-28 PVC PIPE. SANITARY MANHOLES TO BE TO OPSD 701.010 WITH WATERTIGHT FRAME & COVER TO OPSD 401.010.
9) ALL CONNECTIONS OF PVC SANITARY SEWER PIPE TO CONCRETE STRUCTURES SHALL BE BY MEANS OF KOR'N'SEAL SEALED RUBBER BOOT OR APPROVED EQUAL.
10) A MINIMUM CLEAR HORIZONTAL SEPARATION OF 2.5m SHALL BE MAINTAINED BETWEEN ANY SEWER AND ANY PARALLEL WATERMAIN. A MINIMUM CLEAR VERTICAL SEPARATION OF 0.5m SHALL BE MAINTAINED AT SEWER CROSSINGS UNDER WATERMAINS WHEREVER POSSIBLE.
11) ALL WATERMAINS SHALL BE PVC CL150 (DR-18) AND HAVE CLASS 'B' BEDDING PER OPSD 802.010 WITH GRANULAR 'A' COVER MATERIAL. MINIMUM COVER OVER WATERMAIN SHALL BE 1.5m. WATER SERVICES SHALL BE 150mm° PVC DR-18 (CL-150) UNLESS OTHERWISE NOTED.
12) ALL METAL CROSSES, TEES, BENDS, VALVES AND OTHER FITTINGS SHALL HAVE CATHODIC PROTECTION CONSISTING OF ZINC ANODE 550-12. ALL HYDRANT ASSEMBLIES SHALL HAVE CATHODIC PROTECTION CONSISTING OF ZINC ANODE 1100-24. CATHODIC PROTECTION TO BE INSTALLED PER OPSD-1109.011
13) FIRE HYDRANT TO BE FITTED WITH STORZ CONNECTORS.
14) ALL BENDS, TEES, HYDRANTS AND OTHER FITTINGS AS REQUIRED SHALL HAVE THRUST BLOCKS IN ACCORDANCE WITH OPSD 1103.010 AND 1103.020.
15) ALL SEWER LATERALS AND WATER SERVICES SHALL BE INSTALLED TO THE STREETLINE
16) ALL CURBS SHALL BE UNDERLAIN WITH 100mm ø PERFORATED FILTER-WRAPPED PVC SUBDRAIN OUTLETTING TO CATCHBASINS OR SWALES.
17) RIPRAP AND GEOTEXTILE INSTALLATION SHALL COMPLY WITH OPSS 511 AND OPSD 810.01. GEOTEXTILE TO BE TERRAFIX 270R OR APPROVED EQUIVALENT.
18) WHERE DISTURBED OR DAMAGED, EXISTING ROADS TO BE REINSTATED WITH 400mm GRANULAR 'A' BASE, 75mm HL8 HOT MIX ASPHALT BASE COURSE AND 40mm HL3 HOT MIX SURFACE COURSE, OR DEPTHS TO MATCH EXISTING, WHICHEVER IS GREATER. PAVEMENT REINSTATEMENT SHALL COMPLY WITH OPSD 509.010.
19) FILL FOR ROADWAYS, DRIVEWAYS, AND PARKING AREAS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSS 201 IN 150mm THICK LIFTS, USING SUITABLE NATIVE EXCAVATED OR IMPORTED MATERIAL APPROVED BY CONTRACT ADMINISTRATOR AND GEOTECHNICAL ENGINEER. THE SUBSOIL BELOW ANY ROADWAYS OR PARKING FACILITIES SHALL BE PROOF ROLLED AND INSPECTED BY THE GEOTECHNICAL ENGINEER OR HIS DESIGNATE PRIOR TO THE PLACEMENT OF ANY GRANULAR MATERIALS.
20) CONTRACTOR TO OBTAIN EXACT LOCATION OF EXISTING UTILITES PRIOR TO CONNECTION.
21) WHERE CATCHBASIN LEADS ACROSS ROAD HAVE LESS THAN 1.0m COVER, INSULATION TO BE PROVIDED IN ACCORDANCE WITH NIAGARA PENINSULA STANDARD SPECIFICATIONS.
22) DURING CONSTRUCTION, THE FOLLOWING SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED:
- -CATCHBASINS SHALL HAVE 600mm DEEP SUMPS AND FILTER CLOTH UNDER THE GRATE
- -SILT FENCE (PER OPSD 219.110) OR STRAW BALES (PER OPSD 219.100) ON THE DOWNHILL SIDE OF TOPSOIL STOCKPILES
- -SILT FENCE ALONG THE NORTH LIMIT OF THE SITE PER OPSD 219.110
- -MUD TRAPS AT ROAD ENTRANCES AND EXITS

NO.	REVISION	DATE	INIT.
0	INCREASED SANITARY SIZE, ISSUED FOR CONSTRUCTION	07 AUG 2007	DKP
G	RE-ISSUED FOR MOE APPROVAL	25 JUL 2007	HEK
F	RE-ISSUED FOR APPROVAL	04 JUN 2007	HEK
E	ISSUED FOR TENDER	24 APR 2007	DP
D	ISSUED FOR APPROVALS	23 FEB 2007	DP
C	ISSUED FOR DRAFT PLAN APPLICATION	23 MAY 2006	DP

cad file: 06443-BP

plot scale: 1:1

BENCHMARK:
TOP OF CONCRETE MONUMENT LOCATED SOUTH OF THE CENTRELINE OF YORK ROAD, EAST OF THE INTERSECTION OF GRANTHAM-NIAGARA TOWNLINE ROAD AND YORK ROAD.

ELEVATION: 120.892 m

Do not scale drawings. Report any discrepancies to Quartek Group Inc. before proceeding.
Drawings must be sealed by the Architect and / or Engineer prior to the use for any building permit applications and / or government approval. Seals must be signed by the Architect and / or Engineer before drawings are used for any construction.
All construction to be in accordance with the Building Code, Ontario Regulation (403/97).
All drawings and related documents remain the property of Quartek Group Inc., all drawings are protected under copyright and under contract.

drawn by: RCS
design by: DP
approved by:
date: 28 MAR 2006

· architects
· engineers
· planners
· project managers
phone: (905) 984-8676
fax: (905) 682-5896
contact@quartekgroup.com
Quartek Group Inc.

PLAN APPROVED BY
DIRECTOR OF PUBLIC WORKS — DATE

drawing title: SERVICES PLAN/PROFILE STA 0+280 TO CUL-DE-SAC

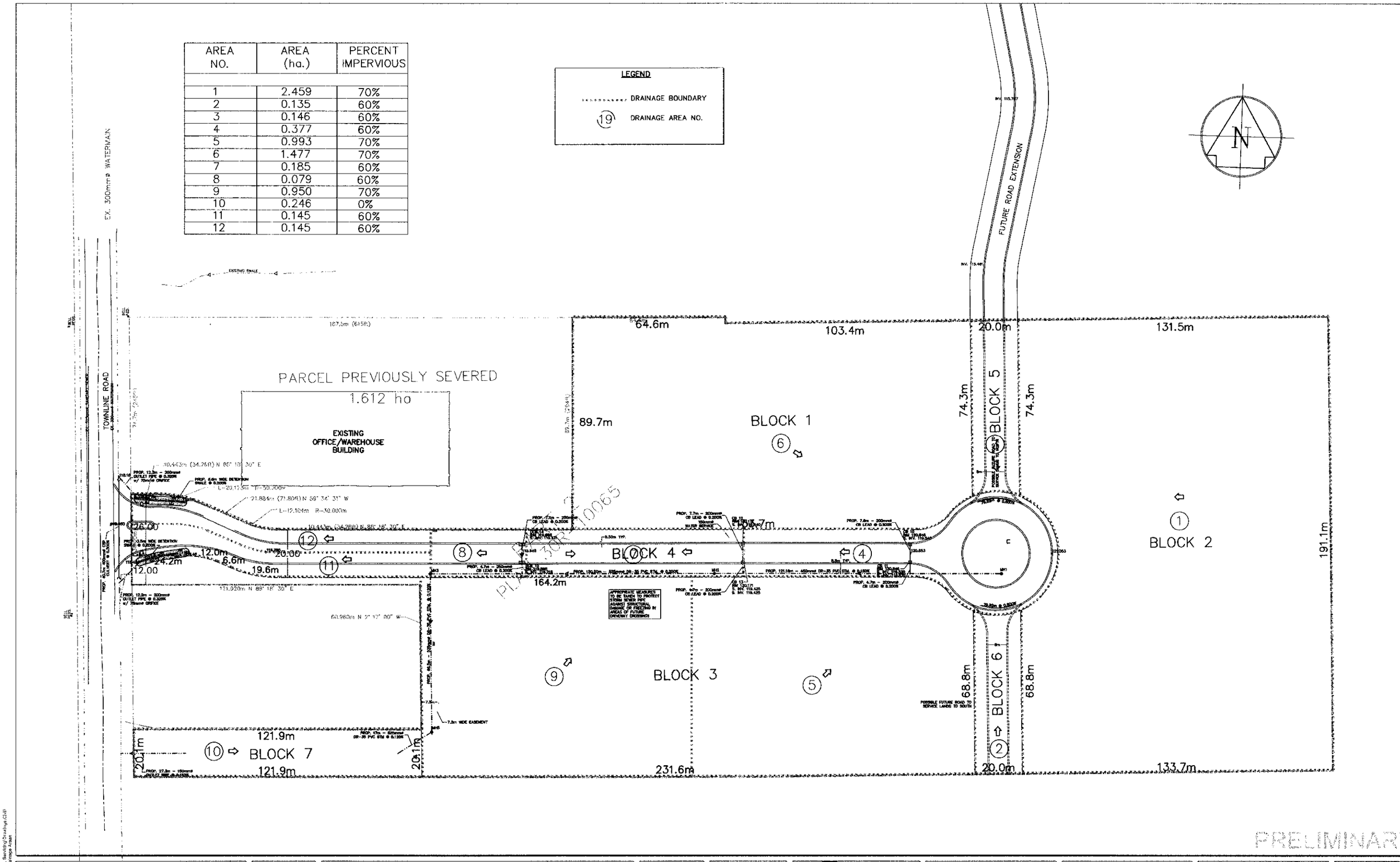
project title: COMPASS CENTRE BUSINESS PARK Townline Road Niagara-on-the-Lake

scale: 1:500 H 1:50 V
job #: 06443
drawing number: 06443-02

P:\2006\06443 Calamar Inc. Subd. Servicing\Drawings\Civil\06443-BP.dwg drawing tab: 06443-02

plotted by: sradzikoski on Oct 05,2007-10:59am

AREA NO.	AREA (ha.)	PERCENT IMPERVIOUS
1	2.459	70%
2	0.135	60%
3	0.146	60%
4	0.377	60%
5	0.993	70%
6	1.477	70%
7	0.185	60%
8	0.079	60%
9	0.950	70%
10	0.246	0%
11	0.145	60%
12	0.145	60%



PRELIMINAR

NO.	REVISION	DATE	INIT.

used file: 06443-BP

plot scale: 1:1

BENCHMARK:
TOP OF CONCRETE MONUMENT LOCATED SOUTH OF THE CENTRELINE OF YORK ROAD, EAST OF THE INTERSECTION OF GRANTHAM-NIAGARA TOWNLINE ROAD AND YORK ROAD.

ELEVATION: 120.892 m

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All construction to be in accordance with the Building Code. Drawing Integration (4/1/97).

All drawings and related documents remain the property of Quartek Group Inc., all drawings are protected under copyright and under contract.

drawn by: AR
design by: DP
approved by:
date:

Quartek Group Inc.
· architects
· engineers
· planners
· project managers
phone: (905) 984-8676
fax: (905) 682-6856
contact@quartekgroup.com

drawing title: DRAINAGE AREA PLAN

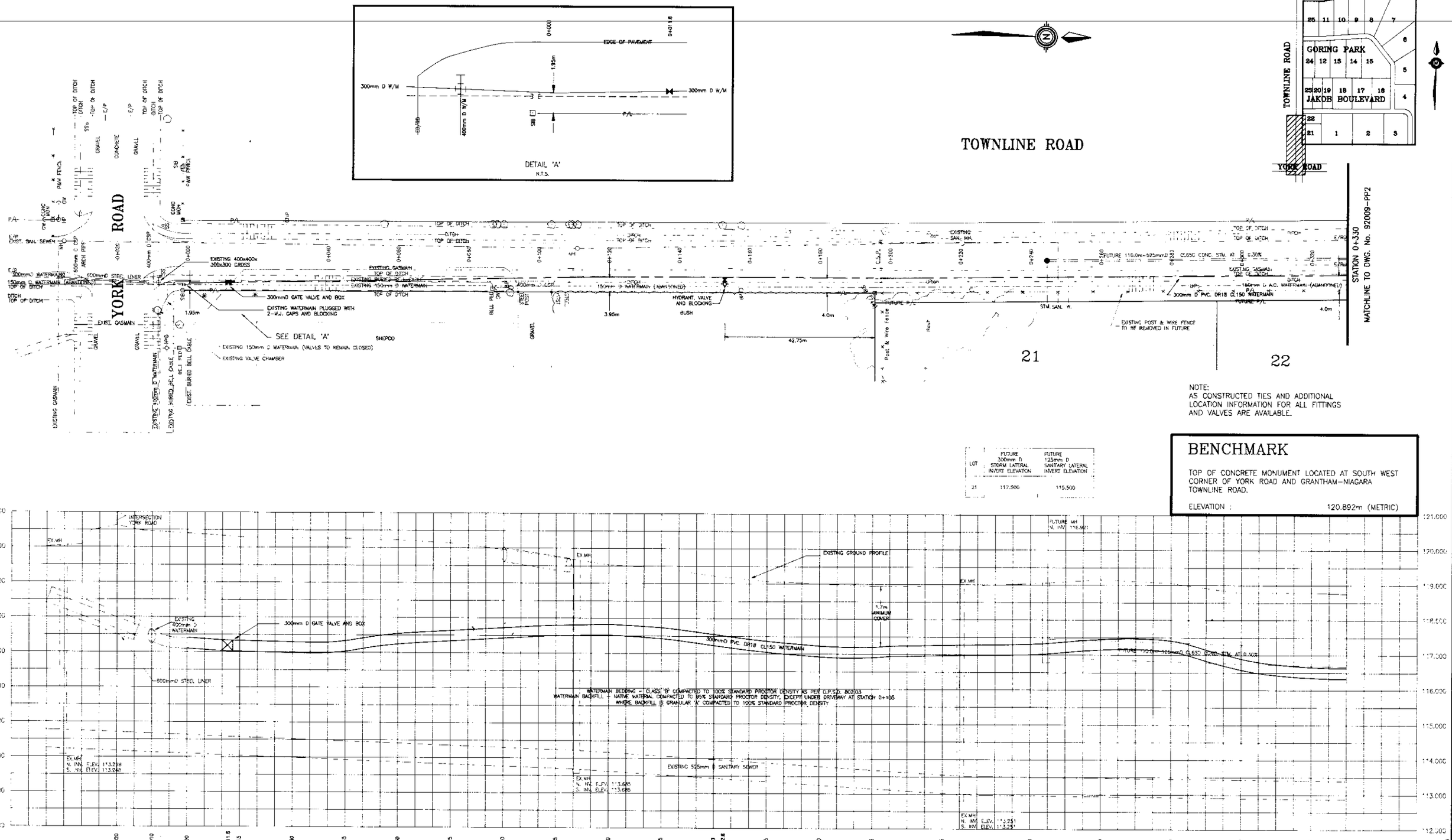
project title: COMPASS CENTRE SUBDIVISION Townline Road Niagara-on-the-Lake

scale: 1:150

job #: 06443

drawing number: 06443 - S

plotted by: doug on Feb 16,2007-11:36am



LOT	FUTURE 300mm D STORM LATERAL INVERT ELEVATION	FUTURE 125mm D SANITARY LATERAL INVERT ELEVATION
21	117.500	115.500

NOTE:
AS CONSTRUCTED TIES AND ADDITIONAL LOCATION INFORMATION FOR ALL FITTINGS AND VALVES ARE AVAILABLE.

BENCHMARK

TOP OF CONCRETE MONUMENT LOCATED AT SOUTH WEST CORNER OF YORK ROAD AND GRANTHAM-NIAGARA TOWNLINE ROAD.

ELEVATION : 120.892m (METRIC)

NO.	REVISIONS	DATE	INT.
7	AS CONSTRUCTED	92 06 24	J.R.D.
6	ISSUED FOR TENDER	92 03 17	J.R.D.
5	REVISED FOR TOWN PROJECT & MOE SUBMISSION	92 03 11	J.R.D.
4	REVISED AS PER TOWNS' CONSULTANTS REVIEW	90 11 12	G.P.D.
3	ISSUED FOR TENDER	90 08 31	G.P.D.
2	WATERMAIN RELOCATED	90 06 12	D.D.
1	ISSUED FOR TOWN REVIEW/MOE. APPROVAL	90 05 16	D.D.

NOTES:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

ALL WORK IS TO BE CONSTRUCTED TO ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS(O.P.S.S. & O.P.S.D.) AND APPROPRIATE MUNICIPAL STANDARDS AND SPECIFICATIONS. IN CASES OF CONFLICT, THE MUNICIPAL REQUIREMENTS HAVE PRECEDENCE.

INSTALLATION OF P.V.C. WATERMAINS AND SERVICES IS TO INCLUDE CATHODIC PROTECTION AND DETECT TAPE.

DRAWN BY: W.F.
DESIGNED BY: D.D.
CHECKED BY: G.P.D.

DENCO Engineering Ltd.
CONSULTING ENGINEERS
26 WELLINGTON STREET
ST. CATHARINES, ONTARIO.
L2R 5W9
(416) 641-2364 Fax: 641-5449

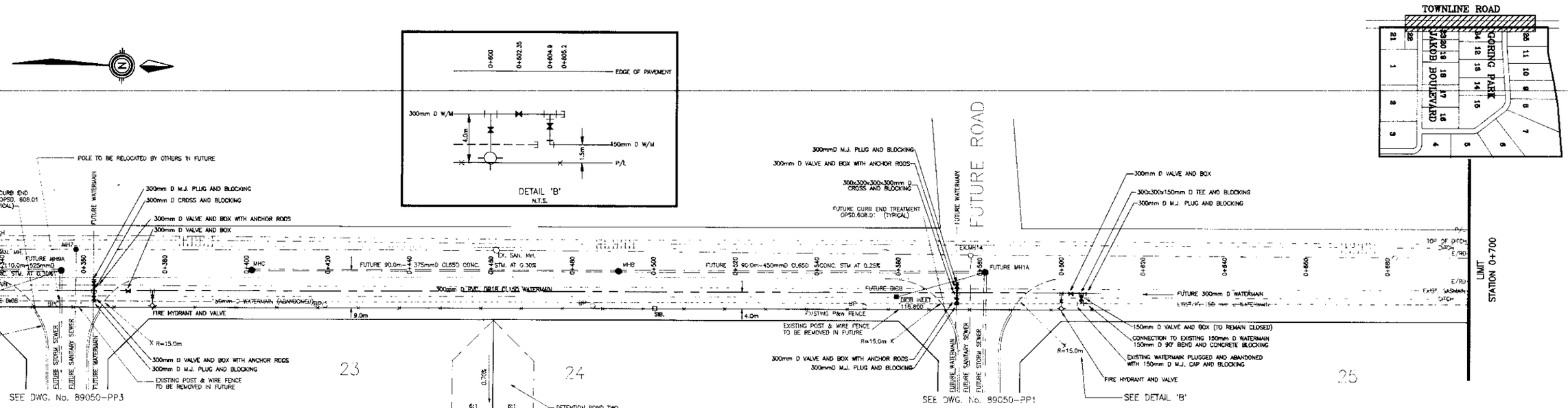
TOWNLINE ROAD WATERMAIN

TOWN OF NIAGARA-ON-THE-LAKE

STN. 0+000 (YORK RD.) TO STN. 0+330

PLAN AND PROFILE

FIELD NOTES: 177, 086, 111, 157
DATE: 90 04 23
SCALE: HORZ. 1:500
VERT. 1:50
DWG. No. 92009-PP1
M.O.N. REF. No.
REV. 7



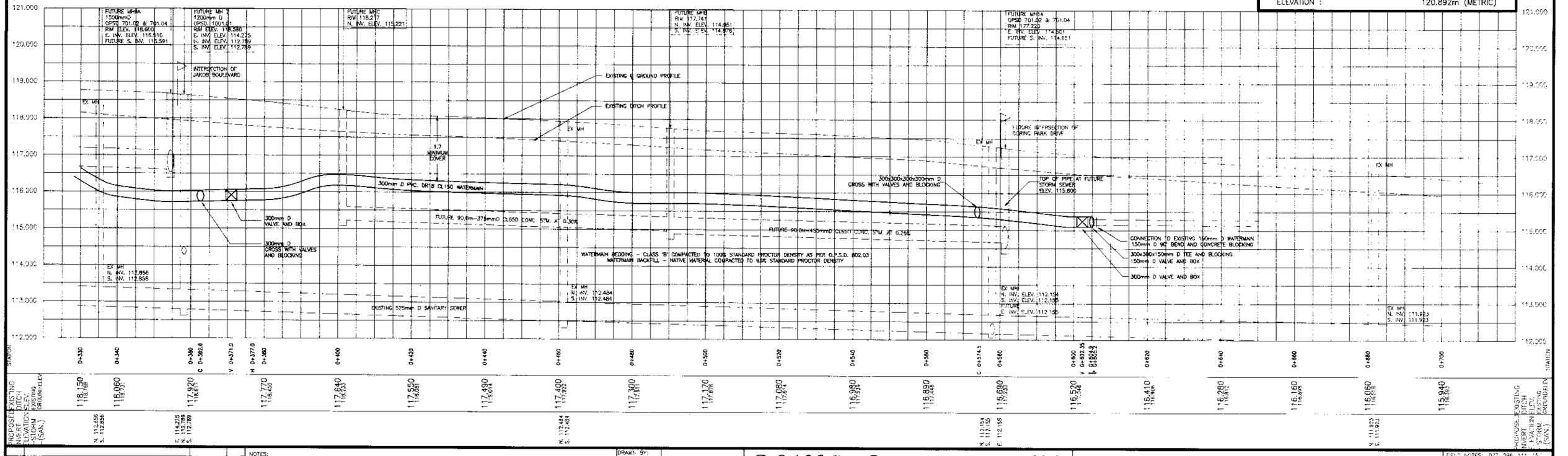
TOWNLINE ROAD

NOTE:
AS CONSTRUCTED TIES AND ADDITIONAL LOCATION INFORMATION FOR ALL FITTINGS AND VALVES ARE AVAILABLE.

