Eva & Ida Streets Residential Development

Preliminary Functional Servicing Report

Project Location:

Part of Lot 10, Concession 4 North of River Thames, Municipality of Thames Centre

Prepared for:

D. Charabin Holdings Inc.
3-627 Maitland Street
London, ON
N5Y 2V7

Prepared by:

MTE Consultants Inc.
123 St. George Street.
London, ON N6A 3A1

June 16, 2023

MTE File No.: 49142-10

Engineers, Scientists, Surveyors.

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1.0 Introduction

MTE Consultants Inc. (MTE) has been retained to provide this preliminary Functional Servicing Report. This report has been prepared in support of the proposed residential development located between Eva & Ida Streets in the Municipality of Thames Centre, County of Middlesex. The site can be legally described as part of Lot 10, Concession 4 North of Thames River, Geographic Township of North Dorchester, in the Municipality of Thames Centre, County of Middlesex.

As presented on the Draft Plan of Condo (Zelinka Priamo Ltd., September 2022) provided in **Appendix A**, the proposed development consists of a Condominium Area – Residential Townhouse Blocks (Blocks 1 to 6) and Stacked Townhouse Block (Block 7), SWM Block (Block 8), Parkland – Significant Woodlot Block (Block 9), an amenity area, and the compensation planting area.

The development has the following legal description: Part of Lot 10, Concession 4 North of Thames River, Geographic Township of North Dorchester, in the Municipality of Thames Centre, County of Middlesex. The subject land is currently bordered by the residential developments on Eva & Ida Streets to the east, agricultural lands to the north and west, and existing storage yard to the south.

The land is currently vacant, and the area is covered by wood and brush. **Figure 1** shows the site location.

2.0 Sanitary Servicing

There are no existing sanitary sewers on Eva Street, Ida Street, nor the vicinity of the subject development. As part of the Dorchester Preferred Wastewater Servicing Strategy (2019) (from *Water and Wastewater Master Plan Update* (WWMP) by GM Blue Plan, dated September 2019) the following capital projects are proposed:

- WW-D-SS-02 outlines the proposal for the 250mmØ sanitary sewer on Eva St.
- WW-D-SPS-01B outlines the proposal for the new sanitary pumping station (SPS) that will pump the sanitary flows from the North Dorchester Area south to the main Dorchester wastewater treatment plant.
- WW-D-FM-01 outlines the proposal for a new forcemain needed to support new development SPS for development blocks North of CN rail in North Dorchester. Approximate location of the forcemain is from the SPS-01B along Minnie Street to the existing forcemain on Dorchester Road Bridge.
- WW-D-FM-02 outlines the proposal for a new forcemain from the existing Dorchester Road Bridge forcemain to the existing Dorchester Road gravity sewers needed to support new development SPS for development blocks North of CN rail in North Dorchester.

Apart from these capital projects required to support new development, following capital projects south of Thames River will be triggered by population growth:

- WW-D-SPS-06B outlines the required pumping station (Turnberry Drive) capacity upgrades to accommodate growth flows in Dorchester. At the date of the Master Plan report (September 2019) the upgrade trigger was the existing need.

- WW-D-FM-08 outlines new forcemain needed to support Dorchester WWTP SPS for all existing and growth developments in Dorchester. At the date of the Master Plan report (September 2019) the upgrade trigger was 5200 new persons and jobs in Dorchester.
- WW-D-TP-01B outlines treatment plant capacity upgrades required to accommodate all development flows in Dorchester. At the date of the Master Plan report (September 2019) the upgrade trigger was 800 new persons and jobs in Dorchester.

Sanitary flows from within the development will be conveyed to the new sanitary sewer on Eva Street and conveyed to the pumping station on Eva Street through the above mentioned future sanitary municipal infrastructure.

The proposed capital program for sanitary infrastructure is presented on Figure ES-4 and in Table ES-2 of the Municipality of Thames Centre Water and Wastewater Master Plan Report (WWMP) prepared by GM Blue Plan Engineering, dated September 2019. The Figure ES-4 and Table ES-2 are provided in **Appendix B.** As shown in **Appendix B**, the subject site is included in drainage area of the future 200mm sanitary sewer on North Street.

The proposed development sanitary plan is shown on **Figure 2** and development population of 216 people is estimated based on the draft plan. The sanitary peak flow calculation is provided in **Appendix B.**

The sanitary peak flow was calculated by multiplying the total population of 216 people by the average usage of 0.00405 litres per second per capita (350 l/capita/day divided by 86400) and the Harmon peaking factor “M” (peaking factor multiplied by 0.8). The total sanitary flow to the receiving future Eva Street 250mmØ sanitary sewer was calculated by increasing the calculated sanitary flow by 10% (uncertainty factor) and adding the infiltration allowance of 0.1 litres per second per hectare. The sanitary flow from the development portion will be conveyed to Eva Street via internal network of 200mmØ sanitary sewers.

Review of the Thames Centre Water and Wastewater Master Plan Update indicates that the subject site is the part of the wastewater (and water) Development Area 15 (refer to Figure 1-9). Figure 1-13 of the report shows that the proposed development target density for the residential area is 50 people/hectare. The proposed development density is 58 ppl/ha (216 people / 3.69 ha) which is more than the density allowed in the plan (50 ppl/ha).

IMAGE SOURCE: MIDDLESEX COUNTY MAPS

FIGURE-1 Date: APR 27/23 Scale: N.T.S.

LOCATION PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: **49142-104**

date — time — CADTAG P:\P\49142\104\FIGURES\49142-104-FIGURES.dwg

IDA STREET

STREET EXTENSION

PRIVATE ROAD 'A'

PRIVATE ROAD 'B'

BLOCK 7
44 UNITS
0.5011 ha

3 STOREY BACK TO BACK - STACKED TOWN BLOCK B (20 UNITS)

3 STOREY BACK TO BACK - STACKED TOWN BLOCK A (24 UNITS)

LANDSCAPE

BLOCK 6
18 UNITS
0.6588 ha

BLOCK 9
PARKLAND
0.9227 ha

VISITOR PARKING

AMENITY AREA

BLOCK 5
8 UNITS
0.2749 ha

BLOCK 3
12 UNITS
0.3860 ha

BLOCK 2
4 UNITS
0.1109 ha

BLOCK 1
4 UNITS
0.1109 ha

SWM BLOCK 80.1452 ha

SIGNIFICANT WOODLAND DRIP LINE

COMPENSATION PLANTING AREA
0.1552 ha

200mm SAN.

PRIVATE ROAD 'B'
200mm SAN.

STREET EXTENSION

EVA STREET

CONNECT TO SANITARY SEWER

250mm SAN.

FUTURE 250mmø CAPITAL PROGRAM SANITARY SEWER TO FUTURE NORTH DORCHESTER SANITARY PUMPING STATION (BY OTHERS)

LEGEND

- FUTURE 250mmø CAPITAL WORKS SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE

FIGURE-3

Date: JUNE 16/23
Scale: 1:1000

PROPOSED SANITARY SEWER

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3.0 Storm Servicing and Stormwater Management Consideration

Based on the municipality engineering requirements and the Ministry of Environment, Conservation and Parks' (MECP) design guidelines, the following SWM targets are established for the proposed development:

- Quantity Control - Control post-development peak flows to below the pre-development levels or to the available capacity of receiving storm sewer, whichever target is more conservative.
- Quality Control - Provide "Normal" Protection Level (70% of TSS removal) of water quality treatment.

The subject development is located within the Upper Thames River Subwatershed and is not within an area regulated by the Upper Thames River Conservation Authority (UTRCA). The UTRCA's Thames -Sydenham & Region Source Protection Map shows that the proposed development is located within 'Moderate and Low Threat Policy Area', 'Significant Groundwater Recharge Area'.

3.1 Existing Conditions

A brief description of the existing drainage conditions is outlined below.

3.1.1 Existing Drainage

The subject land is currently bordered by the residential development to the east, range and woodlands to the north, agricultural lands to the west, and storage yard to the south.

A portion of the property, a large, external area to the north and back yards of the existing residential lots to the east are draining towards an existing ditch inlet catch basin which collects local flows and conveys flows to the existing storm sewer on Eva Street (storm manhole M1A). The central area of the property drains to the south. The existing woodland area in the west portion of the property is generally draining south and west. As the woodland area will not be disturbed and as it is not contributing to the runoff of the development (draining externally to the west), it will not be considered in the SWM modelling. Pre-development catchment areas are presented in **Figure 3**.

Based on the information obtained from AgMaps (Ministry of Agriculture, Food and Rural Affairs), the local soils are determined to have hydrologic soil group (HSG) B.

Pre-development catchment area parameters are summarized in **Table 1.**

Table 1 – Pre-Development Drainage Area Parameters

Catchment ID	Description	Area (ha)	Impervious Area (%)	CN Curve Number[1]
101	Woodland and Range	5.42	0	63
102	Woodland	1.88	0	60

[1]: CN curve number based on MTO Drainage Manual Design Chart 1.09: Soil/Land Use Curve Numbers based on woods land use, range land use, fair hydrologic condition, hydrologic soil group B.

3.1.2 Existing Hydrology

Existing hydrologic conditions were evaluated using the Visual OTTHYMO 6.2 (VO6) hydrologic simulation software. The existing catchment area 101 and 102 parameters provided in **Table 1** were modelled to estimate the pre-development peak flows. The 2,5, 10, 25, and 100-year storm events were all modelled using design parameters outlined in the municipal standards with a 4-hour duration.

The pre-development conditions VO6 input parameters and corresponding model output are presented in **Appendix C** and **Appendix D**, respectively. The model results are summarized in **Table 2**.

Table 2 – Existing Conditions Catchment 101 Peak Flows

Storm Event	Pre-Development Catchment 101 (m^3/s)	Pre-Development Catchment 102 (m^3/s)	Combined Catchments 101 and 102 Outflow (m^3/s)
2-year	0.070	0.024	0.093
5-year	0.074	0.026	0.099
10-year	0.109	0.039	0.147
25-year	0.158	0.058	0.214
50-year	0.199	0.073	0.270
100-year	0.243	0.090	0.330

3.1.3 Allowable Outflow Assessment

In order to match the pre-development conditions, the controlled storm flow from the proposed development is proposed to outlet to the existing Eva Street storm sewer, located close to the property line. There is a 600mmØ storm sewer on Eva Street that connects to the 900mmØ storm sewer on Clara Street. MTE's review of the Record Drawings TC-00175 and TC-00192 indicates that there is approximately 281 l/s capacity in the Eva Street sewer, and from 2000 l/s to 2333 l/s capacity in the Clara Street sewer downstream from Eva Streat. No storm sewer design sheets or area plans are available for the Eva Street and Clara Street storm sewer. Therefore, with the currently available information, it is proposed that the post-development flow for the development area (from 2-year to 100-year) be controlled to pre-development flows. The highlighted Record Drawings TC-00175 and TC-00192 are provided in **Appendix C.**

3.2 Post-Development Conditions

The proposed subject development consists of the Condominium Area – Residential Townhouse Blocks (Blocks 1 to 6) and Stacked Townhouse Block (Block 7), SWM Block (Block 8), Parkland – Significant Woodland Block (Block 9), an amenity area, and the compensation planting area. Eva and Ida Streets will be extended to the proposed Private Road 'A'. The SWM strategy was developed to accommodate the stormwater from the proposed development without negative impacts to the subject site, neighbouring properties, and the receiving Eva Street storm sewer.

3.2.1 Proposed SWM Strategy

The proposed storm sewer plan is presented in **Figure 5.**

It was determined that the most efficient SWM system for the proposed development is through the implementation of SWM Dry Pond (SWMF) with one oil/grit (OGS) separator. Both the OGS and the SWMF will be privately owned by the condo corporation.