BENCHMARK

TOP OF CONCRETE MONUMENT LOCATED AT SOUTH WEST CORNER OF YORK ROAD AND GRANTHAM-NIAGARA TOWNLINE ROAD.

ELEVATION : 120.892m (METRIC)



No.	REVISIONS	DATE	JND
7	AS CONSTRUCTED	92 06 24	J.R.D.
6	ISSUED FOR TENDER	92 03 17	J.R.D.
5	REVISED FOR TOWN PROJECT AND MOE SUBMISSION	92 03 11	J.R.D.
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2	WATERMAIN LOCATION REVISED	90 05 11	C.D.
1	ISSUED FOR TOWN REVIEW/MOE APPROVAL	90 05 16	C.D.

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DRAWN BY: W.J.F./C.M.H.
DESIGNED BY: CD/DM
CHECKED BY: G.P.D.

DENCO Engineering Ltd.
CONSULTING ENGINEERS
25 WELLINGTON STREET,
ST. CATHARINES, ONTARIO.
L2R 5P8
(416) 641-2364 Fax: 641-5449

TOWNLINE ROAD WATERMAIN

TOWN OF NIAGARA-ON-THE-LAKE
STN. 0+330 TO STN. 0+610
PLAN AND PROFILE

FIELD NOTES: 027, 096, 111, 157
DATE: 90 04 23
SCALE: HORZ. 1:500
VERT. 1:50
DWG. No. 92009-PP2
MUN. REF. No.
REV. 7

APPENDIX B

Site Population Calculations
Water Demand Calculations
Sanitary Demand Calculations

Project: 353 Townline Road
Project No.: 369-6730
Prepared By: HR/PR
Checked By: HL
Date: RB

SITE POPULATION CALCULATIONS
353 Townline Road, Niagara-on-the-Lake

Block	Description	Area* (ha)	Pop. Density (persons and jobs/ha)	Total Population
1	Industrial	1.51	100	151
2	Industrial	2.19	100	219
3	Industrial	2.51	100	251
4	Industrial	1.52	100	152
Total Industrial Blocks		**7.73**	**100**	**773**
5	SWM Pond	0.68	0	0
6	NHS	1.81	0	0
7	NH Buffer	0.47	0	0
8	Drainage Channel	0.06	0	0
9	0.3m Reserve	0.00	0	0
ROW	Northwood Ct	0.59	0	0
TOTAL SITE		**11.34**	**0**	**773**

Project: 353 Townline Road
Project No.: 369-6730
Prepared By: HR/PR
Checked By: RB
Date: 2023-12-11

WATER DEMAND CALCULATIONS
353 Townline Road, Niagara-on-the-Lake

USES	Population	Average Daily Demand (L/d)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
Block 1	151	40,770	0.9	1.4
Blocks 2	219	59,130	1.4	2.1
Blocks 3	251	67,770	1.6	2.4
Blocks 4	152	41,040	1.0	1.4
Total	**773**	**208710**	**4.8**	**7.2**

Employment Demand Rate =	270 L/c/d
Maximum Day Factor =	2
Peak Hour Factor =	3

Project: 353 Townline Road
Project No.: 369-6730
Prepared By: HR/PR
Checked By: RB
Date: 2023-12-12

SANITARY FLOW CALCULATIONS
353 Townline Road, Niagara-on-the-Lake

Blocks	Population	Average Daily Flow (L/d)	Peak Flow (L/s)	Infiltration (L/s)	Total Sanitary Flow (L/s)
Block 1	151	41525	1.9	0.43	2.3
Block 2	219	60225	2.7	0.63	3.3
Block 3	251	69025	3.1	0.72	3.8
Block 4	152	41800	1.9	0.43	2.3
ROW	0	0	0.0	0.17	0.2
Total	**773**	**212575**	**9.5**	**2.2**	**11.9**

Employment Demand Rate =	275	L/c/d
Harmon Peaking Factor =	3.87	= 1+(14/(4+p^0.5))
Extraneous Flow =	0.286	L/s/ha

353 Towline Road: Sanitary Sewer Design Sheet

Project: 353 Townline Road
Project No.: 369-6730
Date: 2023-12-11
Designed by: CM
Checked by: RB

Location		Population				Total Area	Peaking Factor	Pop. flow	Extraneous flow	Design flow	Proposed Sewer							
				Cumulative							Length	Pipe Size (D)	Material	Manning's Roughness	Slope	Capacity Q (full)	FULL FLOW VEL.	Q (d) / Q (full) Ratio
		Population	Area (A)	Population	Area (A)		M	Q (p)	Q (i)	Q (d)								
ROW	Block		(ha)		(ha)	(ha)	(min =2, max 4)	L/s	L/s	L/s	m	mm		n	%	L/sec	m/sec	
Townline Road	1	151	1.51	151	1.51	1.51	4.00	1.92	0.43	**2.35**	15	150	PVC	0.013	2.0%	21.5	1.22	11%
Northwood Court	2	219	2.19	219	2.19	2.19	4.00	2.79	0.63	**3.41**	15	150	PVC	0.013	2.0%	21.5	1.22	16%
Northwood Court	ROW	0	0.20	219	2.39	2.39	4.00	2.79	0.68	**3.47**	50	200	PVC	0.013	0.4%	20.7	0.66	17%
Northwood Court	3A	100	1.00	319	3.39	3.39	4.00	4.07	0.97	**5.04**	15	150	PVC	0.013	2.0%	21.5	1.22	23%
Northwood Court	ROW	20	0.20	339	3.59	3.59	4.00	4.32	1.03	**5.34**	100	200	PVC	0.013	0.4%	20.7	0.66	26%
Northwood Court	3B	151	1.51	490	5.09	5.09	3.98	6.20	1.46	**7.66**	15	150	PVC	0.013	2.0%	21.5	1.22	36%
Northwood Court	4	152	1.52	642	6.61	6.61	3.92	8.00	1.89	**9.89**								
Northwood Court	ROW	0	0.20	642	6.81	6.81	3.92	8.00	1.95	**9.95**	100	200	PVC	0.013	0.4%	20.7	0.66	48%
Ex Northwood Court	ROW	0	0.50	642	7.31	7.31	3.92	8.00	2.09	**10.09**	95	200	PVC	0.013	0.4%	20.7	0.66	49%

q = ave. daily per capita flow - employment	275	L/cap/day	
2 = ave. daily per capita flow - residential	275	L/cap/day	
i = unit of peak extraneous flow	0.286	L/ha/s	(infiltration and inflow)
Peaking Factor = M_{av}= K_{av} * (1+(14/(4+((p+p_e)$^{1/2}$))))			(min 2.0, max 4.0)
Note: p and p_e are population in thousands			
Manning's Roughness Coefficient	0.013		

Kav = (A_R + (0.80 * A_e)) / (AR + Ae)
Q (p) = P*q*M*(1/86.4)
Q (i) = i*A (A = area in hectares)
Q (d) = Q (p) + Q (i)

Change in Direction	Minimum Drop (mm)
0°	20
1° - 45°	50
46° - 90°	80

Population Densities:
Industrial 100

APPENDIX C

Stormwater Management Calculations

CURRENT* DRAINAGE CONDITIONS

Existing Developments, Road Network and Storm Drainage Facilities

January 2011

GLENDALE INDUSTRIAL AREA
STORMWATER MANAGEMENT
MASTER PLAN UPDATE
SIX MILE CREEK WATERSHED
(QUEENSTON ROAD, TOWNLINE ROAD,
YORK ROAD AND CONCESSION 7 ROAD)

FIGURE 3-2

QUEENSTON ROAD

YORK ROAD (REGIONAL ROAD 81)

TOWNLINE ROAD

CONCESSION 7 ROAD

WESTWOOD COURT

QEW

Six Mile Creek

DRAINAGE TO AIRPORT WATERSHED

DRAINAGE TO COLE WATERSHED

EXTERNAL DRAINAGE AREA

EX. 600x600 BOX CULVERT

EX. 3600x2400 BOX CULVERT

EX. 900ø CSP

EX. 750ø CSP

EX. 525ø STM @ 0.12%

EX. 450ø STM @ 0.15%

EX. SWM FACILITIES FOR THIS PROPERTY TO REMAIN

NPCA 100-YEAR FLOODLINE LIMIT

1.47 Ha

28.8 Ha

6.18 Ha

13.1 Ha

4.08 Ha

9.98 Ha

9.18 Ha

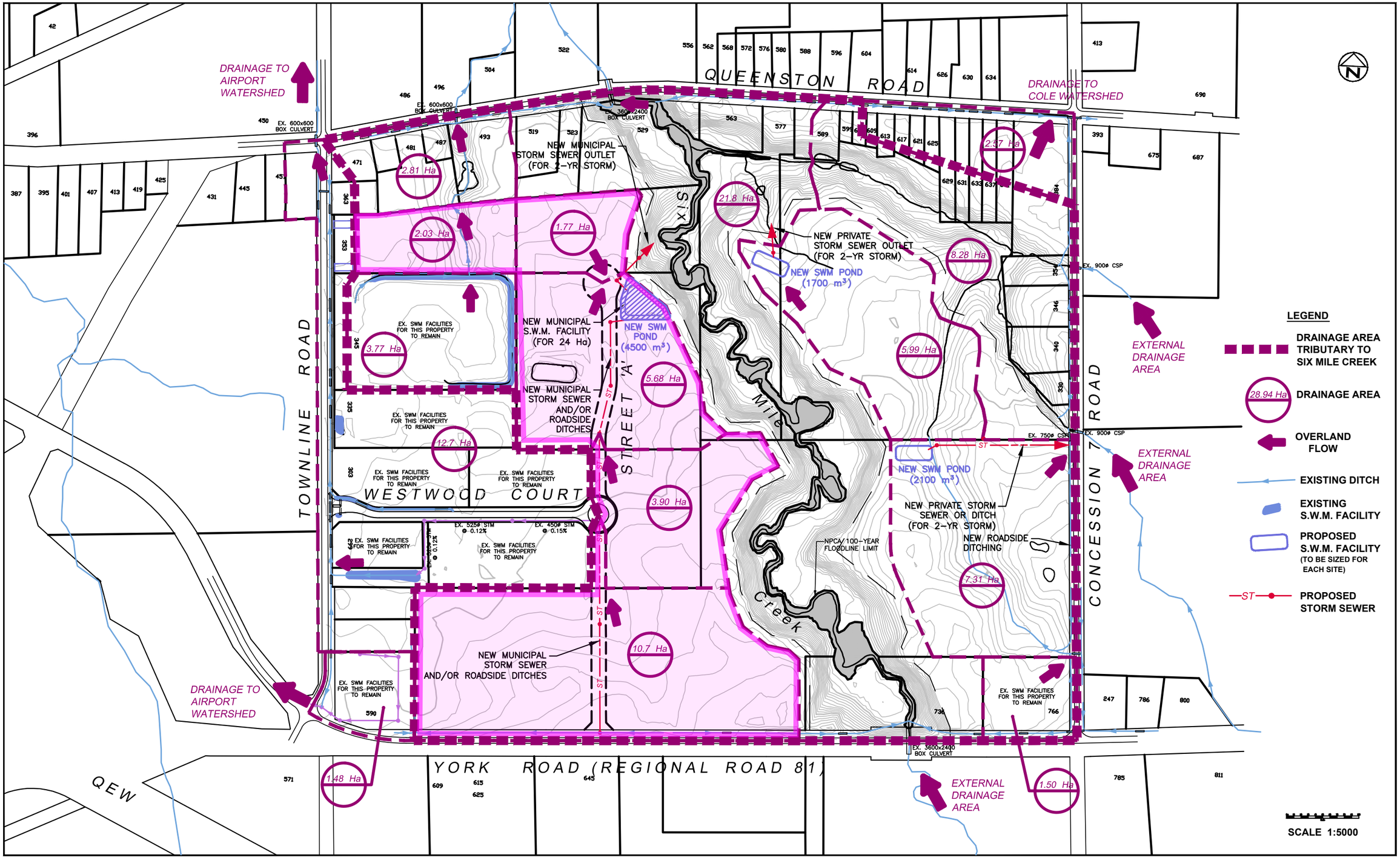
28.94 Ha

LEGEND

- DRAINAGE AREA TRIBUTARY TO SIX MILE CREEK
- DRAINAGE AREA
- OVERLAND FLOW
- EXISTING DITCH
- EXISTING S.W.M. FACILITY

* NOTE: CURRENT REFERS TO EXISTING DRAINAGE AREAS AND BOUNDARIES AS OF SEPTEMBER 2010

SCALE 1:5000



PROPOSED DRAINAGE CONDITIONS

Existing and Proposed - Developments, Road Network and Storm Drainage Facilities

January 2011

NIAGARA-ON-THE-LAKE

R. ASSOCIATES

GLENDALE INDUSTRIAL AREA
STORMWATER MANAGEMENT
MASTER PLAN UPDATE
SIX MILE CREEK WATERSHED
(QUEENSTON ROAD, TOWNLINE ROAD,
YORK ROAD AND CONCESSION 7 ROAD)

FIGURE 4-1

CROZIER
CONSULTING ENGINEERS

353 Townline Road
STORM SEWER DESIGN SHEET

5-Year Minor Storm Conveyance - Town of Niagara-on-the-Lake

A: 664 **B: 0.744** **C: 4.7**

PROJECT: 353 Townline Road
PROJECT No.: 369-6730
FILE: STM Design
DATE: 2023.10.05
Design: CM/HL
Checked: RB

INITIAL TIME OF CONCENTRATION (min): 10.00

INFLUENT CATCHMENT AREA ID / DESCRIPTION	Block	Drainage Area (ha)	Total Drainage Area (ha)	RUN-OFF COEFF.	A x C -	CUMMUL. A x C -	TIME OF CONC. min	Time of Flow	Time Out	I mm/hr	DESIGN Q m³/s	PIPE TYPE -	PIPE SLOPE %	PIPE DIA. mm	FULL FLOW VEL. m/sec	PIPE LENGTH m	FULL FLOW CAPACITY m³/s	PERCENTAGE FULL %
Outlet to Unnamed Tributary																		
BLOCK 1 Roof Control	1	0.67		0.90					Max Controlled Rate ->		**0.006**	Circular	0.40	200	0.66	3	**0.0**	29%
MH15 to Outlet	1	0.58	1.25	0.84	0.48	0.48	10.00	0.03	10.03	89.88	**0.127**	Circular	1.00	375	1.59	3	**0.2**	72%
Outlet to Six Mile Creek																		
BLOCK 2 Roof Control	2	0.97		0.90					Max Controlled Rate ->		**0.008**							
BLOCK 2 to MH1	2	0.63	1.60	0.84	0.53	0.53	10.00	0.38	10.38	89.88	**0.139**	Circular	1.20	375	1.74	40	**0.2**	73%
BLOCK 3A Roof Control	3A	0.62		0.90					Max Controlled Rate ->		**0.004**							
BLOCK 3A to MH1	3A	0.43	1.05	0.84	0.36	0.36	10.00	1.01	11.01	89.88	**0.094**	Circular	1.00	300	1.37	83	**0.1**	97%
MH1 to MH10	ROW	0.17	2.81	0.70	0.12	1.00	10.00	0.90	10.90	89.88	**0.262**	Circular	0.50	600	1.54	83	**0.4**	60%
BLOCK 3B Roof Control	3B	0.62		0.90					Max Controlled Rate ->		**0.004**							
BLOCK 3B to MH7	3B	0.36	0.98	0.84	0.30	0.30	10.00	0.85	10.85	89.88	**0.079**	Circular	1.00	300	1.37	70	**0.1**	82%
BLOCK 4 Roof Control	4	1.04		0.90					Max Controlled Rate ->		**0.008**							
BLOCK 4 to MH7	4	0.21	1.25	0.84	0.17	0.17	10.00	0.58	10.58	89.88	**0.051**	Circular	1.00	375	1.59	55	**0.2**	29%
MH7 to MH6	ROW	0.12	1.37	0.70	0.08	0.56	10.00	0.71	10.71	89.88	**0.151**	Circular	0.50	525	1.40	60	**0.3**	50%
BLOCK 3B & 4 to MH7	3B	0.69		0.84	0.58	0.58	10.00	0.64	10.64	89.88	**0.144**	Circular	1.00	375	1.59	61	**0.2**	82%
MH6 to MH10	ROW	0.17	3.21	0.70	0.12	1.25	10.71	0.94	11.66	86.78	**0.314**	Circular	0.50	600	1.54	87	**0.4**	72%
MH10 to SWM POND	-	0.00	6.02	0.00	0.00	2.26	11.66	0.27	11.92	83.02	**0.544**	Circular	0.50	750	1.78	28	**0.8**	69%

Project Name: 353 Townline Road
Project Number: 0369-6730
Date: 2023-10-05
Completed By: AB/HL

D.A. NAME	**101**
D.A. AREA (ha)	**7.56**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 101

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Silty Clay		BC	100	7.56
				0
				0
				0
Total Area				7.56

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		Other		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0		98		98		98		98		50	0.000	0.00
0		98		98		98		98		50	0	0
Subtotal			0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Lake / Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	2.41	65	5.04	71	0.11	50	0	71		78	7.560	520.01
0		65		71		50	0	71		78	0.00	0.00
Subtotal	2.41		5.04		0		0		0			

Composite Area Calculations		
	Total Pervious Area	7.56
	Total Impervious Area	0
	% Impervious	0.00%
	Composite Curve Number	68.8
	Total Area Check	7.56

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				Silty Clay		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	2.4	24.1	0.25	2.41		0		0		0	0.602
Meadow	8	5.0	40.3	0.28	5.04		0		0		0	1.412
Lake /	16	0.1	1.7	0.05	0.11		0		0		0	0.005
Lawn	5	0.0	0.0	0.20	0		0		0		0	0
Cultivated	7	0.0	0.0	0.35	0		0		0		0	0
Impervious	2	0.0	0.0	0.95	0		0		0		0	0
Composite		7.56	8.8	Composite Runoff Coefficient								0.27

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Sheet Flow	204.27	2.06	1.0%	-	-	-	-	-	0.16	0.11	0.64	0.43

Appropriate calculated time to peak:	0.43	Appropriate Method:	Airport

Project Name: 353 Townline Road
Project Number: 0369-6730
Date: 2023-05-24
Completed By: AB/HL

D.A. NAME	**102**
D.A. AREA (ha)	**1.67**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 102

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Silty Clay		BC	100	1.67
				0
				0
				0
Total Area				1.67

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		Other		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0		98		98		98		98		50	0.000	0.00
0		98		98		98		98		50	0	0
Subtotal			0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Lake / Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	1.44	65	0.23	71		50	0	71		78	1.670	109.96
0		65		71		50	0	71		78	0.00	0.00
Subtotal	1.44		0		0		0		0			

Composite Area Calculations	Total Pervious Area	1.67	
	Total Impervious Area	0	
	% Impervious	0.00%	
	Composite Curve Number	65.8	
	Total Area Check	1.67	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Silty Clay		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	1.4	14.4	0.25	1.44		0		0		0	0.359
Meadow	8	0.2	1.9	0.28	0.23		0		0		0	0.066
Lake /	10	0.0	0.0	0.05	0.00		0		0		0	0.000
Lawn	5	0.0	0.0	0.20	0		0		0		0	0
Cultivated	7	0.0	0.0	0.35	0		0		0		0	0
Impervious	2	0.0	0.0	0.95	0		0		0		0	0
Composite		1.7	9.7	Composite Runoff Coefficient								0.25

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Sheet Flow	360	4.76	1.3%	-	-	-	-	-	0.31	0.21	0.80	0.53

Appropriate calculated time to peak:	0.53	Appropriate Method:	Airport

Project Name: 353 Townline Road
Project Number: 0369-6730
Date: 2023-10-05
Completed By: AB/HL

D.A. NAME UC01
D.A. AREA (ha) 0.78

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment UC01

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Silty Clay		BC	100	0.78
				0
				0
				0
Total Area				0.78

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		Other		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0		98		98		98		98		50	0.000	0.00
0		98		98		98		98		50	0	0
Subtotal			0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Lake / Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0		65	0.77	71	0.01	50	0	71		78	0.780	55.11
0		65		71		50	0	71		78	0.00	0.00
Subtotal	0.00		0.77		0		0		0			

Composite Area Calculations		
	Total Pervious Area	0.78
	Total Impervious Area	0
	% Impervious	0.00%
	Composite Curve Number	70.7
	Total Area Check	0.78

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				Silty Clay		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.0	0.0	0.25	0.00		0		0		0	0.000
Meadow	8	0.8	6.1	0.28	0.77		0		0		0	0.215
Lake /	16	0.0	0.2	0.05	0.01		0		0		0	0.001
Lawn	5	0.0	0.0	0.20	0		0		0		0	0
Cultivated	7	0.0	0.0	0.35	0		0		0		0	0
Impervious	2	0.0	0.0	0.95	0		0		0		0	0
Composite		0.8	8.1	Composite Runoff Coefficient								0.28