Minor flows from the external area to the north (Catchment 203) and minor flows from the proposed development (Catchment 201) will be collected and conveyed by the proposed storm sewers to the proposed OGS unit for quality control and further to the SWMF for quantity control, before releasing to the Eva Street storm sewer system. Similarly, major flows will be conveyed to the SWMF via surface flows on the proposed condominium roads. SWMF weir overflow will be directed to the extension of Eva Street where it will be conveyed along the existing overland flow route on Eva Street to Clara Street. The existing ditch inlet catch basin and the storm lead from the ditch inlet to the storm manhole M1A on Eva Street will be removed, and existing ditches in the southeast corner of the site will be filled during construction and a new ditch inlet catch basin manhole will be placed in the vicinity of the pre-development ditch inlet to collect the flows from the surrounding areas and convey them to the SWMF. Post-development catchment areas are presented in **Figure 4**.

The proposed hydrologic conditions were evaluated using VO6 hydrologic simulation software. The proposed catchment area parameters provided in **Table 3** were modelled to estimate the peak flows. The design storm parameters outlined in the municipal standards were used to model storm events (2-year to 100-year). Design storms were modelled as Chicago Distributions with a 4-hour storm duration. The post-development conditions VO6 input parameters and corresponding model output are presented in **Appendix E**.

Table 3 – Post-Development Catchment Area Parameters

Catchment ID	Description	Area (ha)	Impervious Area (%)	CN Curve Number for Pervious Area
201	Proposed Condominium Area	2.55	56	61[1]
202	SWMF Block	0.15	0	61[1]
203	External Areas Draining to the Development	4.60	0	64
Total Area to SWMF		7.30		

[1]CN value of 61 for pervious area was estimated in accordance with NRCS guidelines considering HSG'B' and grass (good hydrologic condition)

3.2.2 Proposed SWM Pond

The proposed SWM facility was conceptually designed in accordance with the municipal standards and Stormwater Management Planning and Design Manual, MECP, 2003. Note that this conceptual SWMF design will be refined and detailed during the detailed design of the project.

The SWM Block (Block 8) has allocated area of approximately 0.145 ha. The SWMF was conceptually designed as a dry pond with side slopes of 4:1 H:V and maximum storage depth of 2m. The proposed SWMF will outlet to the Village Gate Subdivision sewer system with a maximum peak flow of 93 L/s which is the pre-development catchments 101 and 102 combined 2-year storm event runoff rate.

High Ground Water Consideration. The hydrogeological investigation (Preliminary Hydrogeological Assessment Report by MTE, report draft dated May 2023) indicates high ground water of approximately 0.5m to 1m below the existing ground for the site including the SWM block area. As such, the SWM dry pond will require dewatering and a clay liner. The clay liner will need to be designed to resist uplift pressure. This will all be assessed and detailed during the detailed design stage of the project.

3.2.3 Stormwater Management – Quantity Control

The proposed SWMF was conceptually designed to attenuate the post–development peak discharges to pre-development storm flows. The pre-development catchments 101 and 102 combined 2-year storm event runoff rate of 93 l/s will be released from the pond to the existing storm sewer on Eva Street. Minor flows will be controlled with a single 175mmØ orifice outlet on the SWMF outlet headwall. SWMF will feature a 7m wide weir at the level of 30cm under the top of the pond to outlet the flows during the 50-year and 100-year storm events. A comparison of the pre-development and the post-development flow rates provided in **Table 4** shows that the quantity control requirements are satisfied.

Table 4 – Target Rates (Allowable Peak Flows) and Post-development (Controlled) Flows Comparison (VO6 Results)

Storm Event	Allowable Peak Flows (m^3/s)	Controlled Post-Development Peak Flows Discharge to Eve Street Storm Sewer (m^3/s)
2-year	0.093	0.064
5-year	0.099	0.066
10-year	0.147	0.074
25-year	0.214	0.083
50-year	0.270	0.171
100-year	0.330	0.278

3.2.4 SWMF Preliminary Stage-Storage-Discharge Assessment

The preliminary stage-storage-discharge relationship for the proposed SWMF (dry pond) is presented in the following table. Note that the elevations provided in **Table 5** are conceptual to confirm pond sizing and site development feasibility. As shown in **Table 5**, the proposed pond has sufficient capacity to provide quantity control for the 100-year storm event and store 250-year storm event flows. The complete conceptual stage-storage-discharge relationship and SWMF hydraulic calculations are provided in **Appendix C**.

As previously outlined, a more detailed final SWM design will be completed during the future detailed engineering stage of the process.

Table 5 – SWMF - Conceptual Stage Storage Discharge Relationship

Stage (Conceptual)	Pond Storage Volume (m^3)	Discharge (m^3/s)	Reference Elevation (m)
259.50	0		Bottom of the Pond

259.80	159		
260.00	291		
260.51	506	0.064	1:2-Year WSE
260.55	535	0.066	1:5-Year WSE
260.81	747	0.074	1:10-Year WSE
261.11	1041	0.083	1:25-Year WSE
261.23	1181	0.171	1:50-Year WSE
261.26	1218	0.278	1:100-Year WSE
261.30	1268	0.424	1:250-Year WSE
261.50	1531		Top of the Pond

[1]WSE denotes conceptual water surface elevation.

3.2.5 Stormwater Management – Quality Control

The required 'Normal Level' of stormwater quality control (70% TSS removal) for the proposed development will be provided by an OGS unit. The storm flows from the OGS will be conveyed to SWMF (dry pond) for quantity control.

The storm flows from the subdivision catchment area 201 will be conveyed to the proposed Stormceptor EFO6 oil/grit separator prior to discharging to SWMF. The preliminary sizing calculations provided in **Appendix F** show that this model provides 72% (TSS) removal, which exceeds the required 'Normal' Level (70% TSS removal) of stormwater quality control and treats over 90% of the annual rainfall.

Stormceptor details are provided in **Appendix F**.

3.2.6 Low Impact Development (LID) Consideration

Based on the preliminary geotechnical and hydrogeological investigation completed by MTE Consultants, there is a very limited opportunity for LID features application at the proposed development.

The MECP SMPDM states that the minimum vertical separation between bottom of infiltration feature and groundwater / impervious soil is 1m. As per above referenced geotechnical investigation the high groundwater elevation at the subject site (approximately 1 m) is the limiting factor for LID features application.

Any potential of LID features application will be reviewed in consultation with Municipality and UTRCA during detailed design stage of the process.

3.3 Storm Servicing

Based on MTE's conceptual design the minor runoff (2-year storm event) from the proposed development will be conveyed to internal (private) catchbasins and manholes where it is collected and conveyed via privatel storm sewers to the proposed OGS unit for quality control and then conveyed to SWMF for quantity control. Major flows will be conveyed on the development roads to the SWMF.

For the proposed storm servicing, refer to **Figure 5**. The detailed storm servicing will be provided during the detailed design stage of the process.

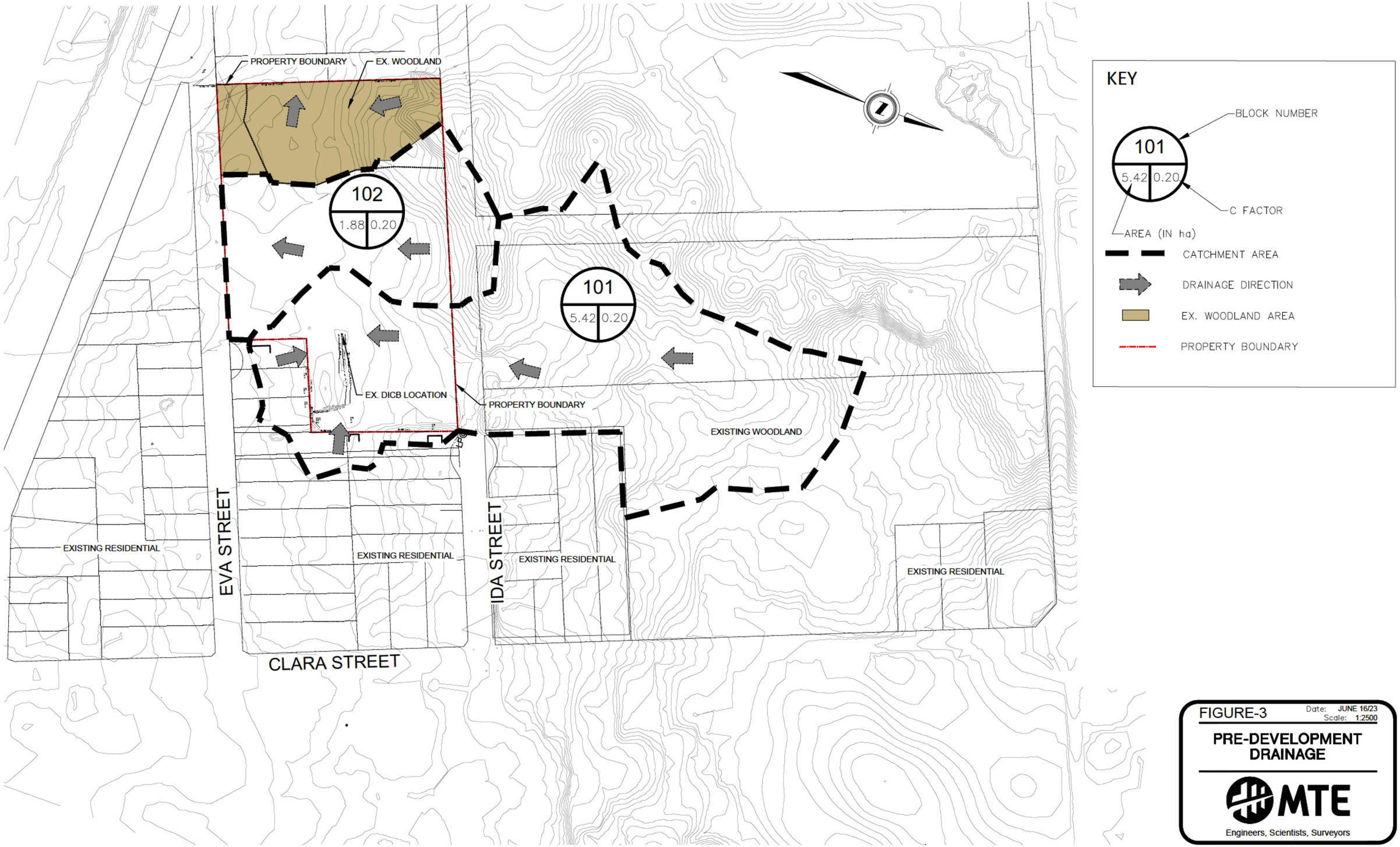

FIGURE-3

Date: JUNE 16/23
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PRE-DEVELOPMENT DRAINAGE