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Sheet Flow	168.28	3.38	2.0%	-	-	-	-	-	0.14	0.10	0.46	0.31

Appropriate calculated time to peak:	0.31	Appropriate Method:	Airport

Project Name: 353 Townline Road
Project Number: 0369-6730
Date: 2023-05-24
Completed By: AG

D.A. NAME	P Block
D.A. AREA (ha)	0.68

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment P Block

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Sandy Silt		BC	100	0.68
				0
				0
				0
Total Area Check				0.68

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWM Pond		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0		98		98		98		98	0.34	98	0.34	33.32
0		98		98		98		98		98	0	0
Subtotal Area	0.00		0		0		0		0.34			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		SWM Pond		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0		65		71		50	0.34	71		78	0.34	24.14
0		65		71		50	0	71		78	0	0
Subtotal Area	0		0		0		0.34		0			

Pervious Area Calculations	Total Pervious Area	0.34
	Composite Pervious Curve Number	71
Impervious Area Calculations	Total Directly Connected Area	0.34
	Total Indirectly Connected Area	0.00
	Total Impervious Area	0.34
	% X imp	50.0
	% T imp	50.0
	Total Area Check	0.68

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
SWM Pond	5	0.34	1.70
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	33.00	18	0.25
Impervious	2.0	13.4%	36.58	0.013

Project Name: 353 Townline Road
Project Number: 0369-6730
Date: 2023-05-24
Completed By: AB/HL

D.A. NAME	**UC02**
D.A. AREA (ha)	**0.31**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment UC02

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Silty Clay		BC	100	0.31
				0
				0
				0
Total Area				0.31

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		Other		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0		98		98		98		98		50	0.000	0.00
0		98		98		98		98		50	0	0
Subtotal			0		0		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Lake / Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.31	65		71		50	0	71		78	0.310	20.15
0		65		71		50	0	71		78	0.00	0.00
Subtotal	0.31		0.00		0		0		0			

Composite Area Calculations		
	Total Pervious Area	0.31
	Total Impervious Area	0
	% Impervious	0%
	Composite Curve Number	65.0
	Total Area Check	0.31

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
				Silty Clay		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.3	3.1	0.25	0.31		0		0		0	0.078
Meadow	8	0.0	0.0	0.28	0.00		0		0		0	0.000
Lake /	16	0.0	0.0	0.05	0.00		0		0		0	0.000
Lawn	5	0.0	0.0	0.20	0		0		0		0	0
Cultivated	7	0.0	0.0	0.35	0		0		0		0	0
Impervious	2	0.0	0.0	0.95	0		0		0		0	0
Composite		0.31	10.0	Composite Runoff Coefficient								0.25

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Sheet Flow	77.03	1.17	1.5%	-	-	-	-	-	0.08	0.05	0.35	0.24

Appropriate calculated time to peak:	0.24	Appropriate Method:	Airport

CROZIER CONSULTING ENGINEERS

Project: 353 Townline Road
Project No.: 0369-6730
Date: 2023-10-31
Designed By: HK

ROOFTOP PONDING CALCULATIONS

ZURN ROOF DRAIN FLOW RATING

Opening	G.P.M. Per Inch of Head	L.P.M. Per Inch of Head	L/s Per Meter of Head	L/s Per 0.05 m of Head	L/s Per 0.10 m of Head	L/s Per 0.15 m of Head
X_1	5.00	22.73	14.91	0.75	1.49	2.24
X_2	3.75	17.05	11.19	0.56	1.12	1.68
X_3	2.50	11.37	7.46	0.37	0.75	1.12
X_4	1.25	5.68	3.73	0.19	0.37	0.56

Note: Zurn control flow rates obtained from Drawing No. P-13521 - Adjustable Weir for Sloped-Roof "Control-Flo" Roof Drain

CONTROLLED ROOFTOP RELEASE RATE CALCULATIONS

Roof Name	Control System	Zurn Model Number	Release Rate per Drain (L/s per meter of head)	Proposed # of Zurn Drains	# of Notches per Zurn Drain	Total Release Rate from Roof (L/s)
Building 1	Zurn Roof Drain	ZCF121-1W-X3-Z-105-10-77	7.46	8	1	8.9
Building 2	Zurn Roof Drain	ZCF121-1W-X3-Z-105-10-77	7.46	14	1	15.7
Building 3A	Zurn Roof Drain	ZCF121-1W-X3-Z-105-10-77	7.46	8	1	8.9
Building 3B	Zurn Roof Drain	ZCF121-1W-X3-Z-105-10-77	7.46	8	1	8.9
Building 4	Zurn Roof Drain	ZCF121-1W-X3-Z-105-10-77	7.46	14	1	15.7

Building 1		Building 2		Building 3A	
Depth (m)	Release Rate (m^3/s)	Depth (m)	Release Rate (m^3/s)	Depth (m)	Release Rate (m^3/s)
0.00	0.000	0.00	0.000	0.00	0.000
0.05	0.001	0.05	0.003	0.05	0.001
0.10	0.003	0.10	0.005	0.10	0.003
0.15	0.004	0.15	0.008	0.15	0.004

Building 3B		Building 4	
Depth (m)	Release Rate (m^3/s)	Depth (m)	Release Rate (m^3/s)
0.00	0.000	0.00	0.000
0.05	0.001	0.05	0.003
0.10	0.003	0.10	0.005
0.15	0.004	0.15	0.008

C201	C202+C203
Depth (m)	Release Rate (m^3/s)
0.000	0.000
0.001	0.008
0.003	0.016
0.004	0.025

Project: 353 Townline Road
Project No.: 0369-6730
Date: 2023-10-31
Designed By: HK

ROOFTOP VOLUME CALCULATIONS

Building	Roof Area (m2)	Drains	A per Drain (m2)	m per Drain (m)
B1	6712	8	839	29.0
B2	9699	14	693	26.3
B3A	6166	8	771	27.8
B3B	6170	8	771	27.8
B4	10441	14	746	27.3

Percentage Roof Area Utilized	70%

Elev (m)	B1	B2	B3A (ha-m)	B3B	B4
0.00	0.0000	0.0000	0.0000	0.0000	0.0000
0.05	0.0235	0.0339	0.0216	0.0216	0.0365
0.10	0.0470	0.0679	0.0432	0.0432	0.0731
0.15	0.0705	0.1018	0.0647	0.0648	0.1096

VO Rating Curves

Building 1	
Discharge	Storage
(m3/s)	(ha-m)
0.0000	0.0000
0.0015	0.0235
0.0030	0.0470
0.0045	0.0705

Buildings 2-4	
Discharge	Storage
(m3/s)	(ha-m)
0.0000	0.0000
0.0082	0.1137
0.0164	0.2273
0.0246	0.3410

Project Name: 353 Townline Road
Project Number: 0369-6730
Date: 2023-10-06
Completed By: RA

SWM Pond Stage Storage Calculations

Operating Level	Elev.	Depth Above Bottom of Pond	Depth Above PP / ED Orifice	Area	Total Storage Volume	Storage Volume Above PP
	(m)	(m)	(m)	(sq.m)	(cu.m)	(cu.m)
Bottom of Pond	**114.00**	**0.00**	**0.00**	**408**	**0**	**0**
	114.25	0.25	0.00	641	131	0
	114.50	0.50	0.00	873	320	0
	114.75	0.75	0.00	1,105	568	0
Permanent Pool	**115.00**	**1.00**	**0.00**	**1,338**	**873**	**0**
	115.30	1.30	0.30	1,677	1,325	452
Extended Detention	115.50	1.50	0.50	1,903	1,683	810
	115.75	1.75	0.75	2,196	2,195	1,322
100-yr	116.00	2.00	1.00	2,489	2,781	1,908
	116.25	2.25	1.25	2,782	3,440	2,567
Emergency Spillway	**116.70**	**2.70**	**1.70**	**3310**	**4,810**	**3,937**
	116.90	2.90	1.90	3609	5,502	4,629
	117.00	3.00	2.00	3758	5,871	4,998
Top of Pond	**117**	**3.20**	**2.20**	**4,058**	**6,652**	**5,779**

CROZIER
CONSULTING ENGINEERS

Project: 353 Townline Road, Niagara-on-the-lake
Project No.: 0369-6730
Created By: HL
Checked By: RA
Date: 2023.10.05

Pond 1 Water Quality Requirements

MOE Stormwater Management Planning and Design Manual, March 2003
Per MOE Table 3.2, Wet Pond To Provide 70% TSS Removal - 24hr Drawdown of ED

Total Storage Volume =	150	m^3/ha	* based on 85% Impervious Level
Permanent Pool =	110	m^3/ha	* based on 85% Impervious Level
Extended Detention =	40	m^3/ha	* based on 85% Impervious Level

25 mm Storm - Extended Detention Calculation

Rainfall Depth =	25	mm	
Base Runoff =	25	mm	Runoff volume from 25mm VO Model for 7.25 ha drainage area, catchment 202, 203, and 204

Riverwalk West Quality/Quantity Pond (Pond 1)

	Updated		
Total Contributing Area =	7.27	ha	*based on Post-development Drainage Plan (Catchments 202 and 203).
Impervious Level =	85	%	

Permanent Pool = 110 m^3/ha * 7.27 ha
= **800 m^3**

Extended Detention = 40 m^3/ha * 7.27 ha
= **291 m^3**

Extended Detention = 25 mm * 7.27 ha
= **1,818 m^3**

Total Storage Required = **2,617 m^3**

Project: 353 Townline Road, Niagara-on-the-lake
Project No.: 0369-6730
Created By: HL
Checked By: RA
Date: 2023.10.05

Sediment Forebay Sizing Calculations

Method #1 - Settling Calculations

Distance = $((rQ_p)/V_s)^{0.5}$ — Equation 4.5 (MOECP, 2003)

r =	2.22		Length (25.7) to width(11.6 m) ratio of forebay
Q_p =	0.01	m^3/s	Peak flow from facility in quality storm in m^3/s (25mm event)
V_s =	0.0003	m/s	Settling Velocity in m/s

Min Distance = 7.6 m

Method #2 - Dispersion Length

Distance = $(8Q/dV_f)$ — Equation 4.6 (MOECP, 2003)

Q =	0.69	m^3/s	Inlet flowrate in m^3/s (5-year 3hr Chicago) - VO Model
d =	1.00	m	Depth of permanent pool in forebay in m
V_f =	0.50	m/s	Desired velocity in forebay in m/s

Min Distance = 11.0 m

Minimum Width Calculations

Width = Dist / 8 — Equation 4.7 (MOECP, 2003)

Min Width = 1.4 m

Check - Forebay Area Method

Ensure cross sectional forebay velocity is < 0.15m/s

Forebay width =	11.6	m	
Forebay depth =	1.0	m	
Side slopes (H:V) =	5		
Bottom width =	3.7	m	
Cross sectional area =	7.6	m^2	
Inlet flow rate	0.69	m^3/s	Inlet flowrate in m^3/s (5-year 3hr Chicago) - VO Model
Average Velocity	0.09	m/s	OK

As per MOECP Guidelines (March 2003) average velocity is to be less than, or equal to, 0.15m/s, therefore forebay sizing is appropriate.

Project: 353 Townline Road, Niagara-on-the-lake
Project No.: 0369-6730
Created By: HL
Checked By: RA
Date: 2023.10.05

EXTENDED DETENTION SPECIFICATIONS - SWM POND DESIGN

Extended Detention Volume (25mm)	1818	m^3
Mimimum Drawdown time	24	hrs
Mimimum Drawdown time	86400	s
Extended Detention Storage Volume Requirement (VO)	821	m^3

Calculation for minimum orifice size

$$t = \frac{0.66 * C2 * h^{1.5} + 2 * C3 * h^{0.5}}{2.75 * A0}$$

Equation 4.11
MOE SWM Planning & Design Manual (2003)

A_0	Cross sectional area of the orifice (m^2)		
h	Maximum water elevation above the orifice (m)	0.51	m
C2	Slope coefficient for the area-depth Linear regression	1222.90	
C3	Intercept for the area-depth linear regression	2870.70	

Ao = 0.0185 m^2 dmax = 153 mm

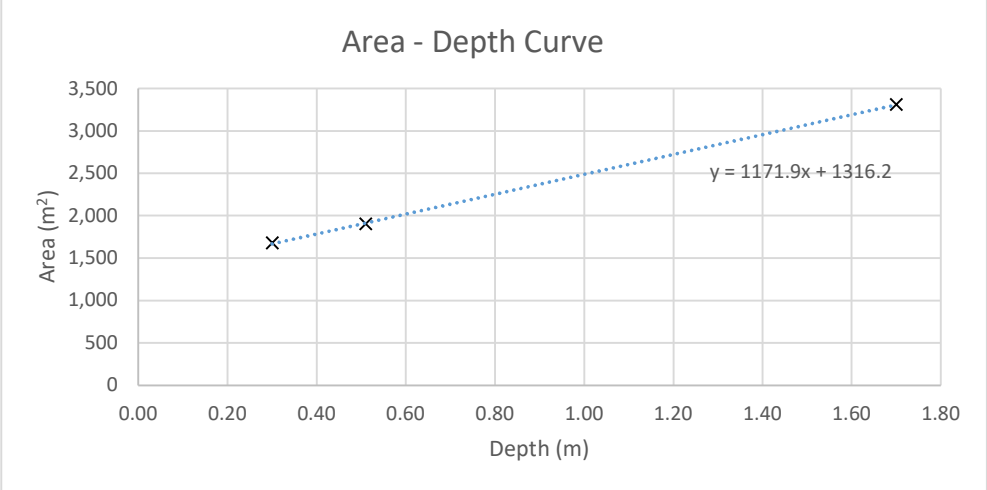
Extended Detention Orifice Diameter (as designed)	d =	**155**	mm
Extended Detention Orifice Area (as designed)	Ao =	0.02	m^2
Calculated Drawdown time	t =	24	hrs
Maximum Head Above Centroid	h =	0.43	m
Calculated Peak Flow	Q_{max} =	0.035	cms

Project: 353 Townline Road, Niagara-on-the-lake
Project No.: 0369-6730
Created By: HL
Checked By: RA
Date: 2023.10.05

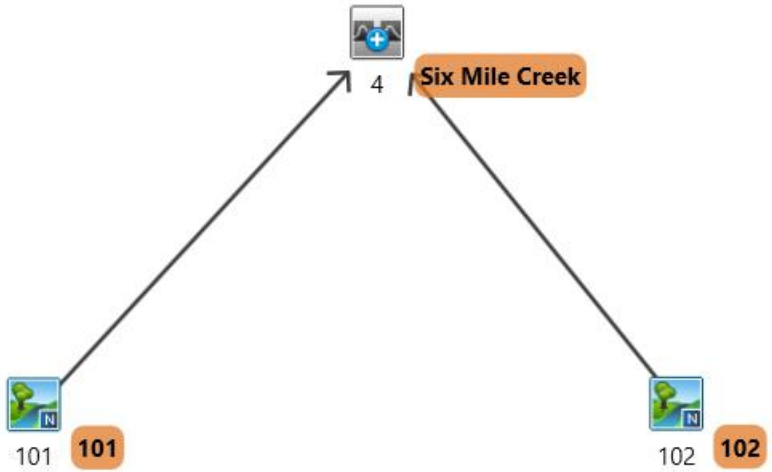
EXTENDED DETENTION SPECIFICATIONS - SWM POND DESIGN

Permenant Pool: 115.00 m

Elevation (m)	Depth (m)	Area (m^2)	Volume (m^3)
115.00	0.00	1,338	0
115.30	0.30	1,677	452
115.51	**0.51**	**1,903**	**821**
116.70	1.70	3,310	3937



Visual Otthymo 6.2 – Model Layout – PRE DEVELOPMENT



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

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


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807a-23d4c18968f4\516fbadd-aee9-4680-8082-e7c2a461e45b\scena


DATE: 12-12-2023                          TIME: 05:02:39

USER:


COMMENTS: _____________________________________________________________


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  ************************************************
  ** SIMULATION : 100yr 3hr 12min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 980.000
| Ptotal= 64.71 mm |                          B=   3.700
--------------------                          C=   0.732
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.83 |  0.80   30.63 |  1.60   14.64 |  2.40    7.55
                0.20    8.17 |  1.00  130.57 |  1.80   11.66 |  2.60    6.82
                0.40   10.38 |  1.20   36.63 |  2.00    9.79 |  2.80    6.23
                0.60   14.82 |  1.40   20.33 |  2.20    8.50 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   7.56   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

    Unit Hyd Qpeak  (cms)=   0.672

    PEAK FLOW       (cms)=   0.298 (i)
    TIME TO PEAK    (hrs)=   1.667
    RUNOFF VOLUME    (mm)=  20.040
    TOTAL RAINFALL   (mm)=  64.709
    RUNOFF COEFFICIENT   =   0.310

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.67   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

    Unit Hyd Qpeak  (cms)=   0.120

    PEAK FLOW       (cms)=   0.046 (i)
    TIME TO PEAK    (hrs)=   1.833
    RUNOFF VOLUME    (mm)=  16.178
    TOTAL RAINFALL   (mm)=  64.709
    RUNOFF COEFFICIENT   =   0.250

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

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| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):      7.56   0.298     1.67    20.04
     + ID2= 2 (  0102):      1.67   0.046     1.83    16.18
       ================================================
       ID = 3 (  0004):      9.23   0.341     1.67    19.34

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\16ec4997-709b-45bf-a04c-c341a06ddb17\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\16ec4997-709b-45bf-a04c-c341a06ddb17\scena


DATE: 12-12-2023                          TIME: 05:02:39

USER:



COMMENTS: _____________________________________________________

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  ***********************************************
  ** SIMULATION : 10yr 3hr 12min Chicago        **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 724.000
| Ptotal= 45.98 mm |                          B=   4.300
--------------------                          C=   0.739
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 12.00 min
                        Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.78 |  0.80   22.19 |  1.60   10.43 |  2.40    5.30
                0.20    5.75 |  1.00   92.03 |  1.80    8.26 |  2.60    4.78
                0.40    7.34 |  1.20   26.62 |  2.00    6.91 |  2.80    4.36
                0.60   10.57 |  1.40   14.61 |  2.20    5.98 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   7.56   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
                0.167   4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
                0.250   5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
                0.333   5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
                0.417   6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
                0.500   7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
                0.583   7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
                0.667   9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
                0.750  10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

    Unit Hyd Qpeak  (cms)=   0.672

    PEAK FLOW       (cms)=   0.146 (i)
    TIME TO PEAK    (hrs)=   1.750
    RUNOFF VOLUME    (mm)=  10.177
    TOTAL RAINFALL   (mm)=  45.981
    RUNOFF COEFFICIENT   =   0.221

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.67   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
                0.167   4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
                0.250   5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
                0.333   5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
                0.417   6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
                0.500   7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
                0.583   7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
                0.667   9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
                0.750  10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

    Unit Hyd Qpeak  (cms)=   0.120

    PEAK FLOW       (cms)=   0.021 (i)
    TIME TO PEAK    (hrs)=   1.917
    RUNOFF VOLUME    (mm)=   7.820
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     TOTAL RAINFALL   (mm)=  45.981
     RUNOFF COEFFICIENT   =   0.170

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

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     7.56   0.146     1.75    10.18
      + ID2= 2 (  0102):     1.67   0.021     1.92     7.82
        ================================================
        ID = 3 (  0004):     9.23   0.167     1.75     9.75

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\29d9dfae-7bb6-42ca-b9b3-51a072b185a3\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\29d9dfae-7bb6-42ca-b9b3-51a072b185a3\scena


DATE: 12-12-2023                          TIME: 05:02:39

USER:


COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : 25mm                         **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\rbabic\AppD
|                  |              ata\Local\Temp\
|                  |              99b7a6e0-4c04-4b9d-b8ce-46c6cb9b336b\001e0f2d
| Ptotal= 30.00 mm |    Comments: 25mm
--------------------
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.00     2.79 |  0.80    15.94 |  1.60     6.84 |  2.40     3.13
                0.20     3.44 |  1.00    58.59 |  1.80     5.22 |  2.60     2.78
                0.40     4.56 |  1.20    19.37 |  2.00     4.25 |  2.80     2.51
                0.60     6.94 |  1.40    10.05 |  2.20     3.60 |

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

--------------------
| CALIB            |
| NASHYD   (  0101)|   Area     (ha)=   7.56   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

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

                           ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     2.79 | 0.833    10.54 | 1.583    10.05 |  2.33     3.60
               0.167     2.79 | 0.917    15.94 | 1.667     7.48 |  2.42     3.51
               0.250     3.18 | 1.000    15.94 | 1.750     6.84 |  2.50     3.13
               0.333     3.44 | 1.083    58.59 | 1.833     6.19 |  2.58     3.13
               0.417     3.66 | 1.167    58.59 | 1.917     5.22 |  2.67     2.85
               0.500     4.56 | 1.250    35.06 | 2.000     5.22 |  2.75     2.78
               0.583     4.56 | 1.333    19.37 | 2.083     4.25 |  2.83     2.67
               0.667     6.46 | 1.417    17.51 | 2.167     4.25 |  2.92     2.51
               0.750     6.94 | 1.500    10.05 | 2.250     3.86 |  3.00     2.51

     Unit Hyd Qpeak  (cms)=   0.672

     PEAK FLOW       (cms)=   0.054 (i)
     TIME TO PEAK    (hrs)=   1.833
     RUNOFF VOLUME    (mm)=   3.849
     TOTAL RAINFALL   (mm)=  30.002
     RUNOFF COEFFICIENT   =   0.128

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area     (ha)=   1.67   Curve Number    (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia       (mm)=   9.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

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

                           ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     2.79 | 0.833    10.54 | 1.583    10.05 |  2.33     3.60
               0.167     2.79 | 0.917    15.94 | 1.667     7.48 |  2.42     3.51
               0.250     3.18 | 1.000    15.94 | 1.750     6.84 |  2.50     3.13
               0.333     3.44 | 1.083    58.59 | 1.833     6.19 |  2.58     3.13
               0.417     3.66 | 1.167    58.59 | 1.917     5.22 |  2.67     2.85
               0.500     4.56 | 1.250    35.06 | 2.000     5.22 |  2.75     2.78
               0.583     4.56 | 1.333    19.37 | 2.083     4.25 |  2.83     2.67
               0.667     6.46 | 1.417    17.51 | 2.167     4.25 |  2.92     2.51
               0.750     6.94 | 1.500    10.05 | 2.250     3.86 |  3.00     2.51
```

```
     Unit Hyd Qpeak  (cms)=   0.120

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=   2.705
     TOTAL RAINFALL   (mm)=  30.002
     RUNOFF COEFFICIENT   =   0.090

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

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     7.56   0.054     1.83     3.85
     + ID2= 2 (  0102):     1.67   0.007     2.00     2.71
       ================================================
       ID = 3 (  0004):     9.23   0.061     1.83     3.64

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\4744c076-df28-43dd-96a0-6c2e1f97806f\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\4744c076-df28-43dd-96a0-6c2e1f97806f\scena


DATE: 12-12-2023                          TIME: 05:02:39

USER:



COMMENTS: _____________________________________________________________

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  ***********************************************
  ** SIMULATION : 25yr 3hr 12min Chicago        **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 821.000
| Ptotal= 53.30 mm |                          B=   4.000
--------------------                          C=   0.735
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    5.59 |  0.80   25.49 |  1.60   12.09 |  2.40    6.19
                0.20    6.71 |  1.00  106.98 |  1.80    9.60 |  2.60    5.59
                0.40    8.54 |  1.20   30.52 |  2.00    8.05 |  2.80    5.10
                0.60   12.24 |  1.40   16.85 |  2.20    6.98 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   7.56   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
               0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
               0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
               0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
               0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
               0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
               0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
               0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
               0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Unit Hyd Qpeak  (cms)=   0.672

     PEAK FLOW       (cms)=   0.200 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=  13.769
     TOTAL RAINFALL   (mm)=  53.305
     RUNOFF COEFFICIENT   =   0.258

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.67   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
               0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
```

```
              0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
              0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
              0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
              0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
              0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
              0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
              0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Unit Hyd Qpeak  (cms)=   0.120

     PEAK FLOW       (cms)=   0.030 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=  10.825
     TOTAL RAINFALL   (mm)=  53.305
     RUNOFF COEFFICIENT   =   0.203

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

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     7.56   0.200     1.75    13.77
     + ID2= 2 (  0102):     1.67   0.030     1.92    10.83
       ================================================
       ID = 3 (  0004):     9.23   0.229     1.75    13.24

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\70af02bd-84cf-4215-b26d-33572a0d0df6\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\70af02bd-84cf-4215-b26d-33572a0d0df6\scena


DATE: 12-12-2023                          TIME: 05:02:39

USER:


COMMENTS: _____
```

```
--------------------------------------------------------------------------------
----------------------
  ***********************************************
  ** SIMULATION : 2yr 3hr 12min Chicago         **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 567.000
| Ptotal= 34.59 mm |                          B=   5.200
--------------------                          C=   0.746
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.57 |  0.80   17.16 |  1.60    7.93 |  2.40    3.96
                0.20    4.30 |  1.00   67.90 |  1.80    6.24 |  2.60    3.56
                0.40    5.53 |  1.20   20.64 |  2.00    5.20 |  2.80    3.24
                0.60    8.04 |  1.40   11.21 |  2.20    4.48 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   7.56   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

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

                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
               0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
               0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
               0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
               0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
               0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
               0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
               0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
               0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Unit Hyd Qpeak  (cms)=   0.672

     PEAK FLOW       (cms)=   0.075 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   5.425
     TOTAL RAINFALL   (mm)=  34.593
     RUNOFF COEFFICIENT   =   0.157

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.67   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53
```

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

                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
              0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
              0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
              0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
              0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
              0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
              0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
              0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
              0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

    Unit Hyd Qpeak  (cms)=   0.120

    PEAK FLOW       (cms)=   0.010 (i)
    TIME TO PEAK    (hrs)=   2.000
    RUNOFF VOLUME    (mm)=   3.948
    TOTAL RAINFALL   (mm)=  34.593
    RUNOFF COEFFICIENT   =   0.114

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

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     7.56   0.075     1.75     5.43
     + ID2= 2 (  0102):     1.67   0.010     2.00     3.95
       ====================================================
       ID = 3 (  0004):     9.23   0.085     1.83     5.16

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\e7e42041-4319-4a52-80b5-e861ca31fdbb\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\e7e42041-4319-4a52-80b5-e861ca31fdbb\scena

DATE: 12-12-2023                          TIME: 05:02:39

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------
-----------------------
  ************************************************
  ** SIMULATION : 50yr 3hr 12min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 900.000
| Ptotal= 58.79 mm |                          B=   3.800
--------------------                          C=   0.734
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    6.17 |  0.80   27.91 |  1.60   13.29 |  2.40    6.83
               0.20    7.39 |  1.00  118.69 |  1.80   10.56 |  2.60    6.16
               0.40    9.40 |  1.20   33.40 |  2.00    8.86 |  2.80    5.63
               0.60   13.45 |  1.40   18.49 |  2.20    7.69 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   7.56   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

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

                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
              0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
              0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
              0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
              0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
              0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
              0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
              0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
              0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

    Unit Hyd Qpeak  (cms)=   0.672

    PEAK FLOW       (cms)=   0.246 (i)
    TIME TO PEAK    (hrs)=   1.667
    RUNOFF VOLUME    (mm)=  16.689
    TOTAL RAINFALL   (mm)=  58.787
    RUNOFF COEFFICIENT   =   0.284

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.67   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

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


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
             0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
             0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
             0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
             0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
             0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
             0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
             0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
             0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

     Unit Hyd Qpeak  (cms)=   0.120

     PEAK FLOW       (cms)=   0.037 (i)
     TIME TO PEAK    (hrs)=   1.833
     RUNOFF VOLUME    (mm)=  13.303
     TOTAL RAINFALL   (mm)=  58.787
     RUNOFF COEFFICIENT   =   0.226

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

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     7.56   0.246     1.67    16.69
      + ID2= 2 (  0102):     1.67   0.037     1.83    13.30
        ================================================
        ID = 3 (  0004):     9.23   0.282     1.75    16.08

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

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

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\79a945dc-0c81-4ba8-811f-0e49e46035b6\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-
807a-23d4c18968f4\79a945dc-0c81-4ba8-811f-0e49e46035b6\scena


DATE: 12-12-2023                          TIME: 05:02:39

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
-----------------------
  ***********************************************
  ** SIMULATION : 5yr 3hr 12min Chicago         **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 664.000
| Ptotal= 41.02 mm |                          B=   4.700
--------------------                          C=   0.744
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.00    4.22 |  0.80   20.04 |  1.60    9.32 |  2.40    4.69
              0.20    5.09 |  1.00   81.75 |  1.80    7.35 |  2.60    4.22
              0.40    6.52 |  1.20   24.08 |  2.00    6.13 |  2.80    3.84
              0.60    9.44 |  1.40   13.12 |  2.20    5.30 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   7.56   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

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


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
             0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
             0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
             0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
             0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
             0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
```

353 Townline Road
Visual Otthymo Model Output – PRE DEVELOPMENT

```
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
               0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Unit Hyd Qpeak  (cms)=   0.672

     PEAK FLOW       (cms)=   0.113 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   7.971
     TOTAL RAINFALL   (mm)=  41.019
     RUNOFF COEFFICIENT   =   0.194

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

---------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.67   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
               0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
               0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
               0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
               0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
               0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
               0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Unit Hyd Qpeak  (cms)=   0.120

     PEAK FLOW       (cms)=   0.016 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=   6.004
     TOTAL RAINFALL   (mm)=  41.019
     RUNOFF COEFFICIENT   =   0.146

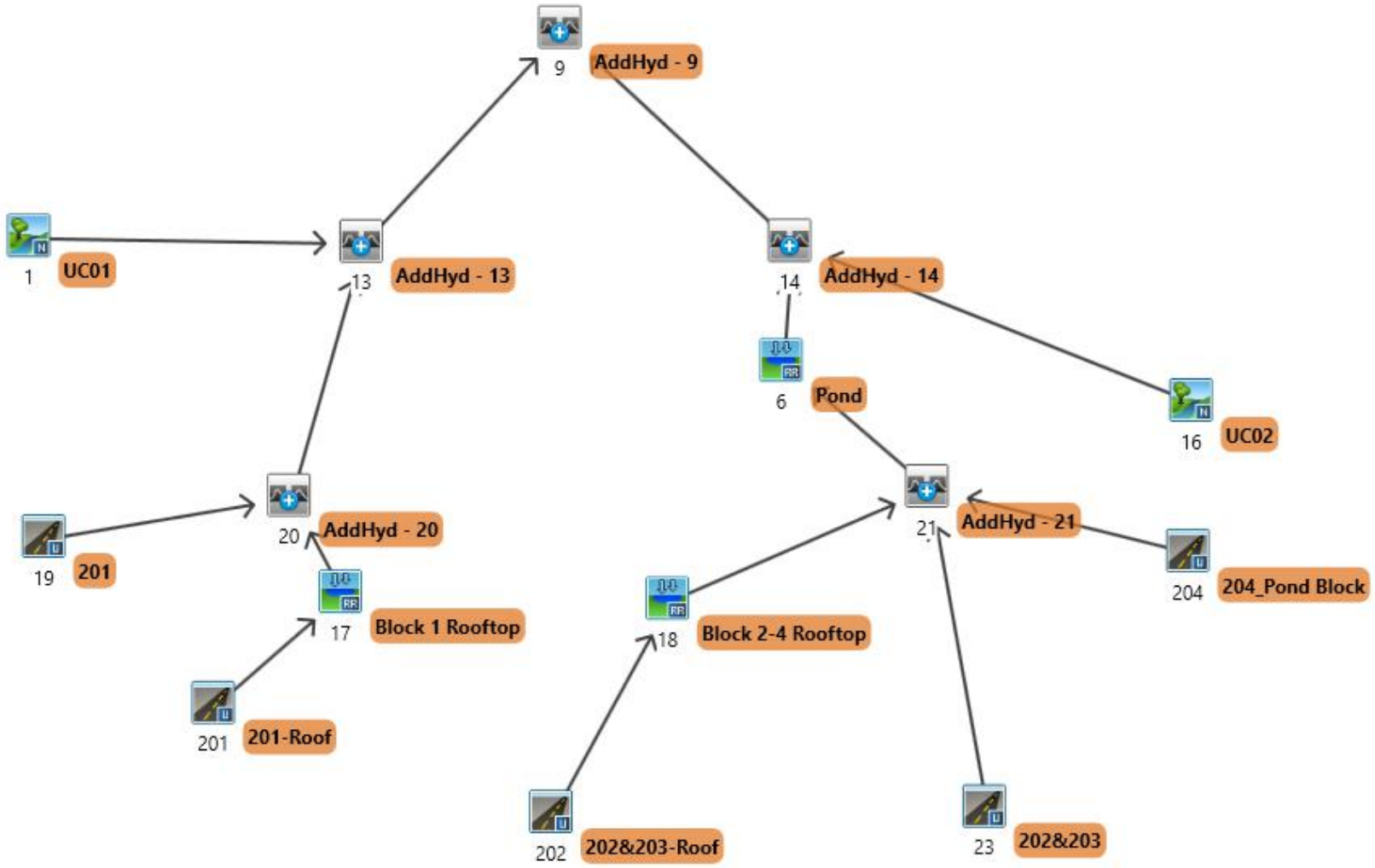
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     7.56   0.113     1.75     7.97
      + ID2= 2 (  0102):     1.67   0.016     1.92     6.00
        ==========================================================
        ID = 3 (  0004):     9.23   0.129     1.75     7.61

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

Visual Otthymo 6.2 – Model Layout – POST DEVELOPMENT



353 Townline Road
Visual Otthymo Model Output – POST DEVELOPMENT

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\690d205e-6f26-4c7f-9a22-
cc07d8b9fb42\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\690d205e-6f26-4c7f-9a22-
cc07d8b9fb42\scena

DATE: 12-12-2023                          TIME: 05:04:10

USER:


COMMENTS: _____

--------------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 01                        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 567.000
| Ptotal= 34.59 mm |                          B=   5.200
--------------------                          C=   0.746
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.57 |  0.80   17.16 |  1.60    7.93 |  2.40    3.96
                0.20    4.30 |  1.00   67.90 |  1.80    6.24 |  2.60    3.56
                0.40    5.53 |  1.20   20.64 |  2.00    5.20 |  2.80    3.24
                0.60    8.04 |  1.40   11.21 |  2.20    4.48 |

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   0.78   Curve Number   (CN)= 70.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.31

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

                                  ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
               0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
               0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
               0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
               0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
               0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
               0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
               0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
               0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Unit Hyd Qpeak  (cms)=   0.096

     PEAK FLOW       (cms)=   0.009 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   5.324
     TOTAL RAINFALL   (mm)=  34.593
     RUNOFF COEFFICIENT   =   0.154

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

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--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   0.67
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.66         0.01
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00         2.00
     Mannings n            =      0.013        0.250

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

                                  ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
               0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
               0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
               0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
               0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
               0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
               0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
               0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
               0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Max.Eff.Inten.(mm/hr)=      67.90        65.57
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.96 (ii)    1.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.34
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.00          0.126 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17           1.17
     RUNOFF VOLUME    (mm)=      33.59        31.21          33.57
     TOTAL RAINFALL   (mm)=      34.59        34.59          34.59
     RUNOFF COEFFICIENT   =       0.97         0.90           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0017)|     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   |   0.0030     0.0470
                          0.0015     0.0235   |   0.0045     0.0705

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     0.670     0.126      1.17      33.57
   OUTFLOW: ID= 1 (  0017)     0.670     0.001      3.08      27.62

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.09
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0216

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--------------------
| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.46         0.12
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      62.18        40.00
     Mannings n            =      0.013        0.250

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

                                  ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
               0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
               0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
               0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
               0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
               0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
               0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
               0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
               0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Max.Eff.Inten.(mm/hr)=      67.90        59.12
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.24 (ii)   10.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.30         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.01          0.071 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.33           1.17
     RUNOFF VOLUME    (mm)=      33.59        16.13          26.60
```

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     TOTAL RAINFALL   (mm)=      34.59        34.59          34.59
     RUNOFF COEFFICIENT   =       0.97         0.47           0.77

***** 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.

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--------------------
| ADD HYD  (  0020)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.67   0.001     3.08    27.62
     + ID2= 2 (  0019):     0.58   0.071     1.17    26.60
       ================================================
       ID = 3 (  0020):     1.25   0.072     1.17    27.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.78   0.009     1.58     5.32
     + ID2= 2 (  0020):     1.25   0.072     1.17    27.14
       ================================================
       ID = 3 (  0013):     2.03   0.073     1.17    18.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0016)|   Area    (ha)=   0.50   Curve Number   (CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
               0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
               0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
               0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
               0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
               0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
               0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
               0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
               0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Unit Hyd Qpeak  (cms)=   0.080

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   3.744
     TOTAL RAINFALL   (mm)=  34.593
     RUNOFF COEFFICIENT   =   0.108

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

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--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   3.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.22         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        40.00
     Mannings n            =      0.013        0.250

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
               0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
               0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
               0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
               0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
               0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
               0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
               0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
               0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Max.Eff.Inten.(mm/hr)=      67.90        65.57
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.96 (ii)    2.27 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.30
                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.61         0.01          0.613 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17           1.17
     RUNOFF VOLUME    (mm)=      33.59        31.21          33.57
     TOTAL RAINFALL   (mm)=      34.59        34.59          34.59
     RUNOFF COEFFICIENT   =       0.97         0.90           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  99.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0018)|     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   |   0.0164     0.2273
                          0.0082     0.1137   |   0.0246     0.3410

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0202)   3.250     0.613      1.17      33.57
     OUTFLOW: ID= 1 (  0018)   3.250     0.008      3.08      32.48

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.23
                    TIME SHIFT OF PEAK FLOW       (min)=115.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.1044

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--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.68
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.34
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=      13.40        33.00
     Length            (m)=      36.58        18.00
     Mannings n            =      0.013        0.250

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
               0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
               0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
               0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
               0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
               0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
               0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
               0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
               0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Max.Eff.Inten.(mm/hr)=      67.90        11.13
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.75 (ii)    2.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.28
                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.01          0.075 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17           1.17
     RUNOFF VOLUME    (mm)=      32.59         6.57          19.58
     TOTAL RAINFALL   (mm)=      34.59        34.59          34.59
     RUNOFF COEFFICIENT   =       0.94         0.19           0.57

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

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

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--------------------
| CALIB            |
| STANDHYD (  0023)|   Area    (ha)=   2.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.22         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.56         2.00
     Length            (m)=      51.34        40.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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                    ---- TRANSFORMED HYETOGRAPH ----
 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
0.083    3.57 | 0.833   11.69 | 1.583   11.21 |  2.33    4.48
0.167    3.57 | 0.917   17.16 | 1.667    8.59 |  2.42    4.38
0.250    4.01 | 1.000   17.16 | 1.750    7.93 |  2.50    3.96
0.333    4.30 | 1.083   67.90 | 1.833    7.26 |  2.58    3.96
0.417    4.55 | 1.167   67.90 | 1.917    6.24 |  2.67    3.64
0.500    5.53 | 1.250   39.54 | 2.000    6.24 |  2.75    3.56
0.583    5.53 | 1.333   20.64 | 2.083    5.20 |  2.83    3.43
0.667    7.54 | 1.417   18.75 | 2.167    5.20 |  2.92    3.24
0.750    8.04 | 1.500   11.21 | 2.250    4.77 |  3.00    3.24

     Max.Eff.Inten.(mm/hr)=      67.90        59.12
                  over (min)      5.00        15.00
     Storage Coeff.  (min)=       1.75 (ii)   10.46 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.32         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.31         0.06      0.342 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.33       1.17
     RUNOFF VOLUME    (mm)=     32.59        16.13      26.01
     TOTAL RAINFALL   (mm)=     34.59        34.59      34.59
     RUNOFF COEFFICIENT   =      0.94         0.47       0.75

***** 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  (  0021)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0018):     3.25   0.008     3.08    32.48
     + ID2= 2 (  0204):     0.68   0.075     1.17    19.58
       ================================================
       ID = 3 (  0021):     3.93   0.078     1.17    30.25

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

--------------------
| ADD HYD  (  0021)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0021):     3.93   0.078     1.17    30.25
     + ID2= 2 (  0023):     2.77   0.342     1.17    26.01
       ================================================
       ID = 1 (  0021):     6.70   0.420     1.17    28.50

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

--------------------
| RESERVOIR(  0006)|     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   |  0.0420      0.1908
                           0.0009     0.0452   |  0.0470      0.2567
                           0.0050     0.0810   |  0.0560      0.3937
                           0.0180     0.1322   |  0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0021)      6.700     0.420      1.17      28.50
   OUTFLOW: ID= 1 (  0006)      6.700     0.007      7.08      23.55

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.61
                  TIME SHIFT OF PEAK FLOW         (min)=355.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0880

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

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     0.50   0.004     1.50     3.74
     + ID2= 2 (  0006):     6.70   0.007     7.08    23.55
       ================================================
       ID = 3 (  0014):     7.20   0.008     3.08    22.17

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     2.03   0.073     1.17    18.76
     + ID2= 2 (  0014):     7.20   0.008     3.08    22.17
       ================================================
       ID = 3 (  0009):     9.23   0.075     1.17    21.42

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\31ab1e10-ef28-4c3a-a474-
f1d1f24a62a5\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\31ab1e10-ef28-4c3a-a474-
f1d1f24a62a5\scena


DATE: 12-12-2023                          TIME: 05:04:10

USER:


COMMENTS: _____________________________________________________


----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 02                        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 664.000
| Ptotal= 41.02 mm |                          B=   4.700
--------------------                          C=   0.744
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    = 12.00 min
                         Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.22 |  0.80   20.04 |  1.60    9.32 |  2.40    4.69
                0.20    5.09 |  1.00   81.75 |  1.80    7.35 |  2.60    4.22
                0.40    6.52 |  1.20   24.08 |  2.00    6.13 |  2.80    3.84
                0.60    9.44 |  1.40   13.12 |  2.20    5.30 |


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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   0.78   Curve Number   (CN)= 70.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.31

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


                    ---- TRANSFORMED HYETOGRAPH ----
 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

    Unit Hyd Qpeak  (cms)=   0.096

    PEAK FLOW       (cms)=   0.014 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=   7.839
    TOTAL RAINFALL   (mm)=  41.019
    RUNOFF COEFFICIENT   =   0.191