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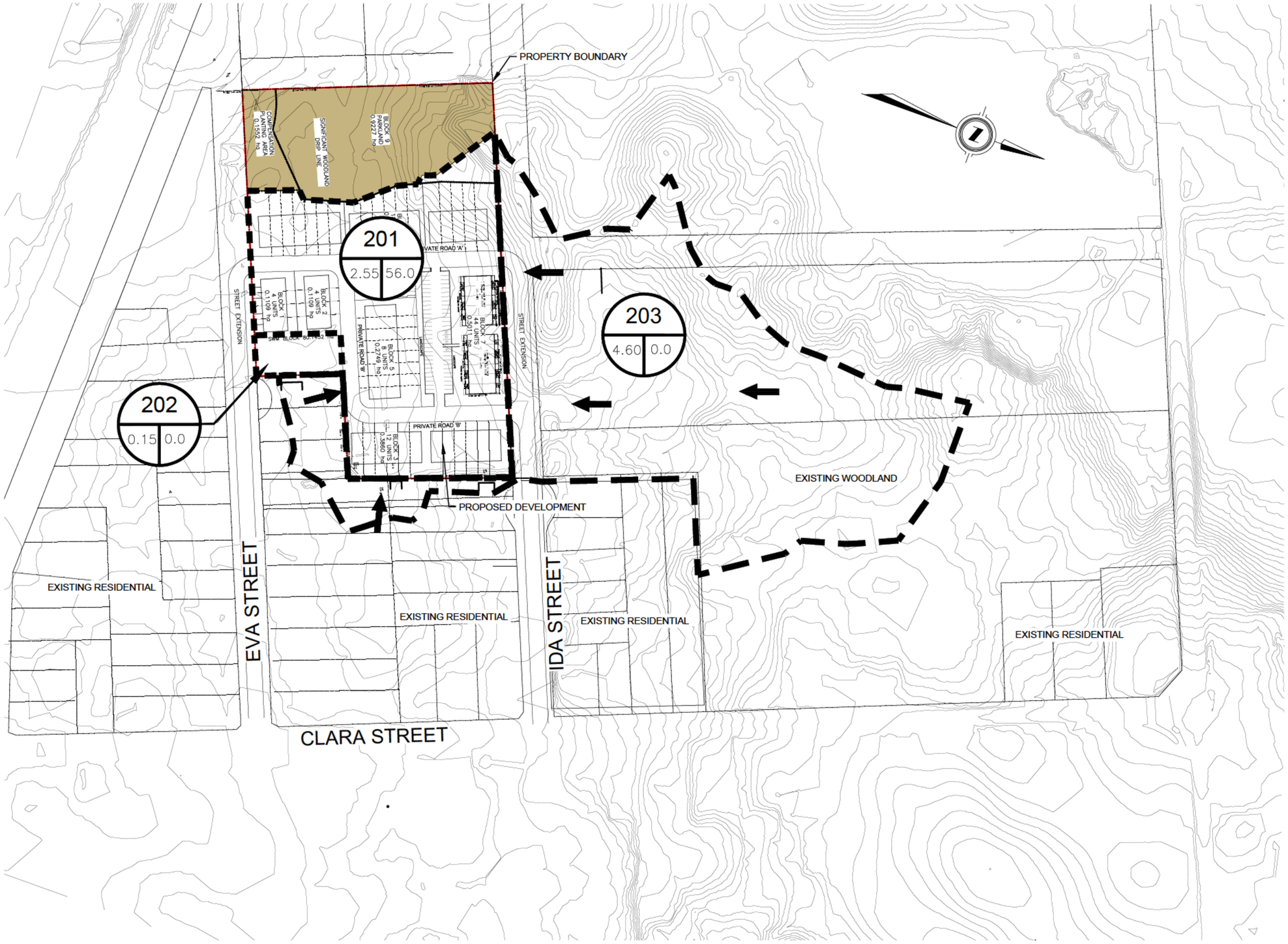

FIGURE-4

Date: JUNE 16/23
Scale: 1:2500

POST-DEVELOPMENT DRAINAGE

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Project No.: 49142-104

IDA STREET

STREET EXTENSION

EXISTING DRAINAGE

BLOCK 9
PARKLAND
0.9227 ha

EXISTING DRAINAGE

SIGNIFICANT WOODLAND DRIP LINE

COMPENSATION PLANTING AREA
0.1552 ha

PRIVATE ROAD 'A'

BLOCK 6
18 UNITS
0.6588 ha

BLOCK 7
44 UNITS
0.5011 ha

3 STOREY BACK TO BACK - STACKED TOWN BLOCK B (20 UNITS)

3 STOREY BACK TO BACK - STACKED TOWN BLOCK A (24 UNITS)

LANDSCAPE

LANDSCAPE

VISITOR PARKING

AMENITY AREA

BLOCK 5
8 UNITS
0.2749 ha

PRIVATE ROAD 'B'

PRIVATE ROAD 'B'

BLOCK 3
12 UNITS
0.3860 ha

OGS-1

DICBMH-1

PROPOSED DICBMH-1 TO COLLECT EX. FLOWS FROM EX. DITCH

BLOCK 2
4 UNITS
0.1109 ha

BLOCK 1
4 UNITS
0.1109 ha

SWM BLOCK 80.1452 ha

PROPOSED STORM TO CONNECT TO EX. STORM SEWER

STREET EXTENSION

EX. 600 STM

EVA STREET

LEGEND

- PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED DICBMH
- EXISTING STORM

FIGURE-2

Date: JUNE 16/23
Scale: 1:1000

PROPOSED STORM SEWER

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4.0 Water Servicing

4.1 Existing Conditions

There is an existing 150mmØ municipal watermains on Eva Street and Ida Street, and a 250mmØ and a 150mmØ watermains on Clara Street.

Based on the hydrant flow tests received from the municipality, the available flow at 20 psi on Eva Street is approximately 142 l/s. Static pressure on Eva Street is 57.1 psi which corresponds to the hydraulic grade line of 302m (approximately 262m ground surface + 40.15 metres of head).

These conditions were used as benchmarks for the water supply analysis (WaterCAD).

4.2 Future Upgrades

Dorchester water supply elevated tank is southwest of the of the Marion Street and Clara Street intersection. As part of the Dorchester Preferred Water Servicing Strategy following local watermain upgrades are proposed: extension of Ida Street watermain and Eva Street watermain to Part 2 Sexton Street (Registered Plan No. 274), a local watermain from Eva and Ida Street watermain extensions north to Marion Street, and a local watermain from Eva St extension to Minnie Street. Proposed future local watermains are not capital projects and do not have specified sizes.

The proposed future local watermains are presented in Figure ES-2 in the WWMP. Figure ES-2 is included in **Appendix G.**

4.3 Proposed Conditions

The proposed development water distribution system will be provided by the proposed 200mmØ watermain in the condominium and 200mmØ watermain connecting to the existing 150mmØ watermain on Ida Street, and 200mmØ watermain connecting to the existing 200mmØ watermain on Eva Street as shown on preliminary water distribution layout presented on **Figure 6**.

4.4 Design Criteria

The design parameters outlined below are based on the current Municipality of Thames Centre Engineering Design Standards (EDS), dated 2021:

- An average demand of 350 l/capita/day
- Minimum water pressures to be maintained in the distribution system of:
  - Minimum of 140 kPa (20 psi) at ground level at maximum day demand flow plus fire flow
  - Minimum of 275 kPa (40 psi) at maximum hourly demand flow
  - Minimum of 275 kPa (40 psi) at average day demand flow
- Maximum residual pressure should not exceed 690 kPa (100 psi)
- Peaking factors based on population: 2.75 for maximum day and 4.13 for maximum hour.
- The maximum permissible velocity for normal rates is 1.5 m/s and 2.4 m/s for fire flow conditions.

4.5 Boundary Conditions

Hydraulic Grade Line was calculated as follows:

- Hydrant D416 is located at 155 Eva Street. Flow test from August 2015 reported a static pressure of 57.1 psi or 40.15 metres of head, and the calculated maximum flow of 142.3 l/s at the residual pressure of 20 psi. The approximate elevation of the road is 262 m, therefore the total hydraulic grade line at this location is approximately 302 m. Flow tests from the hydrant tests in the area resulted in approximately the same hydraulic grade line. Hydrant flow test is presented in **Appendix G.**

Per the WWMD the Dorchester Elevated Tank has a Top Water Level (TWL) of 303m and operates between 301.7m (Low Water Level, LWL) and 303 m (TWL). Assuming the Dorchester Elevated Tank water levels are correct, D416 hydrant flow test results fall in the operating levels range of the Elevated Tank and will be used in the model as the boundary condition. Hydraulic grade line of 302m was used in the model as the boundary condition.

4.6 Water Network Analysis

A detailed water network analysis for the development was completed using WaterCAD software.

We have completed the Average Day, Maximum Day + Fire Flow, and Peak Hour water demand scenarios as well as Water Age Analysis and results are attached to this report. The Water Demand Calculations for each node are also attached. Following Hazen-Williams friction factors were used:

- Hazen-Williams friction factor C of 100 for 150mmØ watermains.
- Hazen-Williams friction factor C of 110 for 200mmØ watermains;

4.6.1 Average Day Demand Scenario

Under this scenario, the minimum pressure in the system for the development was computed to be 362 kPa (>275 kPa minimum required). Please refer to **Appendix G** for the detailed water supply model results.

Under this scenario, the maximum residual pressure in the system for development was computed to be 406 kPa (maximum residual pressure should not exceed 80psi or 550 kPa), Please refer to **Appendix G** for the detailed water supply model results.

4.6.2 Peak Hour Demand Scenario

Under this scenario, the minimum pressure in the system for development was computed to be 362 kPa (>275 kPa minimum required). Maximum velocity = 0.09 m/s (<1.5m/s maximum allowed). Please refer to **Appendix G** for the detailed water supply model results.

4.6.3 Maximum Day Demand Plus Fire Flow

The required fire flow for single detached low density residential areas is 76 l/s as per the Thames Centre Engineering Design Standards. The typical fire flow requirement for medium density residential areas is 90 l/s.

Per the hydrant test results, there is approximately 142 l/s of flow available at the residual pressure of 20 psi in the existing watermain on Eva Street.

The model was setup to match the available hydrant flows in the existing conditions. Fire protection flow of 90 l/s for medium density units is available in the development at residual pressures above the minimum required pressure of 140 kPa with the watermain velocity criterium applied to the proposed watermains only.

Please refer to **Appendix G** for the detailed water supply model results.

4.6.4 Water Age Analysis

The attached quality analysis for water age demonstrates that adequate turn-over will be provided at all development nodes at full occupancy. Maximum water age in the development at full occupancy occurs at node J-40 at 12.3 hrs and pipe P-41 at 55 hrs (< 72hrs [=3 days] maximum allowed).

Based on the water supply model results the development does not require the future local watermains to proceed, the exiting municipal infrastructure can provide adequate water supply satisfying the municipal design criteria.

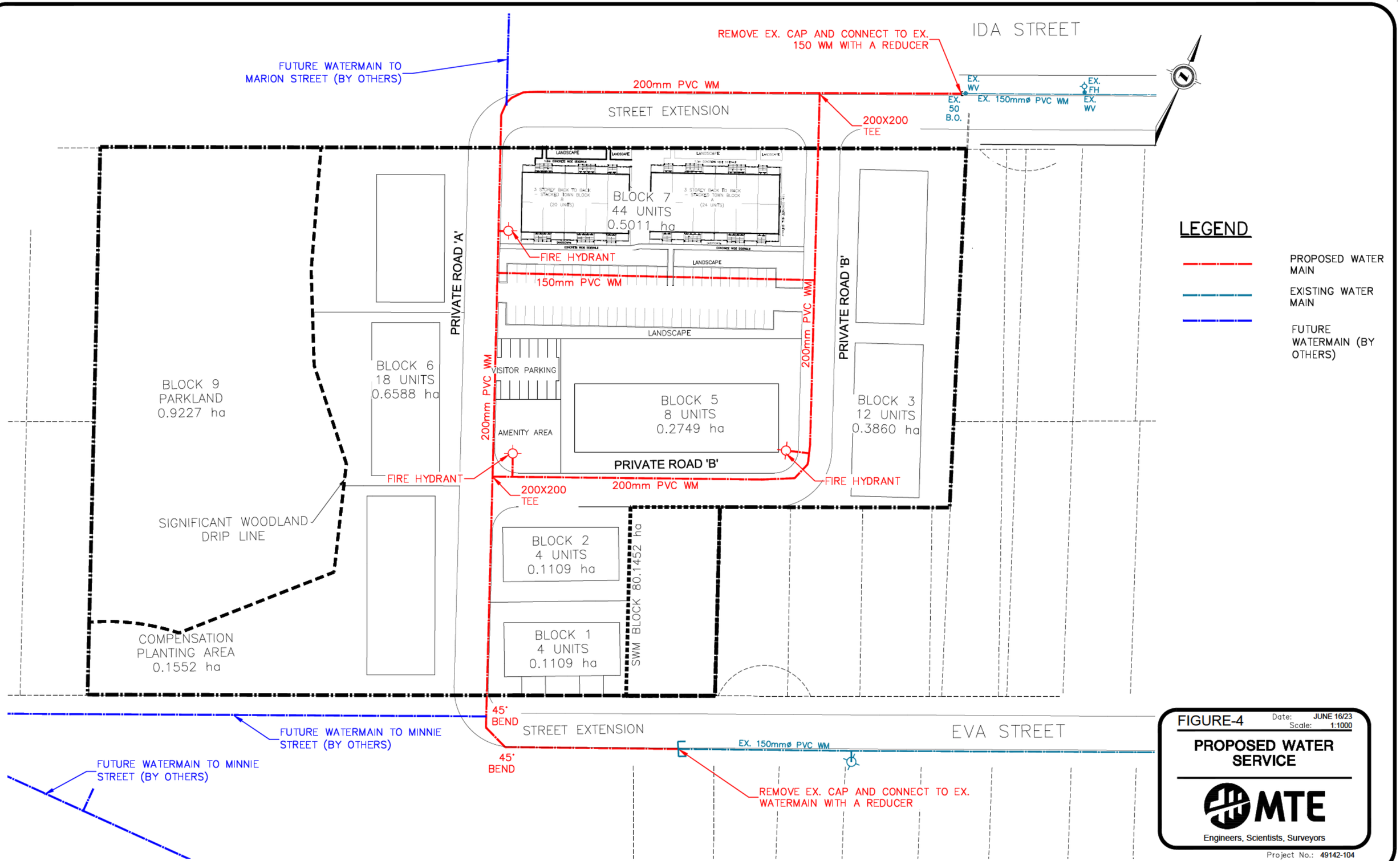

FIGURE-4

Date: JUNE 16/23
Scale: 1:1000

PROPOSED WATER SERVICE

MTE
Engineers, Scientists, Surveyors

Project No.: 49142-104

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5.0 Conclusions and Recommendations

Based on the foregoing analysis, it is concluded that:

i. The proposed sanitary, storm and water servicing as well as the proposed Stormwater Management meet the Municipality and MECP requirements.

It is recommended that:

ii. The site grading, proposed SWM facility, storm servicing, sanitary servicing, water servicing and associated detailed reports will be completed during the future detailed design stage of the process.

All of which is respectfully submitted,

MTE Consultants Inc.

Bogdan Pavlovic, MESc., P. Eng.
Design Engineer
519-204-6510 ext. 2266
bpavlovic@mte85.com

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Appendix A

Draft Plan, Survey

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2191486

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
[O. Reg. 216/10, Section 29(2)]

TOPOGRAPHICAL PLAN OF SURVEY
of all of
LOTS 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
and part of
LOT 22
SOUTH OF IDA STREET
all of
LOTS 11, 12, 13, 14, 15, 16, 17, 18
and part of
LOTS 19, 20, 21 and 22
NORTH OF EVA STREET
and part of
SEXTON STREET
(CLOSED AND DESIGNATED BLOCK C BY ORDER REGISTERED AS INST. No. LT293017)
REGISTERED PLAN No. 274
part of
LOT 10, CONCESSION 4
NORTH OF THE RIVER THAMES
(GEOGRAPHIC TOWNSHIP OF NORTH DORCHESTER)
in the
MUNICIPALITY OF THAMES CENTRE
COUNTY OF MIDDLESEX

MTE | OLS LTD., ONTARIO LAND SURVEYORS

Scale 1 : 500

10m 5 0 10 20 50m

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

NOTES

SIB	DENOTES	STANDARD IRON BAR.
IB	"	IRON BAR.
IBø	"	ROUND IRON BAR.
CC	"	CUT CROSS.
WIT	"	WITNESS.
(SU)	"	SOURCE UNKNOWN
WIT	"	WITNESS.
SSIB	"	SHORT STANDARD IRON BAR
(MTE)	"	MTE OLS LTD.
■	"	MONUMENT FOUND.
□	"	MONUMENT SET.
P1	"	PLAN OF SURVEY BY MURRAY FRASER LIMITED, DATED JULY 25, 1990 (FILE: D4490)
P2	"	PLAN 33R-10584
CLF	"	CHAIN LINK FENCE
BF	"	BOARD FENCE
PEDB	"	BELL TELEPHONE PEDESTAL
LP	"	LIGHT POLE
DICB	"	DITCH INLET CATCH BASIN
CSP	"	CORRUGATED STEEL PIPE
MHST	"	STORM MANHOLE
FH	"	FIRE HYDRANT

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM GPS OBSERVATIONS USING VERTICAL BENCHMARK 0011978U307 HAVING AN ELEVATION OF (CGVD28)(FIRST ORDER) 258.769

AREA OF SITE= 40,640.290 sq.m. (4.064 ha.)(10.042 acres)

BEARINGS ARE UTM GRID DERIVED FROM SPECIFIED CONTROL POINTS 00820060047 AND 00820060048 UTM ZONE 17, NAD83 (CSRS-2010.0)

DISTANCES SHOWN ON THIS PLAN ARE GROUND LEVEL DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999569425

SPECIFIED CONTROL POINTS (SCP's) : UTM ZONE 17, NAD83 (CSRS-2010.0)
GRID COORDINATES TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
SCP 00820060047	4755658.802	492694.188
SCP 00820060048	4756628.071	496896.057

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

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:
(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
(2) THE SURVEY WAS COMPLETED ON THE 6th DAY OF JUNE, 2022

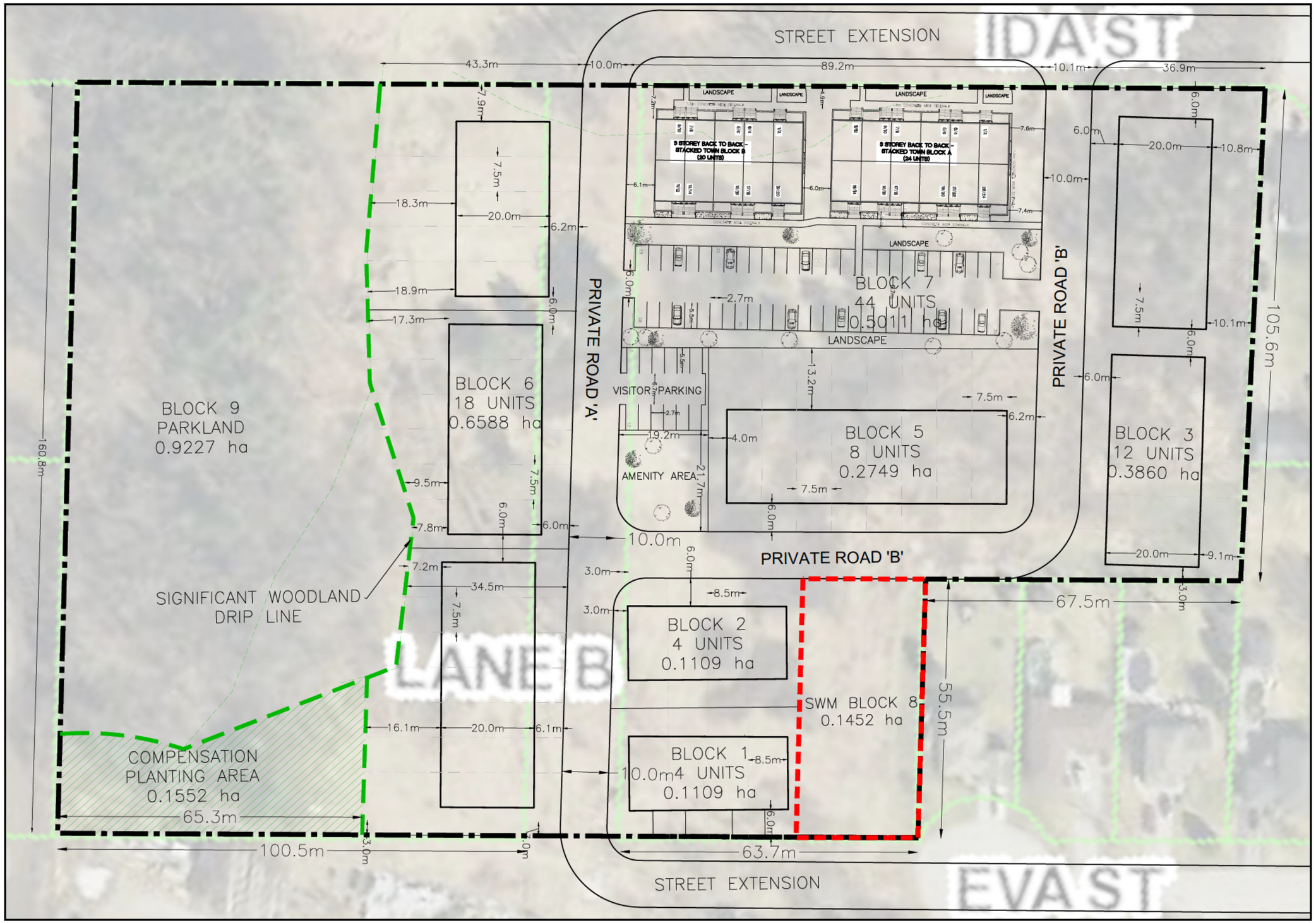
[redacted]

JUNE 15, 2022
LONDON, ONTARIO.

P. R. LEVAC
ONTARIO LAND SURVEYOR

MTE ONTARIO LAND SURVEYORS LTD.
123 ST. GEORGE STREET
LONDON, ONTARIO, N6A 3A1
TEL: 519-204-6510

Cad File:			CGOD :
Surveyed By : NR	Checked By : PRL		MTE File No : 49142-201
Drawn By : rc/MN	Date : 22/06/15		HR File No :



KEY PLAN

DRAFT PLAN OF CONDOMINIUM

PLAN274 LOTS16-21&PT22 S IDA LOTS 16-18
PTS 19-22 N EVA & S. IDA SEXTON ST
CLOSED RP33R 10584 PARTS 1-3

MUNICIPALITY OF THAMES CENTRE
COUNTY OF MIDDLESEX

CURRENT ZONE R1-5

PROPOSED LAND USES AND AREAS

RESIDENTIAL,TOWNHOUSE BLOCK 1	0.1109 ha	0.2740 ac
RESIDENTIAL,TOWNHOUSE BLOCK 2	0.1109 ha	0.2740 ac
RESIDENTIAL,TOWNHOUSE BLOCK 3	0 3860 ha	0.9538 ac
RESIDENTIAL,TOWNHOUSE BLOCK 4	0.4671 ha	1.1542 ac
RESIDENTIAL,TOWNHOUSE BLOCK 5	0 2749 ha	0.6792 ac
RESIDENTIAL,TOWNHOUSE BLOCK 6	0 6588 ha	1.6279 ac
STACKED TOWNHOUSE BLOCK 7	0 5011 ha	1.2382 ac
SWM BLOCK 8	0.1452 ha	0.3587 ac
PARKLAND BLOCK 9	0 9227 ha	2.2800 ac
AMENITY AREA	0 0745 ha	2.2800 ac
COMPENSATION PLANTING AREA	0.1552 ha	0.3835 ac
PROPOSED ROADS		
PRIVATE ROAD "A"	0.1609 ha	0.3975 ac
PRIVATE ROAD "B"	0.1942 ha	0.4798 ac
TOTAL	3 6932 ha	9.1260 ac