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

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353 Townline Road
Visual Otthymo Model Output – POST DEVELOPMENT

```
| CALIB             |
| STANDHYD (  0201)|   Area    (ha)=   0.67
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.66         0.01
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00         2.00
     Mannings n             =     0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
               0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
               0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
               0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
               0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
               0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
               0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Max.Eff.Inten.(mm/hr)=      81.75        79.66
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.89 (ii)    1.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.34
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.00          0.152 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17           1.17
     RUNOFF VOLUME    (mm)=      40.02        37.61          39.99
     TOTAL RAINFALL   (mm)=      41.02        41.02          41.02
     RUNOFF COEFFICIENT   =       0.98         0.92           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  99.0    Ia = Dep. 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(  0017)|     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   |  0.0030      0.0470
                          0.0015     0.0235   |  0.0045      0.0705

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     0.670     0.152      1.17      39.99
   OUTFLOW: ID= 1 (  0017)     0.670     0.002      3.08      34.05

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.08
                 TIME SHIFT OF PEAK FLOW        (min)=115.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0258

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0019)|   Area    (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.46         0.12
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      62.18        40.00
     Mannings n             =     0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
               0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
               0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
               0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
               0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
               0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
               0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Max.Eff.Inten.(mm/hr)=      81.75        80.66
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.08 (ii)    7.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.14
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                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.02          0.095 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.25           1.17
     RUNOFF VOLUME    (mm)=      40.02        21.11          32.45
     TOTAL RAINFALL   (mm)=      41.02        41.02          41.02
     RUNOFF COEFFICIENT   =       0.98         0.51           0.79

***** 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.

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--------------------
| ADD HYD  (  0020)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0017):     0.67   0.002     3.08     34.05
     + ID2= 2 (  0019):     0.58   0.095     1.17     32.45
       ================================================
       ID = 3 (  0020):     1.25   0.095     1.17     33.31

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0001):     0.78   0.014     1.58     7.84
     + ID2= 2 (  0020):     1.25   0.095     1.17    33.31
       ================================================
       ID = 3 (  0013):     2.03   0.098     1.17    23.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0016)|   Area    (ha)=   0.50   Curve Number   (CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
               0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
               0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
               0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
               0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
               0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
               0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Unit Hyd Qpeak  (cms)=   0.080

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   5.728
     TOTAL RAINFALL   (mm)=  41.019
     RUNOFF COEFFICIENT   =   0.140

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0202)|   Area    (ha)=   3.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.22         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        40.00
     Mannings n             =     0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
               0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
               0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
               0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
               0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
               0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
```

```
              0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Max.Eff.Inten.(mm/hr)=      81.75        79.66
           over (min)            5.00         5.00
     Storage Coeff.  (min)=       0.89 (ii)    2.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.31
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.73         0.01          0.738 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=      40.02        37.61         39.99
     TOTAL RAINFALL   (mm)=      41.02        41.02         41.02
     RUNOFF COEFFICIENT   =       0.98         0.92          0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  99.0    Ia = Dep. 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(  0018)|     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   |   0.0164     0.2273
                          0.0082     0.1137   |   0.0246     0.3410

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     3.250     0.738      1.17      39.99
   OUTFLOW: ID= 1 (  0018)     3.250     0.009      3.08      38.91

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.21
                 TIME SHIFT OF PEAK FLOW         (min)=115.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.1244

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.68
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.34
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=      13.40        33.00
     Length            (m)=      36.58        18.00
     Mannings n            =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
               0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
               0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
               0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
               0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
               0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
               0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Max.Eff.Inten.(mm/hr)=      81.75        16.17
           over (min)            5.00         5.00
     Storage Coeff.  (min)=       0.70 (ii)    2.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.29
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.02          0.093 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=      39.02         9.28         24.15
     TOTAL RAINFALL   (mm)=      41.02        41.02         41.02
     RUNOFF COEFFICIENT   =       0.95         0.23          0.59

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0023)|   Area    (ha)=   2.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.22         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.56         2.00

     Length            (m)=      51.34        40.00
     Mannings n            =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.22 | 0.833   13.68 | 1.583   13.12 |  2.33    5.30
               0.167    4.22 | 0.917   20.04 | 1.667   10.08 |  2.42    5.18
               0.250    4.74 | 1.000   20.04 | 1.750    9.32 |  2.50    4.69
               0.333    5.09 | 1.083   81.75 | 1.833    8.53 |  2.58    4.69
               0.417    5.37 | 1.167   81.75 | 1.917    7.35 |  2.67    4.31
               0.500    6.52 | 1.250   47.14 | 2.000    7.35 |  2.75    4.22
               0.583    6.52 | 1.333   24.08 | 2.083    6.13 |  2.83    4.07
               0.667    8.86 | 1.417   21.88 | 2.167    6.13 |  2.92    3.84
               0.750    9.44 | 1.500   13.12 | 2.250    5.63 |  3.00    3.84

     Max.Eff.Inten.(mm/hr)=      81.75        80.66
           over (min)            5.00        10.00
     Storage Coeff.  (min)=       1.62 (ii)    6.55 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.10          0.456 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.25          1.17
     RUNOFF VOLUME    (mm)=      39.02        21.11         31.86
     TOTAL RAINFALL   (mm)=      41.02        41.02         41.02
     RUNOFF COEFFICIENT   =       0.95         0.51          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.

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

--------------------
| ADD HYD  (  0021)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0018):     3.25   0.009     3.08    38.91
      + ID2= 2 (  0204):     0.68   0.093     1.17    24.15
        ==========================================================
        ID = 3 (  0021):     3.93   0.098     1.17    36.36

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

--------------------
| ADD HYD  (  0021)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0021):     3.93   0.098     1.17    36.36
      + ID2= 2 (  0023):     2.77   0.456     1.17    31.86
        ==========================================================
        ID = 1 (  0021):     6.70   0.554     1.17    34.50

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     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   |   0.0420     0.1908
                          0.0009     0.0452   |   0.0470     0.2567
                          0.0050     0.0810   |   0.0560     0.3937
                          0.0180     0.1322   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0021)     6.700     0.554      1.17      34.50
   OUTFLOW: ID= 1 (  0006)     6.700     0.011      3.25      29.30

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.01
                 TIME SHIFT OF PEAK FLOW         (min)=125.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.1052

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

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0016):     0.50   0.007     1.50     5.73
      + ID2= 2 (  0006):     6.70   0.011     3.25    29.30
        ==========================================================
        ID = 3 (  0014):     7.20   0.013     3.00    27.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0009)|
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```
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------      (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     2.03   0.098     1.17    23.52
     + ID2= 2 (  0014):     7.20   0.013     3.00    27.66
       ==========================================
       ID = 3 (  0009):     9.23   0.101     1.17    26.75

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\4c7f681d-13b9-46da-870b-
0efc441f9c70\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\4c7f681d-13b9-46da-870b-
0efc441f9c70\scena


DATE: 12-12-2023                          TIME: 05:04:10

USER:


COMMENTS: _____

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 03                        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 724.000
| Ptotal= 45.98 mm |                          B=   4.300
--------------------                          C=   0.739
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.78 |  0.80   22.19 |  1.60   10.43 |  2.40    5.30
                0.20    5.75 |  1.00   92.03 |  1.80    8.26 |  2.60    4.78
                0.40    7.34 |  1.20   26.62 |  2.00    6.91 |  2.80    4.36
                0.60   10.57 |  1.40   14.61 |  2.20    5.98 |


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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   0.78   Curve Number   (CN)= 70.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.31

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
               0.167    4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
               0.250    5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
               0.333    5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
               0.417    6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
               0.500    7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
               0.583    7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
               0.667    9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
               0.750   10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

     Unit Hyd Qpeak  (cms)=   0.096

     PEAK FLOW       (cms)=   0.018 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  10.020
     TOTAL RAINFALL   (mm)=  45.981
     RUNOFF COEFFICIENT   =   0.218

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

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--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   0.67
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.66          0.01
     Dep. Storage     (mm)=        1.00          1.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       15.00          2.00
     Mannings n            =       0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
               0.167    4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
               0.250    5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
               0.333    5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
               0.417    6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
               0.500    7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
               0.583    7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
               0.667    9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
               0.750   10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

     Max.Eff.Inten.(mm/hr)=      92.03        90.11
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.85 (ii)    1.04 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.34
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.00          0.171 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17           1.17
     RUNOFF VOLUME    (mm)=      44.98        42.55          44.96
     TOTAL RAINFALL   (mm)=      45.98        45.98          45.98
     RUNOFF COEFFICIENT   =       0.98         0.93           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0017)|     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   |   0.0030     0.0470
                          0.0015     0.0235   |   0.0045     0.0705

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     0.670     0.171      1.17      44.96
   OUTFLOW: ID= 1 (  0017)     0.670     0.002      3.08      39.01

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.08
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0290

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.46          0.12
     Dep. Storage     (mm)=        1.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       62.18         40.00
     Mannings n            =       0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
               0.167    4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
               0.250    5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
               0.333    5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
               0.417    6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
               0.500    7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
               0.583    7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
               0.667    9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
               0.750   10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

     Max.Eff.Inten.(mm/hr)=      92.03        97.94
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              over (min)        5.00        10.00
     Storage Coeff.  (min)=      1.99 (ii)    6.69 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.31         0.14
                                                  *TOTALS*
     PEAK FLOW       (cms)=      0.09         0.03          0.109 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.25          1.17
     RUNOFF VOLUME    (mm)=     44.98        25.13         37.03
     TOTAL RAINFALL   (mm)=     45.98        45.98         45.98
     RUNOFF COEFFICIENT   =      0.98         0.55          0.81

***** 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.

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-------------------
| ADD HYD  (  0020)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.67   0.002     3.08    39.01
     + ID2= 2 (  0019):     0.58   0.109     1.17    37.03
       ================================================
       ID = 3 (  0020):     1.25   0.110     1.17    38.09

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

-------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.78   0.018     1.58    10.02
     + ID2= 2 (  0020):     1.25   0.110     1.17    38.09
       ================================================
       ID = 3 (  0013):     2.03   0.114     1.17    27.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0016)|   Area     (ha)=   0.50   Curve Number   (CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.24

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

                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
              0.167    4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
              0.250    5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
              0.333    5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
              0.417    6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
              0.500    7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
              0.583    7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
              0.667    9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
              0.750   10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

     Unit Hyd Qpeak  (cms)=   0.080

     PEAK FLOW       (cms)=   0.009 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   7.486
     TOTAL RAINFALL   (mm)=  45.981
     RUNOFF COEFFICIENT   =   0.163

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

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-------------------
| CALIB            |
| STANDHYD (  0202)|   Area     (ha)=   3.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.22         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        40.00
     Mannings n            =      0.013        0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
              0.167    4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
              0.250    5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
              0.333    5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
              0.417    6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
              0.500    7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
              0.583    7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
              0.667    9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
              0.750   10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

     Max.Eff.Inten.(mm/hr)=      92.03        90.11
              over (min)         5.00         5.00
     Storage Coeff.  (min)=      0.85 (ii)    2.01 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.31
                                                  *TOTALS*
     PEAK FLOW       (cms)=      0.82         0.01          0.831 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=     44.98        42.55         44.96
     TOTAL RAINFALL   (mm)=     45.98        45.98         45.98
     RUNOFF COEFFICIENT   =      0.98         0.93          0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| RESERVOIR(  0018)|     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   |   0.0164     0.2273
                         0.0082     0.1137   |   0.0246     0.3410

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     3.250     0.831      1.17      44.96
   OUTFLOW: ID= 1 (  0018)     3.250     0.010      3.08      43.87

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.21
                 TIME SHIFT OF PEAK FLOW          (min)=115.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.1398

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=   0.68
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.34
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=      13.40        33.00
     Length            (m)=      36.58        18.00
     Mannings n            =      0.013        0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
              0.167    4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
              0.250    5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
              0.333    5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
              0.417    6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
              0.500    7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
              0.583    7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
              0.667    9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
              0.750   10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

     Max.Eff.Inten.(mm/hr)=      92.03        20.41
              over (min)         5.00         5.00
     Storage Coeff.  (min)=      0.66 (ii)    2.61 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.29
                                                  *TOTALS*
     PEAK FLOW       (cms)=      0.09         0.02          0.108 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=     43.98        11.60         27.79
     TOTAL RAINFALL   (mm)=     45.98        45.98         45.98
     RUNOFF COEFFICIENT   =      0.96         0.25          0.60

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

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

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-------------------
| CALIB            |
| STANDHYD (  0023)|   Area     (ha)=   2.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
-------------------
```

353 Townline Road
Visual Otthymo Model Output – POST DEVELOPMENT

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.22         0.55
     Dep. Storage     (mm)=        2.00         5.00
     Average Slope     (%)=       1.56         2.00
     Length            (m)=      51.34        40.00
     Mannings n           =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.78 | 0.833   15.22 | 1.583   14.61 |  2.33    5.98
               0.167    4.78 | 0.917   22.19 | 1.667   11.27 |  2.42    5.85
               0.250    5.36 | 1.000   22.19 | 1.750   10.43 |  2.50    5.30
               0.333    5.75 | 1.083   92.03 | 1.833    9.56 |  2.58    5.30
               0.417    6.07 | 1.167   92.03 | 1.917    8.26 |  2.67    4.88
               0.500    7.34 | 1.250   52.78 | 2.000    8.26 |  2.75    4.78
               0.583    7.34 | 1.333   26.62 | 2.083    6.91 |  2.83    4.61
               0.667    9.92 | 1.417   24.21 | 2.167    6.91 |  2.92    4.36
               0.750   10.57 | 1.500   14.61 | 2.250    6.35 |  3.00    4.36

     Max.Eff.Inten.(mm/hr)=      92.03        97.94
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     1.55 (ii)    6.25 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.33         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.42         0.13          0.523 (iii)
     TIME TO PEAK    (hrs)=        1.17         1.25           1.17
     RUNOFF VOLUME    (mm)=       43.98        25.13          36.44
     TOTAL RAINFALL   (mm)=       45.98        45.98          45.98
     RUNOFF COEFFICIENT   =        0.96         0.55           0.79

***** 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  (  0021)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0018):     3.25   0.010     3.08    43.87
     + ID2= 2 (  0204):     0.68   0.108     1.17    27.79
       ====================================================
       ID = 3 (  0021):     3.93   0.112     1.17    41.09

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

--------------------
| ADD HYD  (  0021)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0021):     3.93   0.112     1.17    41.09
     + ID2= 2 (  0023):     2.77   0.523     1.17    36.44
       ====================================================
       ID = 1 (  0021):     6.70   0.636     1.17    39.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     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   |  0.0420     0.1908
                          0.0009     0.0452   |  0.0470     0.2567
                          0.0050     0.0810   |  0.0560     0.3937
                          0.0180     0.1322   |  0.0000     0.0000

                             AREA      QPEAK     TPEAK       R.V.
                             (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0021)     6.700     0.636      1.17       39.17
   OUTFLOW: ID= 1 (  0006)     6.700     0.015      3.17       33.80

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.31
                TIME SHIFT OF PEAK FLOW         (min)=120.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1191

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

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     0.50   0.009     1.50     7.49
     + ID2= 2 (  0006):     6.70   0.015     3.17    33.80
       ====================================================
       ID = 3 (  0014):     7.20   0.017     3.00    31.97

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

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--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     2.03   0.114     1.17    27.31
     + ID2= 2 (  0014):     7.20   0.017     3.00    31.97
       ====================================================
       ID = 3 (  0009):     9.23   0.117     1.17    30.95

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\1cac5f78-3414-458a-b987-
e160a47b7809\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\1cac5f78-3414-458a-b987-
e160a47b7809\scena


DATE: 12-12-2023                          TIME: 05:04:10

USER:


COMMENTS: _____


--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 04                        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 821.000
| Ptotal= 53.30 mm |                          B=   4.000
--------------------                          C=   0.735
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    = 12.00 min
                         Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    5.59 |  0.80   25.49 |  1.60   12.09 |  2.40    6.19
                0.20    6.71 |  1.00  106.98 |  1.80    9.60 |  2.60    5.59
                0.40    8.54 |  1.20   30.52 |  2.00    8.05 |  2.80    5.10
                0.60   12.24 |  1.40   16.85 |  2.20    6.98 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=   0.78   Curve Number    (CN)= 70.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.31

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
               0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
               0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
               0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
               0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
               0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
               0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
               0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
               0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Unit Hyd Qpeak  (cms)=   0.096

     PEAK FLOW       (cms)=   0.025 (i)
     TIME TO PEAK    (hrs)=   1.500
```

353 Townline Road
Visual Otthymo Model Output – POST DEVELOPMENT

```
     RUNOFF VOLUME    (mm)=  13.575
     TOTAL RAINFALL   (mm)=  53.305
     RUNOFF COEFFICIENT   =   0.255

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0201)|   Area    (ha)=   0.67
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.66         0.01
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00         2.00
     Mannings n            =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
              0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
              0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
              0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
              0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
              0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
              0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
              0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
              0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Max.Eff.Inten.(mm/hr)=     106.98       105.28
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       0.80 (ii)    0.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.34
                                                      *TOTALS*
     PEAK FLOW        (cms)=      0.20         0.00         0.199 (iii)
     TIME TO PEAK     (hrs)=      1.17         1.17          1.17
     RUNOFF VOLUME     (mm)=     52.30        49.86         52.28
     TOTAL RAINFALL    (mm)=     53.30        53.30         53.30
     RUNOFF COEFFICIENT   =       0.98         0.94          0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0017)|     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   |   0.0030     0.0470
                         0.0015      0.0235   |   0.0045     0.0705

                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     0.670     0.199      1.17      52.28
   OUTFLOW: ID= 1 (  0017)     0.670     0.002      3.08      46.34

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.08
                 TIME SHIFT OF PEAK FLOW          (min)=115.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0337

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0019)|   Area    (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
-------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.46         0.12
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      62.18        40.00
     Mannings n            =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
              0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
              0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
              0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
              0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
              0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
              0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
              0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
              0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Max.Eff.Inten.(mm/hr)=     106.98       124.41
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.87 (ii)    6.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.15
                                                      *TOTALS*
     PEAK FLOW        (cms)=      0.10         0.03         0.130 (iii)
     TIME TO PEAK     (hrs)=      1.17         1.25          1.17
     RUNOFF VOLUME     (mm)=     52.30        31.27         43.88
     TOTAL RAINFALL    (mm)=     53.30        53.30         53.30
     RUNOFF COEFFICIENT   =       0.98         0.59          0.82

***** 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  (  0020)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0017):     0.67   0.002     3.08    46.34
       + ID2= 2 (  0019):     0.58   0.130     1.17    43.88
         ==========================================================
         ID = 3 (  0020):     1.25   0.131     1.17    45.20

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

-------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0001):     0.78   0.025     1.50    13.58
       + ID2= 2 (  0020):     1.25   0.131     1.17    45.20
         ==========================================================
         ID = 3 (  0013):     2.03   0.137     1.17    33.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD   (  0016)|   Area    (ha)=   0.50   Curve Number   (CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.24

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
              0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
              0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
              0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
              0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
              0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
              0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
              0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
              0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Unit Hyd Qpeak  (cms)=   0.080

     PEAK FLOW        (cms)=   0.014 (i)
     TIME TO PEAK     (hrs)=   1.417
     RUNOFF VOLUME     (mm)=  10.403
     TOTAL RAINFALL    (mm)=  53.305
     RUNOFF COEFFICIENT   =   0.195