TOTAL NUMBER OF UNIT 46 UNITS
TOTAL NUMBER OF STACK TH 44 UNITS

NO.	REVISION	DATE	INITIAL

JEFF & DIANA HOUSE

EVA STREET

ZELINKA PRIAMO LTD
A Professional Planning Practice
318 Wellington Road, London, Ontario N6C 4P4
Tel (519) 474-7137 Fax (519) 474-2284 e-mail zp@zpplan.com

DRAWN BY	PROJECT NO.
SN	CCI/THC/21-01
DATE	SCALE
SETEMBER 2022	N.T.S

D:\Zelinka\1-Zelinka\HOUSE\Eva Street\Eva St._Concept Plan.dwg

Appendix B

Relevant WWMP Figures, Sanitary Flow Calculation

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Sanitary Mains

- Existing - Local
- Existing - Trunk
- Existing - Forcemain
- Growth - Forcemains
- Growth - Development
- Upgrade
- New
- Benefits Existing

Facility Upgrades

- Pumping Station
- Wastewater Treatment Plant

Landuse

- RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- GENERAL COMMERCIAL
- HIGHWAY COMMERCIAL
- SETTLEMENT INDUSTRIAL
- INSTITUTIONAL
- RECREATIONAL
- PROTECTION AREA
- NATURAL AREA
- PARKS & OPEN SPACE
- ENVIRONMENTAL AREA
- CORE AREAS
- URBAN SETTLEMENT AREA BOUNDARY

WW-D-SS-13
WW-D-SS-16
WW-D-SPS-01B
WW-D-SS-01B
WW-D-SS-12
WW-D-SS-15
WW-D-SPS-02
WW-D-SS-02
WW-D-FM-04
WW-D-FM-01
WW-D-FM-05
WW-D-SS-14
WW-D-SPS-04
WW-D-SPS-03
WW-D-SS-17
WW-D-FM-02
WW-D-SS-011
WW-D-SS-05B-ALT-1
WW-D-SS-05B-ALT-2
WW-D-SS-06B-ALT-1
WW-D-FM-06
WW-D-SS-06B-ALT-2
WW-D-SS-07B-ALT-1
WW-D-FM-09
WW-D-SS-07B-ALT-2
WW-D-SS-09
WW-D-SS-03
WW-D-SS-04
WW-D-SPS-07B
WW-D-SPS-06B
WW-D-FM-08
WW-D-FM-07
WW-D-SPS-05
WW-D-TP-01B

SHAVER RD
HAMILTON RD
BRIDGE ST
JAMES ST
CATHERINE ST
ELGIN RD
DORCHESTER RD

0 1 Kilometers

Figure ES-4

Dorchester Preferred Wastewater Servicing Strategy

BluePlan Engineering

September 2019
418109
NAD 1983 UTM Zone 17N

Table ES-2: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
WW-D-TP-01B	Dorchester Treatment Plant Upgrades	Treatment plant capacity upgrades required to accommodate all development flows in Dorchester	All Dorchester Developments and Existing Areas on Private Sewage Systems (Unserviced)	Accumulated growth	80% Trigger of 1,000 PPJ (Persons + Jobs) = 800 PPJ	C	Treatment		3.2 ML	$ 14,001,000
WW-D-SPS-01B	North Dorchester New Development SPS	New SPS needed to support New Development north of railway in North Dorchester	Development 3-15 Existing Area 1	New Development North of Railway	With new development	B	Pumping		90 L/s	$ 4,732,000
WW-D-SPS-02	North Dorchester Northwest SPS	New SPS needed to support New Development and existing development south of railway and west of Dorchester Road Bridge in North Dorchester	Ex. Area 2	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		8 L/s	$ 568,000
WW-D-SPS-03	North Dorchester Northeast SPS	New SPS needed to support existing development south of railway and east of Dorchester Road Bridge in North Dorchester	Ex. Area 13	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		1 L/s	$ 121,000
WW-D-SPS-04	South Dorchester SPS	New SPS needed to support existing development south of river and north of PS3 drainage area in South Dorchester	Ex. Area 20 and North Part of Ex. Area 19	Development 19, 20 or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Pumping		12 L/s	$ 995,000
WW-D-SPS-05B	Southeast Dorchester SPS	New SPS needed to support Development block east of Valleyview Crescent in South Dorchester	Development 47	Development Block 47	With new development	B	Pumping		8 L/s	$ 538,000
WW-D-SPS-06B	Dorchester SPS Upgrades	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	All Dorchester Development Blocks	Existing Need	Today	B	Pumping		254 L/s	$ 10,065,000
WW-D-SPS-07B	Dorchester PS3	Pumping station capacity upgrades required to accommodate growth flows in Dorchester	Development 16-19, 22-25, 29b	Southeast Development Blocks	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Pumping		102 L/s	$ 5,359,000
WW-D-FM-01	North Dorchester New Development forcemain	New forcemain needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	With WW-D-SPS-01	With new development	A+	Forcemain	475 m	300 mm	$ 1,244,000
WW-D-FM-02	Dorchester Road forcemain extension	New forcemain from Dorchester Road bridge forcemain to Dorchester road gravity sewers needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	With WW-D-SPS-01	With new development	A+	Forcemain	200 m	300 mm	$ 364,000
WW-D-FM-03	Dorchester Road forcemain extension	New forcemain from Dorchester Road bridge forcemain to Byron Ave trunk sewers needed to support new development SPS for development blocks North of CN rail in North Dorchester	Development 3-15 Ex. Area 1 - 4, 13	New Development or Municipal Servicing Replacing Private Sewage Systems	80% Trigger of 2,700 PPJ = 2,100 PPJ	A+	Forcemain	550 m	300 mm	$ 889,000
WW-D-FM-04	North Dorchester Northwest forcemain	New forcemain needed to support northwest development SPS for development blocks South of CN rail and West of Dorchester Road Bridge in North Dorchester	Ex. Area 2 and Surrounding Areas	With WW-D-SPS-02	Existing development	B	Forcemain	730 m	100 mm	$ 1,487,000
WW-D-FM-05	North Dorchester Northeast forcemain	New forcemain needed to support northeast SPS for existing development South of CN rail and East of Dorchester Road Bridge in North Dorchester	Ex. Area 13 and Surrounding Areas	With WW-D-SPS-03	With new development	B	Forcemain	500 m	100 mm	$ 1,183,000
WW-D-FM-06	South Dorchester forcemain	New forcemain needed to support south SPS for existing development South of river in South Dorchester	North part of Ex. Area 19 and Ex. Area 20	With WW-D-SPS-04	Existing development	B	Forcemain	1800 m	100 mm	$ 2,503,000
WW-D-FM-07	Southeast Dorchester forcemain	New forcemain needed to support southeast SPS for existing development East of serviced developments and North of Hamilton Road in South Dorchester	Development 47	With WW-D-SPS-05	With new development	B	Forcemain	620 m	100 mm	$ 771,000
WW-D-FM-08	Dorchester SPS forcemain	New forcemain needed to support Dorchester WWTP SPS for all existing and growth developments in Dorchester.	All Dorchester Development Blocks	With WW-D-SPS-06B (Dorchester SPS)	80% Trigger of 6,500 PPJ = 5,200 PPJ	B	Forcemain	1250 m	350 mm	$ 2,152,000
WW-D-FM-09	PS3 forcemain	Twinned forcemains needed to support PS3 for all development in Southeast Dorchester	Development 16-19, 22-25, 29b	With W-D-SPS-07B (Dorchester PS3)	80% Trigger of 4,500 PPJ = 3,600 PPJ	B	Forcemain	662 m	250 mm	$ 1,777,000
WW-D-SS-01B	New Development SPS West Sewers	New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.	Development 3-7 Ex. Area 1	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	420 m	300 mm	$ 490,000
WW-D-SS-02	New Development SPS East Sewers	New sanitary sewer required for development blocks going to new Development SPS in North Dorchester.	Development 8-15	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A	Sewer	480 m	250 mm	$ 712,000

Table ES-2: Wastewater Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks and/or Existing Unserviced Areas	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
WW-D-SS-03	PS3 West Sewers	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	Proposed construction	A+	Sewer	265 m	375 mm	$ 1,529,000
WW-D-SS-04	PS3 West Sewers	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	45 m	450 mm	$ 126,000
WW-D-SS-05B-ALT-1	Christie Drive and new Development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	370 m	300 mm	$ 563,000
WW-D-SS-06B-ALT-1	Rath-Harris Municipal Drain Crossing	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	B	Sewer	80 m	300 mm	$ 827,000
WW-D-SS-07B-ALT-1	New development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development or Municipal Servicing Replacing Private Sewage Systems	With new or existing development	A+	Sewer	390 m	375 mm	$ 1,993,000
WW-D-SS-09	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 29b	New Development	With new development	A	Sewer	400 m	250 mm	$ 1,183,000
WW-D-SS-10	Sewer East of PS3	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 24, 29b	New Development	With new development	A		30 m	300 mm	$ 102,000
WW-D-SS-11B	Christie Drive and new Development sewer	New sanitary sewer required for development blocks going to PS3 in Dorchester.	Development 17-18, 22, 25 Ex. Area 19	New Development	With new development	A	Sewer	505 m	300 mm	$ 632,000
WW-D-SS-12	Clara Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 7 - 11 Ex. Surrounding Areas	New Development	With new development	A+	Sewer	605 m	200 mm	$ 880,000
WW-D-SS-13	Marion Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 9 - 10 Ex. Surrounding Areas	New Development	With new development	A+	Sewer	210 m	200 mm	$ 342,000
WW-D-SS-14	North Street to Clara Street sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 11-12, 14 Ex. Area 13, Surrounding Areas	New Development	With new development	A	Sewer	450 m	200 mm	$ 670,000
WW-D-SS-15	North Street Sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 9-12, 14 Ex. Area 13, Surrounding Areas	New Development	With new development	A	Sewer	325 m	200 mm	$ 499,000
WW-D-SS-16	Richmond Street Sewer	New sanitary sewer to accommodate growth Northeast of New development SPS in North Dorchester	Development 5-7 Ex. Area 1,3-4, Surrounding Areas	New Development	With new development	A	Sewer	405 m	200 mm	$ 515,000
WW-D-SS-17	Hamilton Road to Christie Drive sewer	New sanitary sewer to accommodate growth flows east of PS3 in Dorchester	Development 16-17	New Development	With new development	A	Sewer	1250 m	200 mm	$ 1,530,000
WW-D-SS-18	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-01B)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-01B catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	7500 m	200 mm	$ 10,445,000
WW-D-SS-19	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-02)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-02 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	5640 m	200 mm	$ 7,856,000
WW-D-SS-20	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-03)	New sanitary sewers to benefit existing unserviced within North Dorchester (WW-D-SPS-03 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	1120 m	200 mm	$ 1,637,000
WW-D-SS-21	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-04)	New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-04 catchment)	Ex. Areas in North Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	5300 m	200 mm	$ 7,383,000
WW-D-SS-22	Sewers for Municipal Servicing Replacing Private Sewage Systems (SPS-06B)	New sanitary sewers to benefit existing unserviced within South Dorchester (WW-D-SPS-06B catchment)	Ex. Areas in South Dorchester on Private Sewage Systems	Municipal Servicing Replacing Private Sewage Systems	With new development	A+	Sewer	8200 m	200 mm	$ 11,420,000

Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

0 1 Kilometers

Figure 1-9

Identified Development Areas

Dorchester and 401 Corridor Lands

BluePlan Engineering

September 2019
418109-G-002
NAD 1983 UTM Zone 17N

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Dorchester (within Settlement Boundary)			
Existing (2018 Pop. with Water Servicing)	5,346		
Proposed Developments Under Construction / With Draft Plan Approval (Properties 7, 25, 27, 28)	1,114	46.9	25.7
Proposed Developments with Preliminary / Concept Plans (No Official Status) (23, 29)	751	21.0	35.7
Remaining Dorchester Residential Developable Lands	10,764	215.3	50.0
Existing (2018 Employment with Water Servicing)	1,765		
Future Dorchester Commercial Developable Lands	542	10.8	50.0
Future Dorchester Industrial Developable Lands	0	0.0	0.0

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
Dorchester Peripheral Lands			
Future Residential (Property 42)	4,527	90.5	50.0
Future Commercial (Property 16)	313	6.3	50.0

Developable Area by Official Plan Land Use	Projected Growth at Buildout based on Density Targets (Equivalent Population)		
	Equiv. Pop. / Jobs	Area (Ha)	Density (ppjha)
401 Corridor Lands			
Future Commercial	0	0.0	0.0
Future Industrial (43, 44a, 45)	11,613	232.3	50.0

0 1 Kilometers

Municipality of Thames Centre

Water and Wastewater Master Plan Update

General Features

- Fully Developed Areas
- Developments that are Draft Plan Approved / Under Construction
- Developments with Conceptual Plans
- Other Development Areas
- Highway
- Arterial Road
- Settlement Boundary
- Property Parcel
- Waterbody

Where No Development Information is Available (e.g. Under Construction, Draft Plans, Preliminary / Concept Plans), Growth Projections are based on proposed density targets.