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0202)|   Area    (ha)=   3.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.22         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        40.00
     Mannings n            =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

```
              0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
              0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
              0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
              0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
              0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
              0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
              0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
              0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
              0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Max.Eff.Inten.(mm/hr)=     106.98       105.28
          over (min)            5.00         5.00
     Storage Coeff.  (min)=      0.80 (ii)    1.89 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.32
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.96         0.01          0.966 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=     52.30        49.86         52.28
     TOTAL RAINFALL   (mm)=     53.30        53.30         53.30
     RUNOFF COEFFICIENT   =      0.98         0.94          0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0018)|     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   |  0.0164      0.2273
                           0.0082     0.1137   |  0.0246      0.3410

                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     3.250     0.966     1.17       52.28
   OUTFLOW: ID= 1 (  0018)     3.250     0.012     3.08       51.20

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.21
                TIME SHIFT OF PEAK FLOW         (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1626

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.68
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.34
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=      13.40        33.00
     Length            (m)=      36.58        18.00
     Mannings n            =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
               0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
               0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
               0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
               0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
               0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
               0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
               0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
               0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Max.Eff.Inten.(mm/hr)=     106.98        27.23
          over (min)            5.00         5.00
     Storage Coeff.  (min)=      0.62 (ii)    2.46 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.30
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.10         0.03          0.129 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=     51.30        15.35         33.32
     TOTAL RAINFALL   (mm)=     53.30        53.30         53.30
     RUNOFF COEFFICIENT   =      0.96         0.29          0.63

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

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

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```
| CALIB            |
| STANDHYD (  0023)|   Area    (ha)=   2.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.22         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.56         2.00
     Length            (m)=      51.34        40.00
     Mannings n            =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.59 | 0.833   17.54 | 1.583   16.85 |  2.33    6.98
               0.167    5.59 | 0.917   25.49 | 1.667   13.04 |  2.42    6.82
               0.250    6.26 | 1.000   25.49 | 1.750   12.09 |  2.50    6.19
               0.333    6.71 | 1.083  106.98 | 1.833   11.09 |  2.58    6.19
               0.417    7.08 | 1.167  106.98 | 1.917    9.60 |  2.67    5.71
               0.500    8.54 | 1.250   61.11 | 2.000    9.60 |  2.75    5.59
               0.583    8.54 | 1.333   30.52 | 2.083    8.05 |  2.83    5.39
               0.667   11.50 | 1.417   27.79 | 2.167    8.05 |  2.92    5.10
               0.750   12.24 | 1.500   16.85 | 2.250    7.41 |  3.00    5.10

     Max.Eff.Inten.(mm/hr)=     106.98       124.41
          over (min)            5.00        10.00
     Storage Coeff.  (min)=      1.46 (ii)    5.89 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.33         0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.49         0.16          0.624 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.25          1.17
     RUNOFF VOLUME    (mm)=     51.30        31.27         43.29
     TOTAL RAINFALL   (mm)=     53.30        53.30         53.30
     RUNOFF COEFFICIENT   =      0.96         0.59          0.81

***** 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  (  0021)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0018):     3.25    0.012     3.08     51.20
      + ID2= 2 (  0204):     0.68    0.129     1.17     33.32
        ========================================================
        ID = 3 (  0021):     3.93    0.135     1.17     48.10

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

--------------------
| ADD HYD  (  0021)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0021):     3.93    0.135     1.17     48.10
      + ID2= 2 (  0023):     2.77    0.624     1.17     43.29
        ========================================================
        ID = 1 (  0021):     6.70    0.759     1.17     46.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     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   |  0.0420      0.1908
                           0.0009     0.0452   |  0.0470      0.2567
                           0.0050     0.0810   |  0.0560      0.3937
                           0.0180     0.1322   |  0.0000      0.0000

                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0021)     6.700     0.759     1.17       46.11
   OUTFLOW: ID= 1 (  0006)     6.700     0.021     3.08       40.52

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.77
                TIME SHIFT OF PEAK FLOW         (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1396

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--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0016):     0.50    0.014     1.42     10.40
      + ID2= 2 (  0006):     6.70    0.021     3.08     40.52
```

```
       ============================================
       ID = 3 (  0014):     7.20   0.024     3.00    38.43

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     2.03   0.137     1.17    33.05
     + ID2= 2 (  0014):     7.20   0.024     3.00    38.43
       ============================================
       ID = 3 (  0009):     9.23   0.143     1.17    37.24

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


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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\f232f9f7-6ef9-4c26-b6e6-
94d2a8986181\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\f232f9f7-6ef9-4c26-b6e6-
94d2a8986181\scena


DATE: 12-12-2023                          TIME: 05:04:10

USER:


COMMENTS: _____


--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 05                        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 900.000
| Ptotal= 58.79 mm |                          B=   3.800
--------------------                          C=   0.734
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 12.00 min
                       Time to peak ratio =  0.38

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.17 |  0.80   27.91 |  1.60   13.29 |  2.40    6.83
                0.20    7.39 |  1.00  118.69 |  1.80   10.56 |  2.60    6.16
                0.40    9.40 |  1.20   33.40 |  2.00    8.86 |  2.80    5.63
                0.60   13.45 |  1.40   18.49 |  2.20    7.69 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=   0.78   Curve Number    (CN)= 70.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.31

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
               0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
               0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
               0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
               0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
               0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
               0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
               0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
               0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

    Unit Hyd Qpeak  (cms)=   0.096

    PEAK FLOW       (cms)=   0.031 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  16.467
    TOTAL RAINFALL   (mm)=  58.787
    RUNOFF COEFFICIENT   =   0.280

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area     (ha)=   0.67
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------

                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.66          0.01
    Dep. Storage     (mm)=       1.00          1.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=      15.00          2.00
    Mannings n            =      0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
               0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
               0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
               0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
               0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
               0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
               0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
               0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
               0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

    Max.Eff.Inten.(mm/hr)=     118.69       117.11
          over (min)        =       5.00         5.00
    Storage Coeff.  (min)=       0.76 (ii)    0.94 (ii)
    Unit Hyd. Tpeak (min)=       5.00         5.00
    Unit Hyd. peak  (cms)=       0.34         0.34
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.22         0.00          0.221 (iii)
    TIME TO PEAK    (hrs)=       1.17         1.17          1.17
    RUNOFF VOLUME    (mm)=      57.79        55.33         57.76
    TOTAL RAINFALL   (mm)=      58.79        58.79         58.79
    RUNOFF COEFFICIENT   =       0.98         0.94          0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0017)|     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   |  0.0030     0.0470
                           0.0015     0.0235   |  0.0045     0.0705

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     0.670     0.221      1.17       57.76
  OUTFLOW: ID= 1 (  0017)      0.670     0.002      3.08       51.82

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.07
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0372

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0019)|   Area     (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------

                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.46          0.12
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=      62.18         40.00
    Mannings n            =      0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
               0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
               0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
```

```
              0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
              0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
              0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
              0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
              0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
              0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

     Max.Eff.Inten.(mm/hr)=     118.69       145.59
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.79 (ii)    6.04 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.04        0.146 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.25         1.17
     RUNOFF VOLUME    (mm)=      57.79        35.99        49.06
     TOTAL RAINFALL   (mm)=      58.79        58.79        58.79
     RUNOFF COEFFICIENT   =       0.98         0.61         0.83

***** 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  (  0020)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.67   0.002     3.08    51.82
     + ID2= 2 (  0019):     0.58   0.146     1.17    49.06
       ================================================
       ID = 3 (  0020):     1.25   0.147     1.17    50.54

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.78   0.031     1.50    16.47
     + ID2= 2 (  0020):     1.25   0.147     1.17    50.54
       ================================================
       ID = 3 (  0013):     2.03   0.156     1.17    37.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0016)|   Area    (ha)=   0.50   Curve Number   (CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

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

                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
               0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
               0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
               0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
               0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
               0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
               0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
               0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
               0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

     Unit Hyd Qpeak  (cms)=   0.080

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  12.814
     TOTAL RAINFALL   (mm)=  58.787
     RUNOFF COEFFICIENT   =   0.218

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   3.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.22         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        40.00
     Mannings n            =      0.013        0.250

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

```
                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
               0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
               0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
               0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
               0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
               0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
               0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
               0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
               0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

     Max.Eff.Inten.(mm/hr)=     118.69       117.11
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       0.76 (ii)    1.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.06         0.01        1.071 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17         1.17
     RUNOFF VOLUME    (mm)=      57.79        55.33        57.76
     TOTAL RAINFALL   (mm)=      58.79        58.79        58.79
     RUNOFF COEFFICIENT   =       0.98         0.94         0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0018)|     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   |   0.0164      0.2273
                          0.0082      0.1137   |   0.0246      0.3410

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     3.250     1.071      1.17      57.76
   OUTFLOW: ID= 1 (  0018)     3.250     0.013      3.08      56.68

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.21
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1796

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.68
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.34
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=      13.40        33.00
     Length            (m)=      36.58        18.00
     Mannings n            =      0.013        0.250

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

                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
               0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
               0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
               0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
               0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
               0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
               0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
               0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
               0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

     Max.Eff.Inten.(mm/hr)=     118.69        32.91
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       0.60 (ii)    2.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.30
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.03        0.147 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17         1.17
     RUNOFF VOLUME    (mm)=      56.79        18.36        37.57
     TOTAL RAINFALL   (mm)=      58.79        58.79        58.79
     RUNOFF COEFFICIENT   =       0.97         0.31         0.64

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0023)|   Area    (ha)=   2.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.22         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.56         2.00
     Length            (m)=      51.34        40.00
     Mannings n              =    0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.17 | 0.833   19.23 | 1.583   18.49 |  2.33    7.69
               0.167    6.17 | 0.917   27.91 | 1.667   14.33 |  2.42    7.52
               0.250    6.91 | 1.000   27.91 | 1.750   13.29 |  2.50    6.83
               0.333    7.39 | 1.083  118.69 | 1.833   12.20 |  2.58    6.83
               0.417    7.80 | 1.167  118.69 | 1.917   10.56 |  2.67    6.29
               0.500    9.40 | 1.250   67.52 | 2.000   10.56 |  2.75    6.16
               0.583    9.40 | 1.333   33.40 | 2.083    8.86 |  2.83    5.95
               0.667   12.64 | 1.417   30.42 | 2.167    8.86 |  2.92    5.63
               0.750   13.45 | 1.500   18.49 | 2.250    8.16 |  3.00    5.63

     Max.Eff.Inten.(mm/hr)=     118.69       145.59
           over (min)          5.00        10.00
     Storage Coeff.  (min)=     1.40 (ii)    5.65 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.33         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.55         0.19        0.703 (iii)
     TIME TO PEAK    (hrs)=     1.17         1.25         1.17
     RUNOFF VOLUME    (mm)=    56.79        35.99        48.47
     TOTAL RAINFALL   (mm)=    58.79        58.79        58.79
     RUNOFF COEFFICIENT   =     0.97         0.61         0.82

***** 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  (  0021)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0018):     3.25   0.013     3.08    56.68
     + ID2= 2 (  0204):     0.68   0.147     1.17    37.57
       ================================================
       ID = 3 (  0021):     3.93   0.153     1.17    53.37

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

--------------------
| ADD HYD  (  0021)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0021):     3.93   0.153     1.17    53.37
     + ID2= 2 (  0023):     2.77   0.703     1.17    48.47
       ================================================
       ID = 1 (  0021):     6.70   0.856     1.17    51.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     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   |  0.0420      0.1908
                          0.0009      0.0452   |  0.0470      0.2567
                          0.0050      0.0810   |  0.0560      0.3937
                          0.0180      0.1322   |  0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0021)     6.700     0.856      1.17      51.34
   OUTFLOW: ID= 1 (  0006)     6.700     0.027      3.08      45.59

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.17
                TIME SHIFT OF PEAK FLOW         (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1545

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

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     0.50   0.017     1.42    12.81
     + ID2= 2 (  0006):     6.70   0.027     3.08    45.59
       ================================================
       ID = 3 (  0014):     7.20   0.031     3.00    43.32

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     2.03   0.156     1.17    37.45
     + ID2= 2 (  0014):     7.20   0.031     3.00    43.32
       ================================================
       ID = 3 (  0009):     9.23   0.164     1.17    42.02

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

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

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\3283567b-6c8c-4e37-90f1-
91d1e2a29fa0\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\3283567b-6c8c-4e37-90f1-
91d1e2a29fa0\scena


DATE: 12-12-2023                          TIME: 05:04:10

USER:


COMMENTS: _____

--------------------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 06                        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 980.000
| Ptotal= 64.71 mm |                          B=   3.700
--------------------                          C=   0.732
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    = 12.00 min
                         Time to peak ratio =  0.38

                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    6.83 |  0.80   30.63 |  1.60   14.64 |  2.40    7.55
                  0.20    8.17 |  1.00  130.57 |  1.80   11.66 |  2.60    6.82
                  0.40   10.38 |  1.20   36.63 |  2.00    9.79 |  2.80    6.23
                  0.60   14.82 |  1.40   20.33 |  2.20    8.50 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   0.78   Curve Number   (CN)= 70.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.31

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
```

353 Townline Road
Visual Otthymo Model Output – POST DEVELOPMENT

```
              0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
              0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
              0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
              0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
              0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
              0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
              0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

     Unit Hyd Qpeak  (cms)=   0.096

     PEAK FLOW       (cms)=   0.037 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  19.789
     TOTAL RAINFALL   (mm)=  64.709
     RUNOFF COEFFICIENT   =   0.306

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

---------------------------------------------------------------------------------
--------------------
| CALIB                |
| STANDHYD (  0201)|   Area     (ha)=   0.67
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.66         0.01
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00         2.00
     Mannings n            =      0.013        0.250

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

     Max.Eff.Inten.(mm/hr)=     130.57       129.11
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       0.74 (ii)    0.90 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.34
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.00         0.243 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=      63.71        61.24         63.68
     TOTAL RAINFALL   (mm)=      64.71        64.71         64.71
     RUNOFF COEFFICIENT   =       0.98         0.95          0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  99.0    Ia = Dep. 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(  0017)|     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   |   0.0030     0.0470
                          0.0015     0.0235   |   0.0045     0.0705

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     0.670     0.243      1.17      63.68
   OUTFLOW: ID= 1 (  0017)     0.670     0.003      3.08      57.74

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.08
                 TIME SHIFT OF PEAK FLOW         (min)=115.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0410

---------------------------------------------------------------------------------
--------------------
| CALIB                |
| STANDHYD (  0019)|   Area     (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.46         0.12
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      62.18        40.00
     Mannings n            =      0.013        0.250

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

     Max.Eff.Inten.(mm/hr)=     130.57       168.11
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.73 (ii)    5.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.05         0.163 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.25          1.17
     RUNOFF VOLUME    (mm)=      63.71        41.19         54.69
     TOTAL RAINFALL   (mm)=      64.71        64.71         64.71
     RUNOFF COEFFICIENT   =       0.98         0.64          0.85

***** 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  (  0020)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0017):     0.67   0.003     3.08     57.74
     + ID2= 2 (  0019):     0.58   0.163     1.17     54.69
       ==========================================================
       ID = 3 (  0020):     1.25   0.165     1.17     56.33

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0001):     0.78   0.037     1.50     19.79
     + ID2= 2 (  0020):     1.25   0.165     1.17     56.33
       ==========================================================
       ID = 3 (  0013):     2.03   0.175     1.17     42.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------------
--------------------
| CALIB                |
| NASHYD   (  0016)|   Area     (ha)=   0.50   Curve Number   (CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

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


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

     Unit Hyd Qpeak  (cms)=   0.080

     PEAK FLOW       (cms)=   0.021 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  15.616
     TOTAL RAINFALL   (mm)=  64.709
     RUNOFF COEFFICIENT   =   0.241

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

---------------------------------------------------------------------------------
--------------------
| CALIB                |
| STANDHYD (  0202)|   Area     (ha)=   3.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=       3.22         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        40.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

     Max.Eff.Inten.(mm/hr)=     130.57       129.11
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       0.74 (ii)    1.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.32
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.17         0.01         1.179 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=      63.71        61.24         63.68
     TOTAL RAINFALL   (mm)=      64.71        64.71         64.71
     RUNOFF COEFFICIENT   =       0.98         0.95          0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0018)|     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   |   0.0164     0.2273
                          0.0082     0.1137   |   0.0246     0.3410

                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     3.250     1.179      1.17      63.68
   OUTFLOW: ID= 1 (  0018)     3.250     0.014      3.08      62.60

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.21
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1980

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.68
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.34
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=      13.40        33.00
     Length            (m)=      36.58        18.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

     Max.Eff.Inten.(mm/hr)=     130.57        39.19
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       0.58 (ii)    2.27 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.30
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.04         0.165 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.17          1.17
     RUNOFF VOLUME    (mm)=      62.71        21.81         42.26
     TOTAL RAINFALL   (mm)=      64.71        64.71         64.71
     RUNOFF COEFFICIENT   =       0.97         0.34          0.65

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0023)|   Area    (ha)=   2.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.22         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.56         2.00
     Length            (m)=      51.34        40.00
     Mannings n             =     0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.83 | 0.833   21.14 | 1.583   20.33 |  2.33    8.50
               0.167    6.83 | 0.917   30.63 | 1.667   15.78 |  2.42    8.31
               0.250    7.64 | 1.000   30.63 | 1.750   14.64 |  2.50    7.55
               0.333    8.17 | 1.083  130.57 | 1.833   13.45 |  2.58    7.55
               0.417    8.62 | 1.167  130.57 | 1.917   11.66 |  2.67    6.96
               0.500   10.38 | 1.250   74.20 | 2.000   11.66 |  2.75    6.82
               0.583   10.38 | 1.333   36.63 | 2.083    9.79 |  2.83    6.58
               0.667   13.93 | 1.417   33.37 | 2.167    9.79 |  2.92    6.23
               0.750   14.82 | 1.500   20.33 | 2.250    9.02 |  3.00    6.23

     Max.Eff.Inten.(mm/hr)=     130.57       168.11
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.35 (ii)    5.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.16
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.60         0.22         0.786 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.25          1.17
     RUNOFF VOLUME    (mm)=      62.71        41.19         54.10
     TOTAL RAINFALL   (mm)=      64.71        64.71         64.71
     RUNOFF COEFFICIENT   =       0.97         0.64          0.84

***** 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  (  0021)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0018):     3.25   0.014     3.08    62.60
      + ID2= 2 (  0204):     0.68   0.165     1.17    42.26
        ==========================================
        ID = 3 (  0021):     3.93   0.172     1.17    59.08

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

--------------------
| ADD HYD  (  0021)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0021):     3.93   0.172     1.17    59.08
      + ID2= 2 (  0023):     2.77   0.786     1.17    54.10
        ==========================================
        ID = 1 (  0021):     6.70   0.958     1.17    57.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     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   |   0.0420     0.1908
                          0.0009     0.0452   |   0.0470     0.2567
                          0.0050     0.0810   |   0.0560     0.3937
                          0.0180     0.1322   |   0.0000     0.0000

                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0021)     6.700     0.958      1.17      57.02
   OUTFLOW: ID= 1 (  0006)     6.700     0.034      3.08      51.11
```

```
                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.51
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1704

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

-------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     0.50   0.021     1.42    15.62
     + ID2= 2 (  0006):     6.70   0.034     3.08    51.11
       ================================================
       ID = 3 (  0014):     7.20   0.038     3.00    48.65

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

-------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     2.03   0.175     1.17    42.29
     + ID2= 2 (  0014):     7.20   0.038     3.00    48.65
       ================================================
       ID = 3 (  0009):     9.23   0.187     1.17    47.25

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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\141df075-fba9-44cb-9506-
bfed458f77f7\scena
  Summary filename: C:\Users\rbabic\AppData\Local\Civica\VH5\4ded0c6b-d6f8-47bc-807a-23d4c18968f4\141df075-fba9-44cb-9506-
bfed458f77f7\scena


DATE: 12-12-2023                       TIME: 05:04:10

USER:


COMMENTS: _____

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 07                        **
  ************************************************


-------------------
|    READ STORM    |    Filename: C:\Users\rbabic\AppD
|                  |              ata\Local\Temp\
|                  |              b89ccfdc-8821-41b8-9dc3-7071a7faa516\d978c8d4
| Ptotal= 30.00 mm |   Comments: 25mm
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.79 |  0.80   15.94 |  1.60    6.84 |  2.40    3.13
                0.20    3.44 |  1.00   58.59 |  1.80    5.22 |  2.60    2.78
                0.40    4.56 |  1.20   19.37 |  2.00    4.25 |  2.80    2.51
                0.60    6.94 |  1.40   10.05 |  2.20    3.60 |

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

-------------------
| CALIB            |
| NASHYD  (  0001)|   Area     (ha)=   0.78   Curve Number    (CN)= 70.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.10   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.31

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.79 | 0.833   10.54 | 1.583   10.05 |  2.33    3.60
               0.167    2.79 | 0.917   15.94 | 1.667    7.48 |  2.42    3.51
               0.250    3.18 | 1.000   15.94 | 1.750    6.84 |  2.50    3.13
               0.333    3.44 | 1.083   58.59 | 1.833    6.19 |  2.58    3.13
               0.417    3.66 | 1.167   58.59 | 1.917    5.22 |  2.67    2.85
               0.500    4.56 | 1.250   35.06 | 2.000    5.22 |  2.75    2.78
               0.583    4.56 | 1.333   19.37 | 2.083    4.25 |  2.83    2.67
               0.667    6.46 | 1.417   17.51 | 2.167    4.25 |  2.92    2.51
               0.750    6.94 | 1.500   10.05 | 2.250    3.86 |  3.00    2.51

    Unit Hyd Qpeak  (cms)=   0.096

    PEAK FLOW       (cms)=   0.006 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=   3.770
    TOTAL RAINFALL   (mm)=  30.002
    RUNOFF COEFFICIENT   =   0.126

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

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0201)|   Area     (ha)=   0.67
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.66         0.01
    Dep. Storage     (mm)=       1.00         1.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      15.00         2.00
    Mannings n           =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.79 | 0.833   10.54 | 1.583   10.05 |  2.33    3.60
               0.167    2.79 | 0.917   15.94 | 1.667    7.48 |  2.42    3.51
               0.250    3.18 | 1.000   15.94 | 1.750    6.84 |  2.50    3.13
               0.333    3.44 | 1.083   58.59 | 1.833    6.19 |  2.58    3.13
               0.417    3.66 | 1.167   58.59 | 1.917    5.22 |  2.67    2.85
               0.500    4.56 | 1.250   35.06 | 2.000    5.22 |  2.75    2.78
               0.583    4.56 | 1.333   19.37 | 2.083    4.25 |  2.83    2.67
               0.667    6.46 | 1.417   17.51 | 2.167    4.25 |  2.92    2.51
               0.750    6.94 | 1.500   10.05 | 2.250    3.86 |  3.00    2.51

    Max.Eff.Inten.(mm/hr)=      58.59        56.02
              over (min)        5.00         5.00
    Storage Coeff.  (min)=      1.01 (ii)    1.24 (ii)
    Unit Hyd. Tpeak (min)=      5.00         5.00
    Unit Hyd. peak  (cms)=      0.34         0.33
                                                        *TOTALS*
    PEAK FLOW       (cms)=      0.11         0.00          0.109 (iii)
    TIME TO PEAK    (hrs)=      1.17         1.17          1.17
    RUNOFF VOLUME    (mm)=     29.00        26.64         28.98
    TOTAL RAINFALL   (mm)=     30.00        30.00         30.00
    RUNOFF COEFFICIENT   =      0.97         0.89          0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0017)|     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   |  0.0030      0.0470
                         0.0015     0.0235   |  0.0045      0.0705

                             AREA      QPEAK     TPEAK        R.V.
                             (ha)      (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0201)     0.670     0.109      1.17       28.98
   OUTFLOW: ID= 1 (  0017)     0.670     0.001      3.08       23.03

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.09
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0187

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0019)|   Area     (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.46         0.12
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      62.18        40.00
    Mannings n           =      0.013        0.250
```

353 Townline Road
Visual Otthymo Model Output – POST DEVELOPMENT

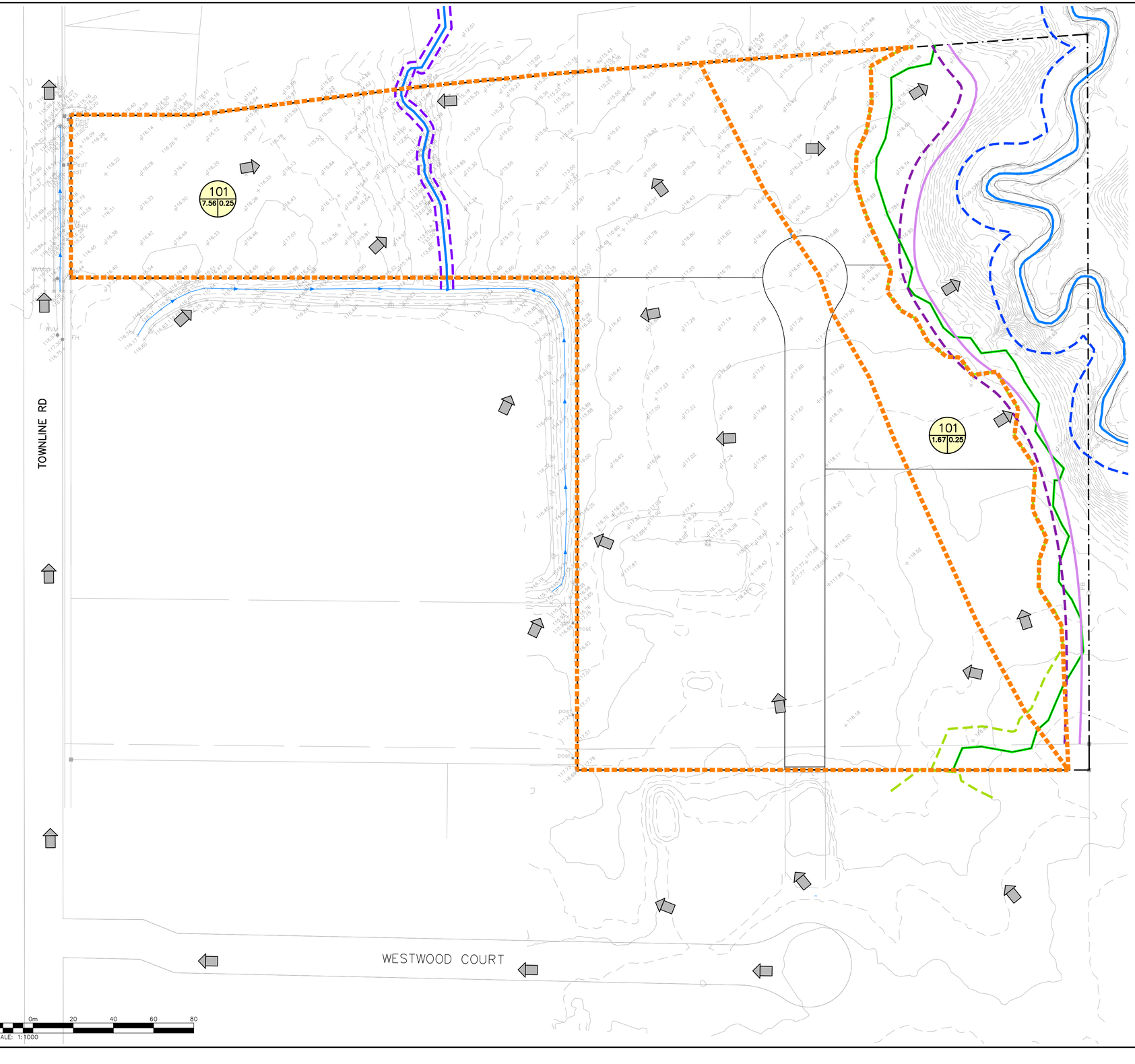
```
        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.79 | 0.833   10.54 | 1.583   10.05 |  2.33    3.60
                0.167    2.79 | 0.917   15.94 | 1.667    7.48 |  2.42    3.51
                0.250    3.18 | 1.000   15.94 | 1.750    6.84 |  2.50    3.13
                0.333    3.44 | 1.083   58.59 | 1.833    6.19 |  2.58    3.13
                0.417    3.66 | 1.167   58.59 | 1.917    5.22 |  2.67    2.85
                0.500    4.56 | 1.250   35.06 | 2.000    5.22 |  2.75    2.78
                0.583    4.56 | 1.333   19.37 | 2.083    4.25 |  2.83    2.67
                0.667    6.46 | 1.417   17.51 | 2.167    4.25 |  2.92    2.51
                0.750    6.94 | 1.500   10.05 | 2.250    3.86 |  3.00    2.51

     Max.Eff.Inten.(mm/hr)=      58.59        46.19
               over (min)        5.00        15.00
     Storage Coeff.  (min)=      2.38 (ii)   11.99 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.30         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.06         0.01          0.060 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.33           1.17
     RUNOFF VOLUME    (mm)=     29.00        12.77          22.50
     TOTAL RAINFALL   (mm)=     30.00        30.00          30.00
     RUNOFF COEFFICIENT   =      0.97         0.43           0.75

***** 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  (  0020)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0017):     0.67   0.001     3.08    23.03
     + ID2= 2 (  0019):     0.58   0.060     1.17    22.50
       ================================================
       ID = 3 (  0020):     1.25   0.061     1.17    22.78

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

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.78   0.006     1.58     3.77
     + ID2= 2 (  0020):     1.25   0.061     1.17    22.78
       ================================================
       ID = 3 (  0013):     2.03   0.062     1.17    15.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0016)|   Area    (ha)=   0.50   Curve Number   (CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.79 | 0.833   10.54 | 1.583   10.05 |  2.33    3.60
                0.167    2.79 | 0.917   15.94 | 1.667    7.48 |  2.42    3.51
                0.250    3.18 | 1.000   15.94 | 1.750    6.84 |  2.50    3.13
                0.333    3.44 | 1.083   58.59 | 1.833    6.19 |  2.58    3.13
                0.417    3.66 | 1.167   58.59 | 1.917    5.22 |  2.67    2.85
                0.500    4.56 | 1.250   35.06 | 2.000    5.22 |  2.75    2.78
                0.583    4.56 | 1.333   19.37 | 2.083    4.25 |  2.83    2.67
                0.667    6.46 | 1.417   17.51 | 2.167    4.25 |  2.92    2.51
                0.750    6.94 | 1.500   10.05 | 2.250    3.86 |  3.00    2.51

     Unit Hyd Qpeak  (cms)=   0.080

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   2.549
     TOTAL RAINFALL   (mm)=  30.002
     RUNOFF COEFFICIENT   =   0.085

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   3.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
```

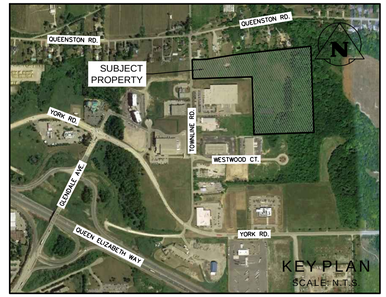
```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.22         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      15.00        40.00
     Mannings n            =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.79 | 0.833   10.54 | 1.583   10.05 |  2.33    3.60
                0.167    2.79 | 0.917   15.94 | 1.667    7.48 |  2.42    3.51
                0.250    3.18 | 1.000   15.94 | 1.750    6.84 |  2.50    3.13
                0.333    3.44 | 1.083   58.59 | 1.833    6.19 |  2.58    3.13
                0.417    3.66 | 1.167   58.59 | 1.917    5.22 |  2.67    2.85
                0.500    4.56 | 1.250   35.06 | 2.000    5.22 |  2.75    2.78
                0.583    4.56 | 1.333   19.37 | 2.083    4.25 |  2.83    2.67
                0.667    6.46 | 1.417   17.51 | 2.167    4.25 |  2.92    2.51
                0.750    6.94 | 1.500   10.05 | 2.250    3.86 |  3.00    2.51

     Max.Eff.Inten.(mm/hr)=      58.59        56.02
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      1.01 (ii)    2.40 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.30
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.52         0.01          0.529 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.17           1.17
     RUNOFF VOLUME    (mm)=     29.00        26.64          28.98
     TOTAL RAINFALL   (mm)=     30.00        30.00          30.00
     RUNOFF COEFFICIENT   =      0.97         0.89           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    Ia = Dep. 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(  0018)|     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   |   0.0164     0.2273
                          0.0082     0.1137   |   0.0246     0.3410

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     3.250     0.529      1.17      28.98
   OUTFLOW: ID= 1 (  0018)     3.250     0.006      3.08      27.89

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.23
                TIME SHIFT OF PEAK FLOW          (min)=115.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0901

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.68
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.34
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=      13.40        33.00
     Length            (m)=      36.58        18.00
     Mannings n            =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.79 | 0.833   10.54 | 1.583   10.05 |  2.33    3.60
                0.167    2.79 | 0.917   15.94 | 1.667    7.48 |  2.42    3.51
                0.250    3.18 | 1.000   15.94 | 1.750    6.84 |  2.50    3.13
                0.333    3.44 | 1.083   58.59 | 1.833    6.19 |  2.58    3.13
                0.417    3.66 | 1.167   58.59 | 1.917    5.22 |  2.67    2.85
                0.500    4.56 | 1.250   35.06 | 2.000    5.22 |  2.75    2.78
                0.583    4.56 | 1.333   19.37 | 2.083    4.25 |  2.83    2.67
                0.667    6.46 | 1.417   17.51 | 2.167    4.25 |  2.92    2.51
                0.750    6.94 | 1.500   10.05 | 2.250    3.86 |  3.00    2.51

     Max.Eff.Inten.(mm/hr)=      58.59         8.18
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      0.79 (ii)    3.13 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.27
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.06         0.01          0.063 (iii)
     TIME TO PEAK    (hrs)=      1.17         1.17           1.17
     RUNOFF VOLUME    (mm)=     28.00         4.86          16.43
```

353 Townline Road
Visual Otthymo Model Output – POST DEVELOPMENT

```
     TOTAL RAINFALL   (mm)=      30.00        30.00          30.00
     RUNOFF COEFFICIENT   =       0.93         0.16           0.55

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0023)|   Area    (ha)=   2.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  60.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.22         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.56         2.00
     Length            (m)=      51.34        40.00
     Mannings n             =     0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.79 | 0.833   10.54 | 1.583   10.05 |  2.33    3.60
                0.167    2.79 | 0.917   15.94 | 1.667    7.48 |  2.42    3.51
                0.250    3.18 | 1.000   15.94 | 1.750    6.84 |  2.50    3.13
                0.333    3.44 | 1.083   58.59 | 1.833    6.19 |  2.58    3.13
                0.417    3.66 | 1.167   58.59 | 1.917    5.22 |  2.67    2.85
                0.500    4.56 | 1.250   35.06 | 2.000    5.22 |  2.75    2.78
                0.583    4.56 | 1.333   19.37 | 2.083    4.25 |  2.83    2.67
                0.667    6.46 | 1.417   17.51 | 2.167    4.25 |  2.92    2.51
                0.750    6.94 | 1.500   10.05 | 2.250    3.86 |  3.00    2.51

     Max.Eff.Inten.(mm/hr)=      58.59        46.19
           over (min)            5.00        15.00
     Storage Coeff.  (min)=       1.86 (ii)   11.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.32         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.05          0.290 (iii)
     TIME TO PEAK    (hrs)=       1.17         1.33           1.17
     RUNOFF VOLUME    (mm)=      28.00        12.77          21.90
     TOTAL RAINFALL   (mm)=      30.00        30.00          30.00
     RUNOFF COEFFICIENT   =       0.93         0.43           0.73

***** 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  (  0021)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0018):     3.25   0.006     3.08    27.89
     + ID2= 2 (  0204):     0.68   0.063     1.17    16.43
       ================================================
       ID = 3 (  0021):     3.93   0.066     1.17    25.91

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

--------------------
| ADD HYD  (  0021)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0021):     3.93   0.066     1.17    25.91
     + ID2= 2 (  0023):     2.77   0.290     1.17    21.90
       ================================================
       ID = 1 (  0021):     6.70   0.356     1.17    24.25

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     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   |   0.0420     0.1908
                           0.0009     0.0452   |   0.0470     0.2567
                           0.0050     0.0810   |   0.0560     0.3937
                           0.0180     0.1322   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0021)     6.700     0.356      1.17      24.25
   OUTFLOW: ID= 1 (  0006)     6.700     0.005     15.42      19.51

                        PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.32
                        TIME SHIFT OF PEAK FLOW          (min)=855.00
                        MAXIMUM  STORAGE   USED       (ha.m.)=  0.0785

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

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     0.50   0.003     1.58     2.55
     + ID2= 2 (  0006):     6.70   0.005    15.42    19.51
       ================================================
       ID = 3 (  0014):     7.20   0.005     3.00    18.33

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     2.03   0.062     1.17    15.48
     + ID2= 2 (  0014):     7.20   0.005     3.00    18.33
       ================================================
       ID = 3 (  0009):     9.23   0.063     1.17    17.71

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

FIGURES AND DRAWINGS





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m) — 116.50
- EXISTING CONTOUR (1.0m) — 117
- EXISTING DITCH
- EXISTING STORM MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- WATERCOURSE
- WATERCOURSE 15.0m BUFFER
- REFINED EXTENT OF SIGNIFICANT WOODLAND
- NATURAL HERITAGE SYSTEM 10.0m BUFFER
- APPROX. STABLE TOP OF SLOPE
- APPROX. STABLE TOP OF SLOPE 7.5m SETBACK
- EXISTING OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- ID — CATCHMENT I.D.
- A | RC — AREA (ha) | RUNOFF COEFFICIENT

No.	ISSUE / REVISION	YYYY/MMM/DD
1	DRAFT PLAN OF SUBDIVISION 1ST SUBMISSION	2023/DEC/13
0	ISSUED FOR COORDINATION	2023/JUN/14

ELEVATION NOTE:

ELEVATIONS ARE OF GEODETIC ORIGIN (CGVD:1928-1978) AND ARE DERIVED FROM ONSS OBSERVATIONS AND NATURAL RESOURCES CANADA'S GEOID MODEL HT2.0.

SURVEY NOTES:

SURVEY COMPLETED BY J.D.BARNES LIMITED (2022/SEP/08)
PROJECT No.: 22-16-129-00

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS)(2010.0).

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999597.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY PEARCE MCCLUSKEY GROUP
DATE RECEIVED 2023/FEB/03

DRAWING NOTES:

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

353 TOWNLINE ROAD
TOWN OF NIAGARA-ON-THE-LAKE

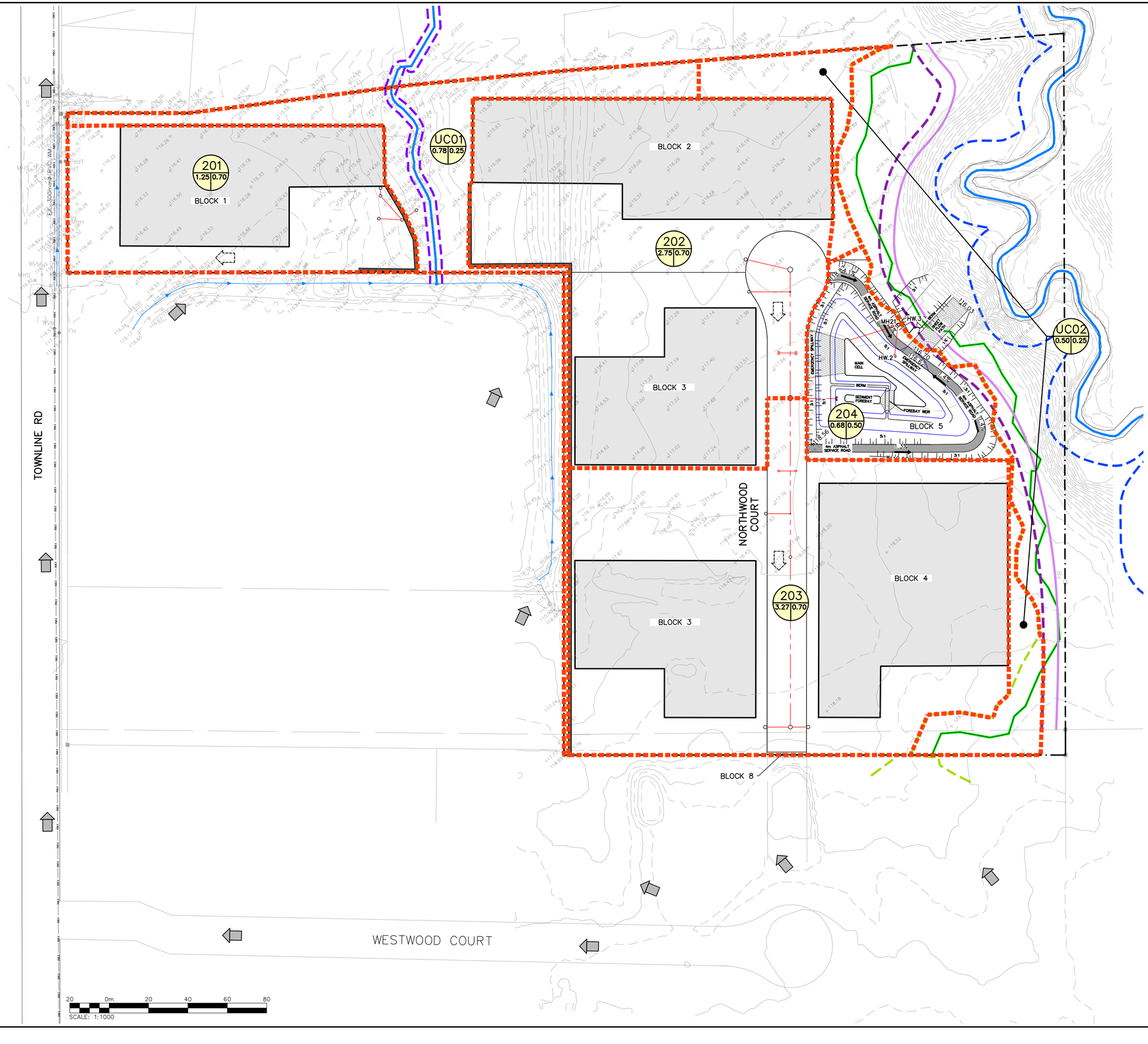
Drawing

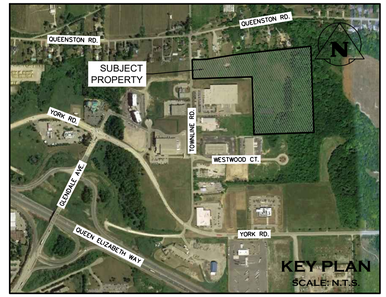
PRE-DEVELOPMENT DRAINAGE PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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

Drawn	Design	Project No.	
R.L.	B.A./P.F.		369-6730
Check	Check	Scale	Dwg.
H.L.	N.C.	1:1000	FIG1





NOTE:

ALL BLOCKS SUBJECT TO DETAILED SITE PLAN DESIGN. BUILDING AREAS ARE SHOWN FOR PRELIMINARY PURPOSES ONLY AND ARE SUBJECT TO CHANGE PENDING SITE PLAN DESIGN.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- 215.00 EXISTING GRADE
- 215.00 PROPOSED GRADE
- EXISTING STORM MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- WATERCOURSE
- WATERCOURSE 15.0m BUFFER
- APPROX. STABLE TOP OF SLOPE
- APPROX. STABLE TOP OF SLOPE 7.5m SETBACK
- REFINED EXTENT OF SIGNIFICANT WOODLAND
- NATURAL HERITAGE SYSTEM 10.0m BUFFER
- STORM DRAINAGE CATCHMENT
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- ID / AREA (ha) | RUNOFF COEFFICIENT — CATCHMENT I.D.

No.	ISSUE / REVISION	YYYY/MMM/DD
1	DRAFT PLAN OF SUBDIVISION 1ST SUBMISSION	2023/DEC/13
0	ISSUED FOR COORDINATION	2023/JUN/14

ELEVATION NOTE:

ELEVATIONS ARE OF GEODETIC ORIGIN (CGVD:1928-1978) AND ARE DERIVED FROM GNSS OBSERVATIONS AND NATURAL RESOURCES CANADA'S GEOID MODEL HT2.0.

SURVEY NOTES:

SURVEY COMPLETED BY J.D.BARNES LIMITED (2022/SEP/08)
PROJECT No.: 22-16-129-00

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS)(2010.0).

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999597.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY PEARCE MCCLUSKEY GROUP
DATE RECEIVED 2023/FEB/03

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

353 TOWNLINE ROAD
TOWN OF NIAGARA-ON-THE-LAKE

Drawing

POST-DEVELOPMENT DRAINAGE PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON. L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	Design	Project No.
R.L.	B.A./P.F.	369-6730
Check	Check	Scale / Dwg.
H.L.	N.C.	1:1000 / FIG2

TOWNLINE ROAD

WESTWOOD COURT

NORTHWOOD COURT

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

Part 1, Plan 30R-9813

Part 2, Plan 30R-9813

Part 4, Plan 30R-9813

WATERCOURSE 3.0m BUFFER

WATERCOURSE 3m BUFFER

WATERCOURSE

WATERCOURSE 15.0m BUFFER

REFINED EXTENT OF SIGNIFICANT WOODLAND

10.0m NHS BUFFER

LIMIT OF MUD MAT TO EDGE OF ASPHALT PATH, CONTRACTOR TO MAINTAIN THE PATH DURING CONSTRUCTION. CONSTRUCTION ENTRANCE TO BE CONFIRMED BY SITE ENGINEER.

EX. CONCRETE PAD TO BE REMOVED AND DISPOSED OFF-SITE

TEMPORARY MUD MAT AT CONSTRUCTION ENTRANCE PER DETAIL ON THIS DWG.