Area Description	Land Use	Proposed Target Density (ppjha)
Dorchester and Peripheral Areas	Residential	50
	Commercial	50
	Industrial	50
401 Corridor Lands	Industrial	50

Figure 1-13
Dorchester Projected Growth 2018 – Buildout Proposed Density Targets

BluePlan Engineering

September 2019
418109-G-002
NAD 1983 UTM Zone 17N

Sanitary Flow Calculations

DATE:	May 11, 2023
JOB N0.:	MTE-49142-104

Client:	**D. Charabin Holdings Inc.**
Project:	**Eva & Ida Streets Subdivision**
Location:	**Dorchester, ON**

SANITARY FLOWS

Buildings	Units	Area (ha)	Population	Harmon Peaking Factor	Infiltration (l/s)	Peak Flow (l/s)
Eva & Ida Street Subdivision TH Units & Stacked TH Units	90	3.69	216	3.31	0.37	3.55
Total	90		216		0.37	**3.55**

Municipality of Thames Centre Engineering Design Standards

Multi-Unit 2.4 people/unit

Per Capita Flow: 350 l/capita/day 0.004050926 l/cap/s

Infiltration Rate: 0.1 l/ha/s

Peaking factor: Harmon Formula

$$M = 0.8 * (1 + \frac{14}{4 + P^{\frac{1}{2}}})$$

where P is tributary population in thousands

M is the peaking factor

Peak Domestic Sewage Flows:

$$Q(d) = 1.1PM + IA$$

Appendix C

SWM Parameters, Conceptual Stage-Storage Discharge Relationship, Existing Storm Sewer Infrastructure

Eva & Ida Street Subdivision
STORMWATER MANAGEMENT
Dorchester, Ontario

Project Number:	49142-104
Date:	May 26, 2023
Design By:	BXP
File:	M:\49142\104\Reports\FSR\Docs\49142-104 SWM Pond Master Sheet xlsx

HYDROLOGIC PARAMETERS
Pre-Development Conditions

Sub-Catchment Number	Area (ha)	Overland Slope (%)	SCS Curve Number Pervious (AMC II)	SCS Curve Number Pervious (AMC III)	SCS Curve Number Impervious	Percent Impervious (%)	Land Use	Comment
101	5.42	2.6	63	80	0	0	Woods, Range	
102	1.88	1.6	60	78	0	0	Woods	
Total	**7.30**					**0.00**		

Post-Development Conditions

Sub-Catchment Number	Area (ha)	Overland Slope (%)	SCS Curve Number Pervious (AMC II)	SCS Curve Number Pervious (AMC III)	SCS Curve Number Impervious	Percent Impervious (%)	Land Use	Comment
201	2.55	2	61	78	98	56	Medium Density Residential	
202	0.15	2	61	78	0	0	Pond Block	
203	4.60	2.4	64	80	0	0	Woods, Range	External Areas Draining to Development
Tributary To Pond	7.30					**19.55**		
Total	**7.30**					**19.55**		

IDF PARAMETERS
Thames Centre

Frequency (Years)	A	B	C	Comment
25mm	538.850	6.331	0.809	Thames Centre
2	1290.000	8.500	0.860	
5	1183.740	7.641	0.838	
10	1574.382	9.025	0.860	
25	2019.372	9.824	0.875	
50	2270.665	9.984	0.876	
100	2619.363	10.500	0.884	
250	3048.220	10.030	0.888	

Eva & Ida Street Subdivision
STORMWATER MANAGEMENT
Dorchester, Ontario

Project Number: 49142-104
Date: ########
Design By: BXP
File: M:\49142\104\Reports\FSR\Docs\49142-104 SWM Pond Master Sheet.xlsx

TIME TO PEAK
Pre-Development Conditions

101

	Area (ha)	C	AxC	CN		IA	
Woods	3.370	0 20	0.674	60	202.230	10	33.705
Range	2.048	0 20	0.410	69	141.319	8	16.385
	5.419		1.084		343.549		50.090

Area A = 5.42 ha
Composite C = 0.2 Composite CN = 63 Composite I = 9.24
Slope S = 2.600
Length L = 384.40 m

Airport Method

$$tc = \frac{3.26(1.1-C)L^{0.5}}{S^{0.33}}$$

$$tc = \frac{3.26(1.1-0.2)(384.4)^{0.5}}{(2.6)^{0.33}}$$

tc = TIME OF CONCENTRATION (min)
C = RUNOFF COEFFICIENT
L = CATCHMENT LENGTH (m)
S = CATCHMENT SLOPE (%)

tc = 41.97 min 0.70 hrs
tp = 27.98 min 0.47 hrs

TIME TO PEAK
Pre-Development Conditions

102

	Area (ha)	C	AxC	CN		IA	
Woods	1.879	0 20	0.376	60	112.737	10	18.790
	1.879		0.376		112.737		18.790

Area A = 1.88 ha
Composite C = 0.2 Composite CN = 60 Composite I = 10.
Slope S = 1.600
Length L = 169.30 m

Airport Method

$$tc = \frac{3.26(1.1-C)L^{0.5}}{S^{0.33}}$$

$$tc = \frac{3.26(1.1-0.2)(169.3)^{0.5}}{(1.6)^{0.33}}$$

tc = TIME OF CONCENTRATION (min)
C = RUNOFF COEFFICIENT
L = CATCHMENT LENGTH (m)
S = CATCHMENT SLOPE (%)

tc = 32.69 min 0.54 hrs
tp = 21.79 min 0.36 hrs

TIME TO PEAK
Post-Development Conditions

203

	Area (ha)	C	AxC	CN		IA	
Woods	2.556	0 20	0.511	60	153.374	10	25.562
Range	2.048	0 20	0.410	69	141.319	8	16.385
	4.604		0.921		294.693		41.947

Area A = 4.6 ha
Composite C = 0.2 Composite CN = 64 Composite I = 9.11
Slope S = 2.400
Length L = 290.00 m

Airport Method

$$tc = \frac{3.26(1.1-C)L^{0.5}}{S^{0.33}}$$

$$tc = \frac{3.26(1.1-0.2)(290)^{0.5}}{(2.4)^{0.33}}$$

tc = TIME OF CONCENTRATION (min)
C = RUNOFF COEFFICIENT
L = CATCHMENT LENGTH (m)
S = CATCHMENT SLOPE (%)

tc = 37.43 min 0.62 hrs
tp = 24.95 min 0.42 hrs

Eva & Ida Street Subdivision
STORMWATER MANAGEMENT
Dorchester, Ontario

Project Number: 49142-104
Date: May 5, 2023
Design By: BXP
File: M:\49142\104\Reports\FSR\Docs\49142-104 SWM Pond Master Sheet.xlsx

Thames Centre IDF Parameters

Return Period (years)	A,B,C Parameters A	B	C
25mm (4hr)	538.85	6.33	0.809
2	1,290	8.50	0.860
5	1,184	7.64	0.838
10	1,574	9.03	0.860
25	2,019	9.82	0.875
50	2,271	9.98	0.876
100	2,619	10 50	0.884
250	3,048	10 30	0.888

Pre-Development Flows (Visual OTTHYMO Model)

Coverage	**101**	**102**	**Total Runoff**
Area (ha)	5.42	1.88	(101+201)
Return Period	2 year	2 year	2 year
Pre-Development Peak Flow (m^3/s)	0.070	0.024	0.093
Return Period	5 year	5 year	5 year
Pre-Development Peak Flow (m^3/s)	0.074	0.026	0.099
Return Period	10 year	10 year	10 year
Pre-Development Peak Flow (m^3/s)	0.109	0.039	0.147
Return Period	25 year	25 year	25 year
Pre-Development Peak Flow (m^3/s)	0.158	0.058	0.214
Return Period	50 year	50 year	50 year
Pre-Development Peak Flow (m^3/s)	0.199	0.073	0.270
Return Period	100 year	100 year	100 year
Pre-Development Peak Flow (m^3/s)	0.243	0.090	0.330
Return Period	250 year	250 year	250 year
Pre-Development Peak Flow (m^3/s)	0.318	0.119	0.433

Post-Development Flows (Visual OTTHYMO Model)

Coverage	**201**	**202**	**203**	**Total Runoff**	**Attenuated Discharge**
Area (ha)	2.55	0.15	4 60	(201+202+203)	
Return Period	2 year	2 year	2 year	2 year	2 year
Post-Development Peak Flow (m^3/s)	0 358	0 004	0.066	0 370	0.064
Return Period	5 year	5 year	5 year	5 year	5 year
Post-Development Peak Flow (m^3/s)	0 366	0 004	0.071	0 379	0.066
Return Period	10 year	10 year	10 year	10 year	10 year
Post-Development Peak Flow (m^3/s)	0.440	0 006	0.104	0.461	0.074
Return Period	25 year	25 year	25 year	25 year	25 year
Post-Development Peak Flow (m^3/s)	0 537	0 008	0.151	0 570	0.083
Return Period	50 year	50 year	50 year	50 year	50 year
Post-Development Peak Flow (m^3/s)	0 611	0 010	0.189	0 654	0.171
Return Period	100 year	100 year	100 year	100 year	100 year
Post-Development Peak Flow (m^3/s)	0.705	0 012	0.231	0.760	0.278
Return Period	250 year	250 year	250 year	250 year	250 year
Post-Development Peak Flow (m^3/s)	0 852	0 016	0.301	0 929	0.424

Eva & Ida Street Subdivision
STORMWATER MANAGEMENT
Dorchester, Ontario

Project Number: 49142-104
Date: May 26, 2023
Design By: BXP
File: M:\49142\104\Reports\FSR\Docs\49142-104 SWM Pond Master Sheet.xlsx