TEMPORARY SILT FENCE PER OPSD 219.130

EX. WOOD DECK TO BE REMOVED AND DISPOSED OFF-SITE

TEMPORARY MUD MAT AT CONSTRUCTION ENTRANCE PER DETAIL ON THIS DWG.

LIMIT OF MUD MAT TO EDGE OF ASPHALT PATH, CONTRACTOR TO MAINTAIN THE PATH DURING CONSTRUCTION. CONSTRUCTION ENTRANCE TO BE CONFIRMED BY SITE ENGINEER.

TEMPORARY SILT FENCE PER OPSD 219.130

ASPHALT EDGE

TOP OF SLOPE

CENTER LINE OF DITCH

CONCRETE

BUSH

WOOD DECK

WVM

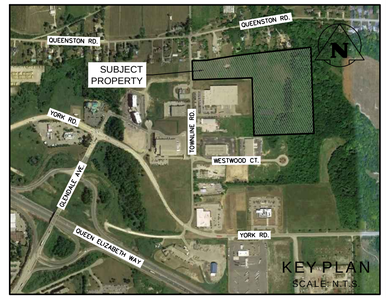
MHS

FH

20 0m 20 40 60 80

SCALE: 1:1000

N



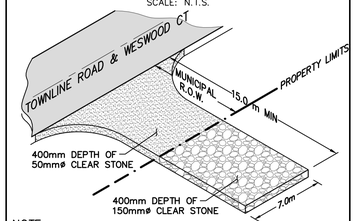
KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- WATERCOURSE
- WATERCOURSE 15.0m BUFFER
- REFINED EXTENT OF SIGNIFICANT WOODLAND
- NATURAL HERITAGE SYSTEM 10.0m BUFFER
- APPROX. STABLE TOP OF SLOPE
- APPROX. STABLE TOP OF SLOPE 7.5m SETBACK
- EXISTING OVERLAND FLOW DIRECTION
- MUD-MAT; SEE DETAIL
- SILT FENCE; SEE DETAIL

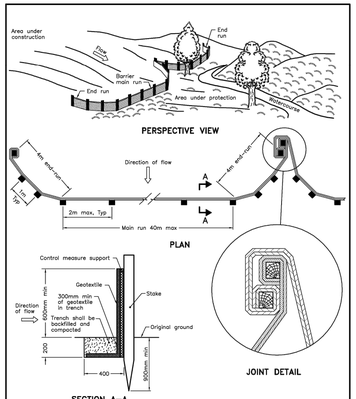
MUD-MAT DETAIL

SCALE: N.T.S.



NOTE:

GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.



SECTION A-A

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

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

No.	DRAFT PLAN OF SUBDIVISION 1ST SUBMISSION	2023/DEC/13
1	ISSUED FOR COORDINATION	2023/JUN/14
0		
No.	ISSUE / REVISION	YYYY/MMM/DD

ELEVATION NOTE:

ELEVATIONS ARE OF GEODETIC ORIGIN (CGVD:1928-1978) AND ARE DERIVED FROM GNSS OBSERVATIONS AND NATURAL RESOURCES CANADA'S GEOID MODEL HT2.0.

SURVEY NOTES:

SURVEY COMPLETED BY J.D.BARNES LIMITED (2022/SEP/08)
PROJECT No.: 22-16-129-00

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DATE RECEIVED 2023/FEB/03

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Project

353 TOWNLINE ROAD
TOWN OF NIAGARA-ON-THE-LAKE

Drawing

EROSION AND SEDIMENT CONTROL PLAN

CROZIER
CONSULTING ENGINEERS

2800 High Point Drive
Suite 100
Milton, ON. L9T 6P4
905-875-0026 T
905-875-4915 F
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Drawn	R.L.	Design	B.A./P.F.	Project No.	369-6730
Check	H.L.	Check	N.C.	Scale 1:1000	Dwg. C101

TOWNLINE ROAD

EX. SAN MH61
T/G 116.41
S INV 111.97
N INV 111.97

EX. 300mmø PVC WM

15.6m–150mmø SAN @ 2.0%

BLOCK 1

BLOCK 1 PRELIMINARY ROOFTOP CONTROL DESIGN:

STORAGE VOL = 705 m3
MAX PONDING HEIGHT = 0.15m
MAX DISCHARGE RATE = 6 L/S

BLOCK 1 ROOF LEADER

BLOCK 1 AT–GRADE STM DRAIN (SUBJECT TO SITE PLAN DESIGN)

BLOCK 1 STM OUTFALL TO WATERCOURSE (SUBJECT TO SITE PLAN DESIGN)

PR. 200mmø PVC WATERMAIN

EX. HYDRANT & VALVE

EX. SAN MH62
T/G 117.16
S INV 112.15
N INV 112.15

WATERCOURSE 3m BUFFER

3.0m

WATERCOURSE

BLOCK 2

BLOCK 2 PRELIMINARY ROOFTOP CONTROL DESIGN:

STORAGE VOL = 1020 m3
MAX PONDING HEIGHT = 0.15m
MAX DISCHARGE RATE = 8 L/S

BLOCK 3

BLOCK 3 PRELIMINARY ROOFTOP CONTROL DESIGN:

STORAGE VOL = 1300 m3
MAX PONDING HEIGHT = 0.15m
MAX DISCHARGE RATE = 8 L/S

STM MH1
T/G 118.50
S INV 115.63
W INV 115.70

SAN MH4A
T/G 118.45
S INV 116.48
N INV 116.51

SAN CTRL MH4

15.6m–150mmø STM @ 0.4%

STM CTRL.MH1

65.2m–600mmø STM @ 0.5%

STM CTRL.MH2

PR. 200mmø PVC WATERMAIN

50.0m–200mmø SAN @ 0.4%

SAN MH3A
T/G 118.30
N INV 116.28
S INV 116.25

STM MH10
T/G 118.40
S INV 115.38
N INV 115.30
E INV 115.12

23.0m–750mmø STM @ 0.5%

100.0m–200mmø SAN @ 0.4%

SAN CTRL MH3

STM CTRL.MH3

80.7m–600mmø STM @ 0.5%

SAN MH2A
T/G 118.81
N INV 115.85
S INV 115.82

STM MHTEE6
T/G 118.81
N INV 115.78
S INV 115.81

PR. 200mmø PVC WATERMAIN

BLOCK 4

BLOCK 4 PRELIMINARY ROOFTOP CONTROL DESIGN:

STORAGE VOL = 1100 m3
MAX PONDING HEIGHT = 0.15m
MAX DISCHARGE RATE = 8 L/S

86.4m–525mmø STM @ 0.5%

100.0m–200mmø SAN @ 0.4%

SAN CTRL MH1

STM CTRL.MH4

SAN CTRL MH2

STM CTRL.MH5

NORTHWOOD COURT

BLOCK 8

PR. 200mmø PVC WATERMAIN

72.5m–200mmø SAN @ 0.4%

STM MH7
T/G 119.26
W INV 117.16
E INV 117.16
N INV 116.24

SAN MH1A
T/G 119.35
N INV 115.42
S INV 115.39

CONNECT PR. 200mmø PVC WM TO EX. PVC WM

EX. SAN PLUG INV.115.10

EX. HYDRANT & VALVE

EX. SAN MH5A
T/G 121.07
E INV 115.95
W INV 114.95
N INV 115.00
S INV 115.00

EX. 150mmø WATER SERVICE

EX. SAN PLUG

EX. SAN MH63
T/G 117.80
S INV 112.36
N INV 112.36

EX. SAN MH64
T/G 118.56
S INV 112.87
N INV 112.87

EX. 200mmø DR–18 PVC WM

EX. SAN MH2A
T/G 119.42
E INV 113.78
W INV 113.78

EX. SAN MH3A
T/G 119.93
E INV 114.18
W INV 114.18

EX. SAN MH4A
T/G 120.36
E INV 114.59
W INV 114.59

EX. SAN MH1A
T/G 118.97
E INV 113.41
N INV 113.18
S INV 113.18

EX. STM MH3
T/G 120.25
E INV 118.93
S INV 118.92

EX. STM MH2
T/G 120.42
E INV 119.08
W INV 119.07

EX. STM MH1
T/G 121.11
W INV 119.26

WESTWOOD COURT

WATERCOURSE 15.0m BUFFER

REFINED EXTENT OF SIGNIFICANT WOODLAND

10.0m NHS BUFFER

15.0m

WATERCOURSE

BLOCK 5 ADDITION

STM HW.1
T/G 116.35
W INV 115.00

10.0m

20 0m 20 40 60 80
SCALE: 1:1000

N

NOTE:

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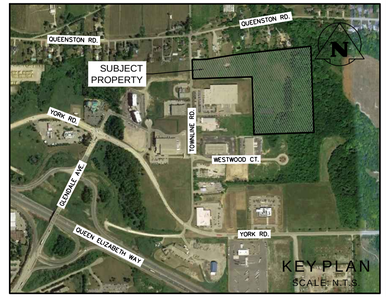

KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN & GATE VALVE
- EXISTING FIRE HYDRANT & GATE VALVE
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SINGLE CATCHBASIN MANHOLE
- PROPOSED HEADWALL
- PROPOSED SANITARY SEWER & MANHOLE
- WATERCOURSE
- WATERCOURSE 15.0m BUFFER
- REFINED EXTENT OF SIGNIFICANT WOODLAND
- NATURAL HERITAGE SYSTEM 10.0m BUFFER
- APPROX. STABLE TOP OF SLOPE
- APPROX. STABLE TOP OF SLOPE 7.5m SETBACK

No.	ISSUE / REVISION	YYYY/MMM/DD
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Project

353 TOWNLINE ROAD
TOWN OF NIAGARA–ON–THE–LAKE

Drawing

SITE SERVICING PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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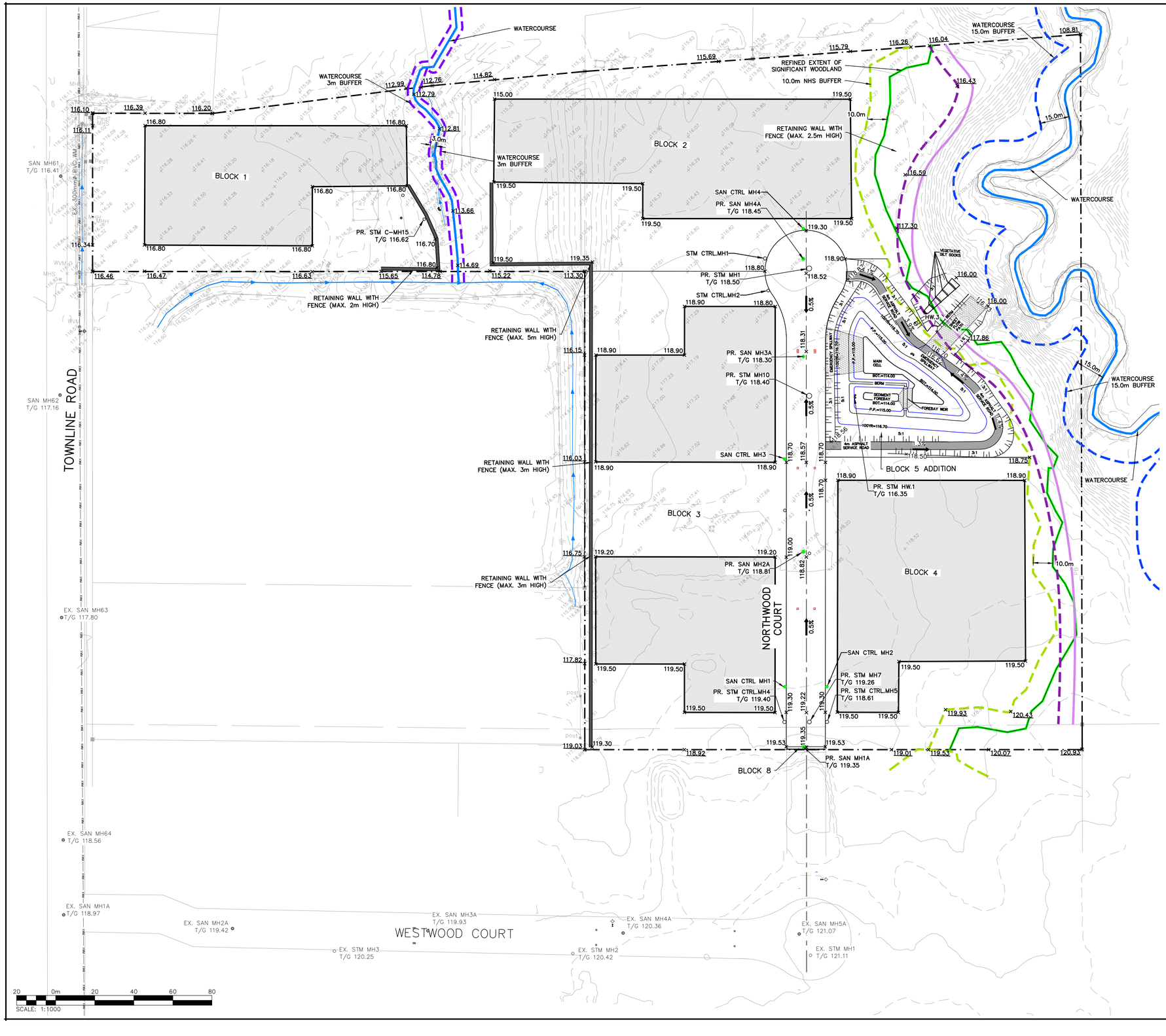
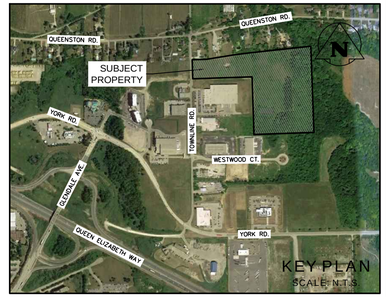
Suite 100
Milton, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca
info@cfcrozier.ca

Drawn	Design	Project No.	
R.L.	B.A./P.F.		369–6730
Check	Check	Scale	Dwg.
H.L.	N.C.	1:1000	C102





NOTE:

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LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE
- PROPOSED GRADE (TO MATCH EXISTING)
- PROPOSED MINOR FLOW DIRECTION
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED OVERLAND FLOW DIRECTION
- EXISTING MAJOR OVERLAND FLOW DIRECTION
- PROPOSED SWALE FLOW DIRECTION
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- WATERCOURSE
- WATERCOURSE 15.0m BUFFER
- REFINED EXTENT OF SIGNIFICANT WOODLAND
- NATURAL HERITAGE SYSTEM 10.0m BUFFER
- PROPOSED RETAINING WALL
- APPROX. STABLE TOP OF SLOPE
- APPROX. STABLE TOP OF SLOPE 7.5m SETBACK

No.	ISSUE / REVISION	YYYY/MMM/DD
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0	ISSUED FOR COORDINATION	2023/JUN/14

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Project

353 TOWNLINE ROAD
TOWN OF NIAGARA-ON-THE-LAKE

Drawing

SITE GRADING PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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

Drawn	R.L.	Design	B.A./P.F.	Project No.	369-6730
Check	H.L.	Check	N.C.	Scale	1:1000
				Dwg.	C103

MH1
TOP=118.50
S 600ø INV. 115.63
W 675ø INV. 115.70

65.2m–600mmø STM @ 0.5%

MH10
TOP=118.40
S 600ø INV. 115.38
N 600ø INV. 115.30
E 750ø INV. 115.12

80.7m–600mmø STM @ 0.5%

HW.1
TOP=116.35
W 750ø INV. 115.00

25.6m–300mmø
STM @ 3.9%

HW.3
TOP=116.14
SW 900ø INV. 114.96

7.0m–900mmø
STM @ 0.5%

MH21
TOP=121.94
S 900ø INV. 115.42
W 300ø INV. 115.00
NE 900ø INV. 115.00

15.4m–900mmø
STM @ 0.5%

HW.2
TOP=116.37
N 900ø INV. 115.50

VEGETATIVE SILT SOCKS

1 / C105

4m ASPHALT SERVICE ROAD

100YR=116.70

P.P.=115.00

EMERGENCY SPILLWAY

MAIN CELL

BOT.=114.00

BERM

SEDIMENT FOREBAY

FOREBAY WEIR

SHEET FLOW PATH

3:1

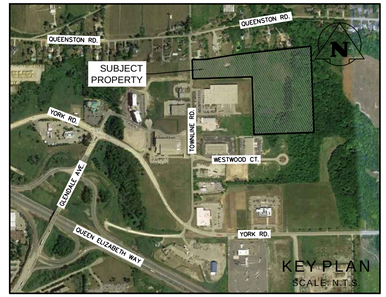
5:1

4.1%

1.4%

1.3%

SCALE: 1:250



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SINGLE CATCHBASIN MANHOLE
- PROPOSED HEADWALL
- WATERCOURSE
- WATERCOURSE 15.0m BUFFER
- APPROX. STABLE TOP OF SLOPE
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- REFINED EXTENT OF SIGNIFICANT WOODLAND
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Project

353 TOWNLINE ROAD
TOWN OF NIAGARA-ON-THE-LAKE

Drawing

SWM POND PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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Milton, ON, L9T 6P4
905-875-0026 T
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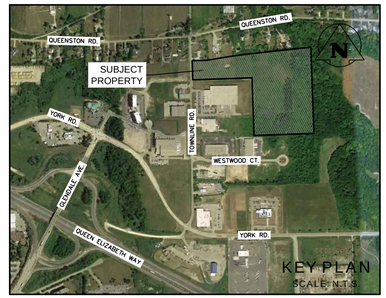
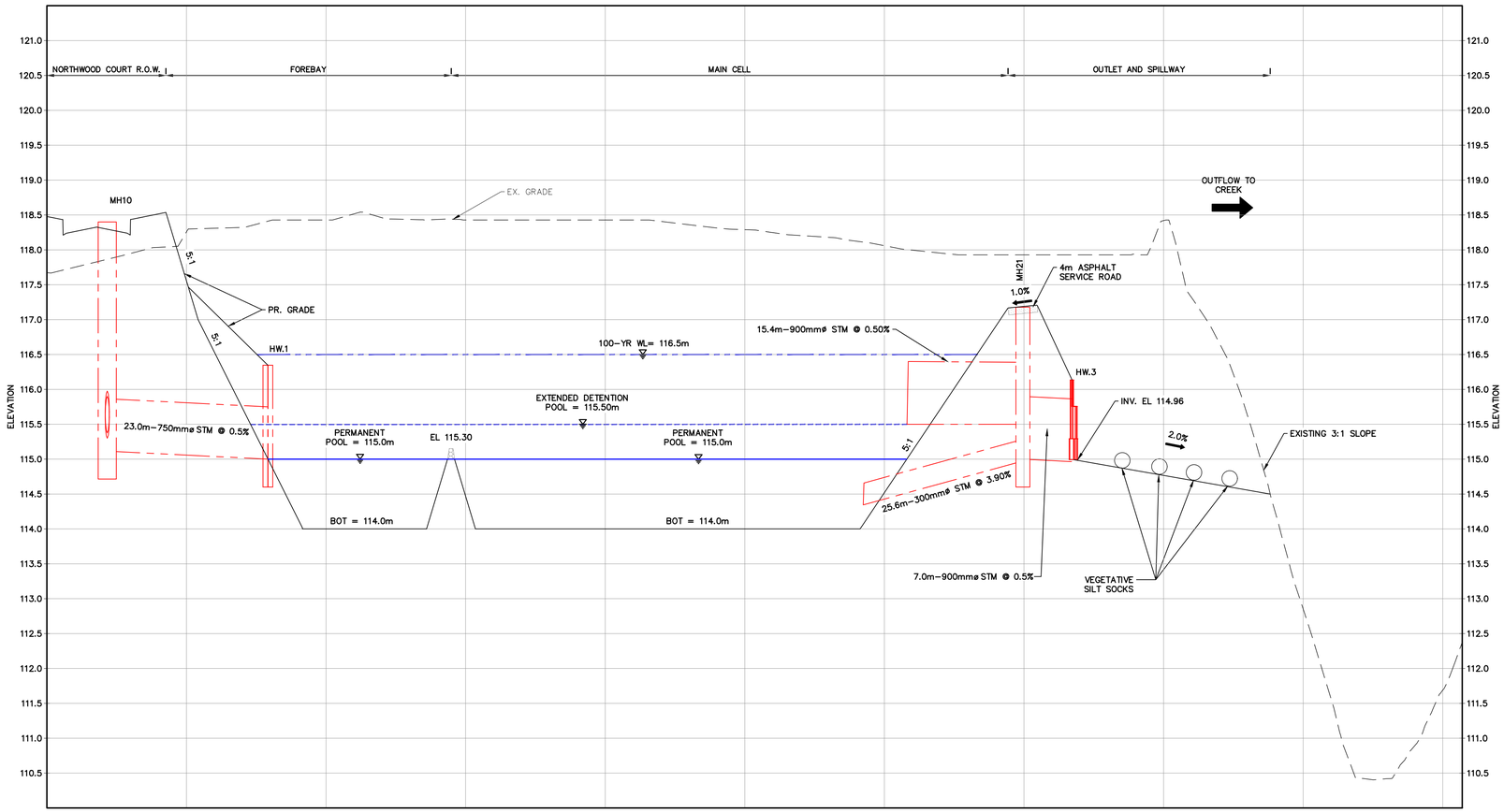
Drawn	Design	Project No.	
R.L.	B.A./P.F.	369-6730	
Check	Check	Scale	Dwg.
H.L.	R.A.	1:250	C104



SWM POND SECTION

SCALE H: 1:400
V: 1:40



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