STAGE-STORAGE RELATIONSHIP

Stage	Active Depth	Main Pond		Total Pond Volume	Volume Summary	Ponding Elevation	Comments	Stage
		Area	Volume					
m	*m*	m^2	m^3	m^3	m^3	*m*		*m*
259.50	0.00	262.15	0.00	0.00		259.50	Pond Bottom	259.50
259.60	0.10	309.84	28.60	28.60				259.60
259.70	0.20	357.54	33.37	61.97				259.70
259.80	0.30	405.23	38.14	100.11				259.80
259.90	0.40	452.92	42.91	143.01				259.90
260.00	0.50	500.61	47.68	190.69				260.00
260.10	0.60	548.31	52.45	243.14				260.10
260.20	0.70	596.00	57.22	300.35				260.20
260.30	0.80	643.69	61.98	362.34				260.30
260.40	0.90	691.38	66.75	429.09				260.40
260.50	1.00	739.08	71.52	500.61				260.50
260.60	1.10	786.77	76.29	576.90	506	260.51	2-Year Event Level	260.60
260.70	1.20	834.46	81.06	657.97	535	260.55	5-Year Event Level	260.70
260.80	1.30	882.15	85.83	743.80				260.80
260.90	1.40	929.85	90.60	834.40	747	260.81	10-Year Event Level	260.90
261.00	1.50	977.54	95.37	929.77				261.00
261.10	1.60	1132.56	105.50	1035.27	1041	261.11	25-Year Event Level	261.10
261.20	1.70	1185.13	115.88	1151.16	1181	261.23	50-Year Event Level	261.20
261.30	1.80	1238.71	121.19	1272.35	1218	261.26	100-Year Event Level	261.30
261.40	1.90	1293.28	126.60	1398.95	1268	261.30	250-Year Event Level	261.40
261.50	2.00	1348.86	132.11	1531.05			Top of the pond	261.50

STORMWATER MANAGEMENT
Dorchester, Ontario

Project Number:	49142-104
Date:	May 26, 2023
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File:	M:\49142\104\Reports\FSR\Docs\49142-104 SWM Pond Master Sheet.xlsx

Orifice Calculations

$Q_o=C_d*A_o*(2*g*H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	259.50	500.00	500.00
Width (m)			
Diameter/Height (m)	0.175	0.350	0.500
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

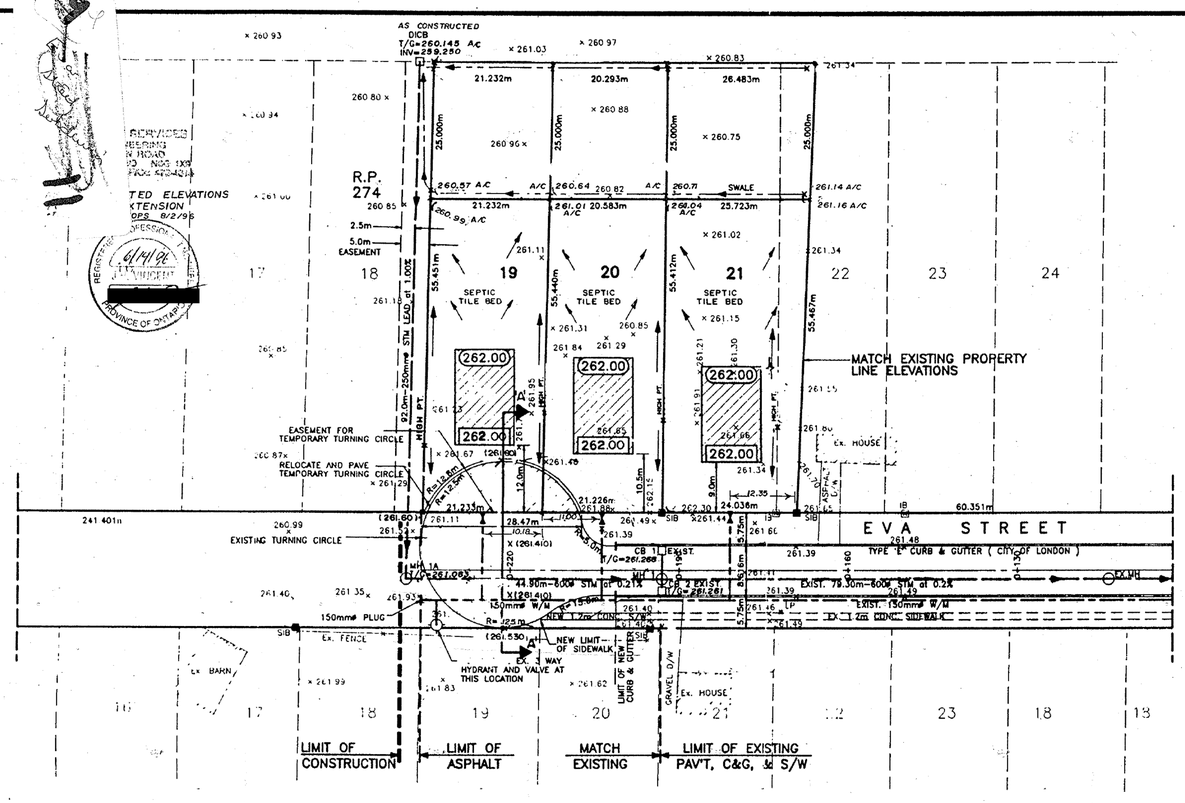
Weir Calculations

$Q_w = 2/3*C_d*(2g)^{1/2}*L*H_w^{3/2} + 8/15*C_d*(2g)^{1/2}*\tan\theta*H_w^{5/2}$

C_d	0.50
Invert (m)	261.20
Length (m)	7.000
Side Slope (H	6
Side Slope (r	1.406

STAGE-DISCHARGE RELATIONSHIP

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Infiltration	Weir Flow	Total Flow
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow	Flow		
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s	m^3/s	m^3/s
259.50	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0000
259.60	29	0.01	0.05	0.0089	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0089
259.70	62	0.02	0.11	0.0225	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0225
259.80	100	0.02	0.21	0.0309	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0309
259.90	143	0.02	0.31	0.0375	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0375
260.00	191	0.02	0.41	0.0431	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0431
260.10	243	0.02	0.51	0.0481	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0481
260.20	300	0.02	0.61	0.0525	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0525
260.30	362	0.02	0.71	0.0567	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0567
260.40	429	0.02	0.81	0.0605	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0605
260.50	501	0.02	0.91	0.0641	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0641
260.60	577	0.02	1.01	0.0675	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0675
260.70	658	0.02	1.11	0.0708	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0708
260.80	744	0.02	1.21	0.0739	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0739
260.90	834	0.02	1.31	0.0769	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0769
261.00	930	0.02	1.41	0.0798	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0798
261.10	1035	0.02	1.51	0.0825	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0825
261.20	1151	0.02	1.61	0.0852	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0852
261.30	1272	0.02	1.71	0.0878	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.3492	0.4371
261.40	1399	0.02	1.81	0.0904	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.0512	1.1416
261.50	1531	0.02	1.91	0.0928	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	2.0476	2.1405



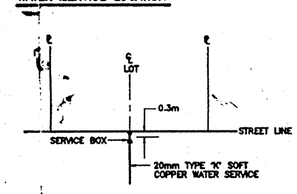
GENERAL NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY MEASURES TO CONTROL SILT ENTERING THE STORM DRAINAGE SYSTEM TO THE SPECIFICATIONS OUTLINED IN THE GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES PREPARED BY THE MINISTRY OF NATURAL RESOURCES. THESE MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION FOR THIS SUBDIVISION PROJECT, AND ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION HAS BEEN COMPLETED TO THE SPECIFICATIONS OF THE TOWNSHIP ENGINEER.
2. NO WEEPING TILE CONNECTIONS WILL BE PERMITTED INTO THE FUTURE SANITARY SEWERS AND NO DIRECT GRAVITY CONNECTIONS FROM THE WEEPING TILES WILL BE PERMITTED TO THE STORM SEWER SYSTEM UNLESS THE STORM SYSTEM HAS THE CAPACITY TO PROVIDE FOR SUCH CONNECTIONS TO THE SATISFACTION OF THE TOWNSHIP ENGINEER. HOWEVER, PUMPED CONNECTIONS FROM THE WEEPING TILES TO THE STORM SEWER WILL BE PERMITTED.
3. ALL WORK SHALL MEET MINIMUM STANDARDS AND SPECIFICATIONS OF THE TOWNSHIP OF NORTH DORCHESTER, DORCHESTER P.U.C. & THE ONTARIO PROVINCIAL STD. DWGS & SPECS.
4. THE CONTRACTOR IS TO MEET ALL THE REQUIREMENTS OF THE OWNERS OF THE UTILITIES ON THIS PLAN, AND MUST MAKE SATISFACTORY ARRANGEMENTS WITH THE UTILITY COMPANIES FOR CROSSING THEIR INSTALLATIONS AND FOR PROVIDING ADEQUATE PROTECTION DURING CONSTRUCTION.
5. ALL ORGANIC UNSTABLE MATERIALS BENEATH THE ROAD ALLOWANCES OR HOUSE FOUNDATIONS MUST BE REMOVED AND THESE AREAS BACKFILLED WITH AN APPROVED GRANULAR MATERIAL, ALL TO THE SATISFACTION OF A GEOTECHNICAL ENGINEER.
6. EXISTING DRAINAGE OF ABUTTING LANDS IS NOT TO BE DISTURBED.
7. BASEMENT OPENINGS TO BE MINIMUM 300mm ABOVE CENTRELINE OF ROAD UNLESS OTHERWISE APPROVED BY THE TOWNSHIP ENGINEER.
8. ALL ROOF WATER OUTLETS FROM THE PROPOSED BUILDINGS AND DRAINAGE FROM IMPERVIOUS AREAS ON THESE LOTS ARE TO BE DIRECTED TOWARDS THE FRONTING STREET UNLESS OTHERWISE APPROVED BY THE TOWNSHIP ENGINEER.
9. SUMP PUMP DISCHARGE MUST BE DIRECTED AWAY FROM DRIVEWAYS
10. RETAINING WALLS, ETC. ARE TO BE DESIGNED BY AND CONSTRUCTED TO THE SPECIFICATIONS OF A REGISTERED PROFESSIONAL ENGINEER.
11. ALL CLASS 4 SEWAGE DISPOSAL SYSTEMS (SEPTIC TANK SYSTEMS) ARE TO BE LOCATED IN THE REAR PORTION OF LOTS & MUST BE REVIEWED & APPROVED BY THE APPROPRIATE AUTHORITY.
12. ALL EXISTING SOD, SIDEWALK, CURB & GUTTER, ETC. DISTURBED BY CONSTRUCTION MUST BE RESTORED.

CONSTRUCTION NOTES:

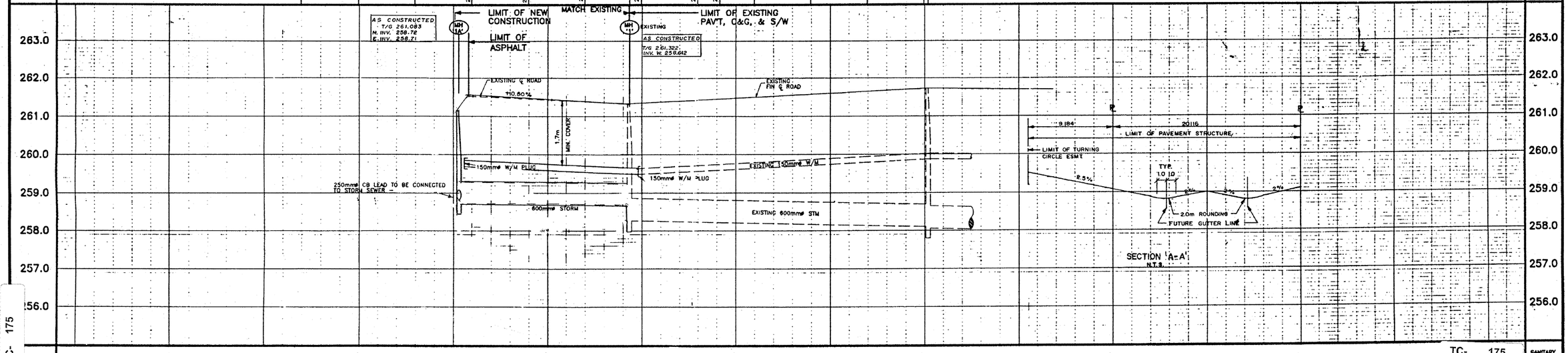
1. DITCH INLET CATCHBASINS AS PER O.P.S.D. 705.04 WITH 3:1 GRATE SLOPE
2. ALL WATER SERVICES TO BE 20mm TYPE 'K' SOFT COPPER.
3. ALL WATERMAINS SHALL BE C900 CL. 150 P.V.C. WITH BEDDING AS PER O.P.S.D. 1102.02 FOR FLEXIBLE PIPE
4. ALL STORM SEWER & CB CONNECTIONS TO HAVE APPROVED RUBBER GASKET JOINTS
5. CB LEADS SHALL BE 250mmø P.V.C. S.D.R. 35 BEDDING AS PER O.P.S.D. 802.04 TYPE I
6. PAVEMENT STRUCTURE : 200mm GRAN. 'B'
   150mm GRAN. 'A'
   50mm HL8
   25mm HL3

WATER SERVICE LOCATION



LEGEND

- 0+205.627 ℄ ROAD STATION
- 142.00 PROP. FRONT APRON ELEV.
- 139.00 PROP. BACK APRON ELEV.
- (261.50) PROPOSED ELEVATION
- × 260.75 EXISTING ELEVATION
- DIRECTION ON DRAINAGE FLOW
- SWALE
- STRAW BALE CHECK DAM
- 20mm WATER SERVICE



TC- 175

SANITARY DATA

STORM DATA

44.9m-600mmø STM at 0.21% CSA A257.2 CL 65-D, BEDDING AS PER O.P.S.D. 802.03 CLASS B

EXIST. 79.3m-600mmø STM at 0.21% CSA A257.2 CL 65-D

No	REVISIONS	DATE	BY
3	REVISED ROAD, TURNING CIR & LOT EL, SECT 'A-A'	NOV. 3/92	K.B.
2	REVISIONS TO NOTES & LOT GRADING	OCT. 23/92	K.B.
1	RELOCATE RLCB AND REVISED SWALE GRADES	OCT. 9, 1992	K.B.

NOTES:

BENCHMARK

1.) TOP SPINDLE OF HYDRANT AT SOUTHWEST CORNER OF CLARA AND EVA STREETS
Elevation = 261.127m

2.) TOP SPINDLE OF HYDRANT AT WEST END OF ORIGINAL EVA STREET JUST EAST OF NEW HOUSES BUILT ON EVA STREET
Elevation = 262.538m

STAMP: W. A. WILSON Oct 13/92

MUNICIPALITY: TOWNSHIP OF NORTH DORCHESTER

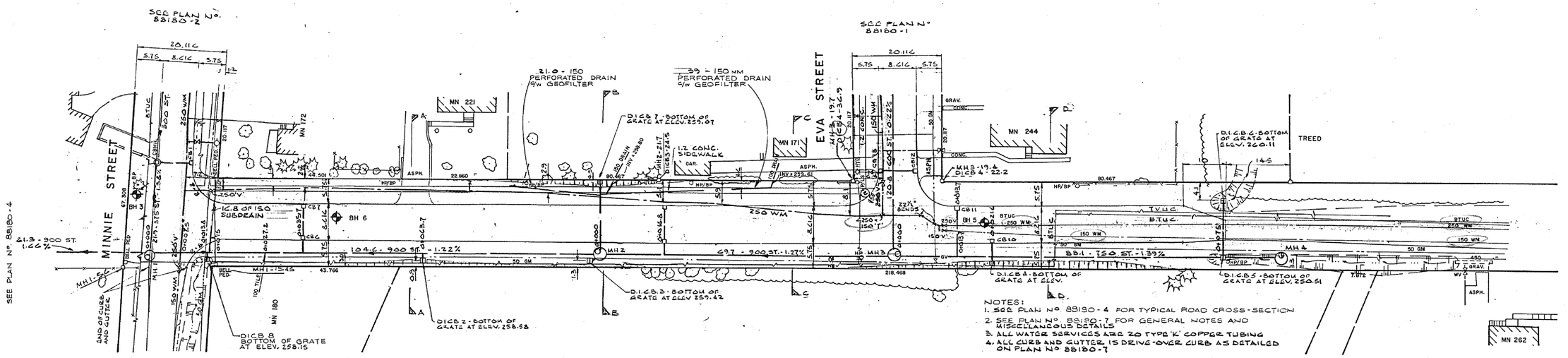
CONSULTANT: UPPER CANADA CONSULTANTS
CONSULTING ENGINEERS/PLANNERS
708 Richmond Street
Valley Building Suite 222
London, Ontario
N6A 5C7

TITLE: EVA STREET, DORCHESTER
LOTS 19, 20, & 21 RP 274
SITE SERVICING & LOT GRADING PLAN

DESIGN: K.B.	DRAWING: M.D./R.E.M.
DATE: AUGUST 1992	
SCALE: HOR. 1:500 VERT. 1:50	
PROJECT No: 2189	DWG No: PP-1
REV.	

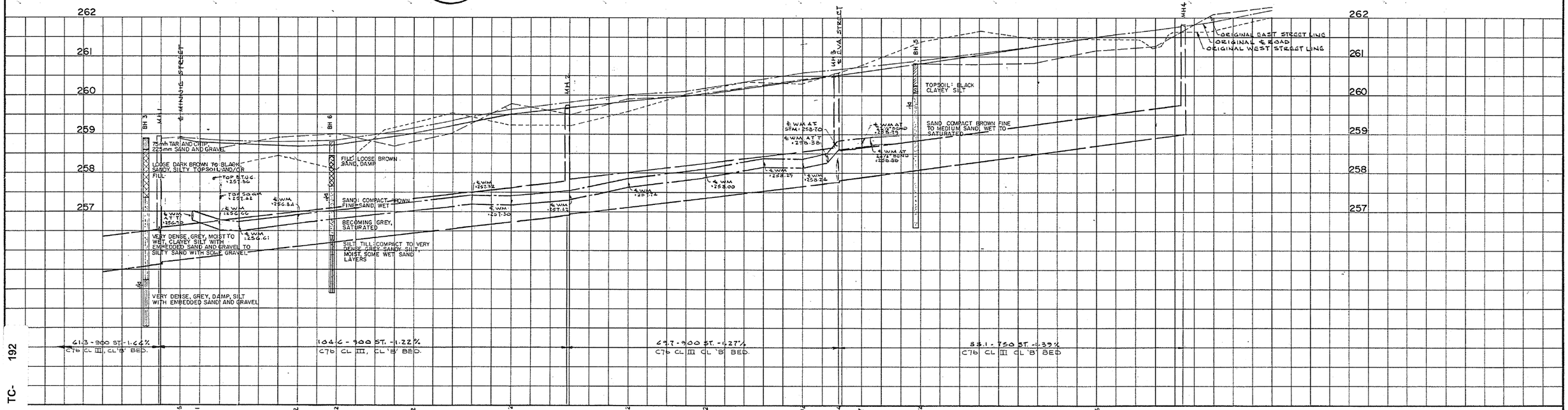
TC- 175

JAN 19 1993



STORM SEWER DESIGNED W.J. BARTLETT

W. J. BARTLETT
29/11/89
PROVINCE OF ONT.



AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION
1 SEE DRAWING No FOR FURTHER DETAIL	STORM SEWERS AND APPURTENANCES	MAY, 1990
2 SEWER DESIGN TRANSITION WIDTH OR AS NOTED	WATERMAINS AND APPURTENANCES	JUNE, 1990
3 REFERENCE B.M. No ELEVATION m	CURB AND GUTTER AND SIDEWALKS	AUG. 1990
4	ROAD STRUCTURE	SEPT. 1990
5		

DESIGN LGWS
DRAWN CD
CHECKED K.W.G
APPROVED
DATE JUNE 1989
F BK 488, 490, 538, 541

No	REVISIONS	DATE	BY
	"AS-CONSTRUCTED"	JAN 27/92	GS

Consulting Civil Engineers
Landscape Architects
361 Dufferin Avenue
London, Ontario N6B 1Z5
(519) 672-8310

development engineering (London) Limited

PROJECT ENGINEER

ENGR'S STAMP

15/8/89

Township of North Dorchester
P.O.BOX 220, 215 HAMILTON ROAD, DORCHESTER, ONTARIO N0L 1G0 Telephone (519) 268-7334

SCALE
HORZ = 1:500
VERT = 1:50
5.0m 0 10.0m Horizontal
0.5m 0 1.0m Vertical

TITLE CLARA/EVA/RAILWAY/MINNIE STREET PRIDE PROGRAM

CLARA STREET
FROM MINNIE STREET TO 150M NORTH OF EVA STREET

PROJECT No 88180
SHEET No 3
PLAN FILE No

Appendix D

Pre-Development Conditions Hydrologic Modelling (VO6)

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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
```


***** 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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\af623907-
Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\af623907-

DATE: 05-26-2023 TIME: 10:48:19

USER:

COMMENTS: _____

** SIMULATION : 10 Year 4 Hour Chicago **

CHICAGO STORM
Ptotal= 54.73 mm

IDF curve parameters: A=1574.382
B= 9.025
C= 0.860
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.72	1.17	13.36	2.17	9.34	3.17	3.48
0.33	3.13	1.33	34.24	2.33	7.30	3.33	3.16
0.50	3.69	1.50	124.99	2.50	5.98	3.50	2.89
0.67	4.50	1.67	41.93	2.67	5.07	3.67	2.66
0.83	5.79	1.83	20.16	2.83	4.40	3.83	2.47
1.00	8.10	2.00	12.86	3.00	3.88	4.00	2.31

CALIB NASHYD (0101) ID= 1 DT= 5.0 min

Area (ha)= 5.42 Curve Number (CN)= 63.0
Ia (mm)= 9.24 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.47

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.72	1.083	13.36	2.083	9.34	3.08	3.48
0.167	2.72	1.167	13.36	2.167	9.34	3.17	3.48
0.250	3.13	1.250	34.24	2.250	7.30	3.25	3.16
0.333	3.13	1.333	34.24	2.333	7.30	3.33	3.16
0.417	3.69	1.417	124.99	2.417	5.98	3.42	2.89
0.500	3.69	1.500	124.99	2.500	5.98	3.50	2.89
0.583	4.50	1.583	41.93	2.583	5.07	3.58	2.66
0.667	4.50	1.667	41.93	2.667	5.07	3.67	2.66
0.750	5.79	1.750	20.16	2.750	4.40	3.75	2.47
0.833	5.79	1.833	20.16	2.833	4.40	3.83	2.47
0.917	8.10	1.917	12.86	2.917	3.88	3.92	2.31
1.000	8.10	2.000	12.86	3.000	3.88	4.00	2.31

```
     Unit Hyd Qpeak  (cms)=   0.440

     PEAK FLOW       (cms)=   0.109 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=  10.631
     TOTAL RAINFALL   (mm)=  54.733
     RUNOFF COEFFICIENT   =   0.194

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.88   Curve Number   (CN)= 60.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

         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    2.72 | 1.083   13.36 | 2.083    9.34 |  3.08    3.48
              0.167    2.72 | 1.167   13.36 | 2.167    9.34 |  3.17    3.48
              0.250    3.13 | 1.250   34.24 | 2.250    7.30 |  3.25    3.16
              0.333    3.13 | 1.333   34.24 | 2.333    7.30 |  3.33    3.16
              0.417    3.69 | 1.417  124.99 | 2.417    5.98 |  3.42    2.89
              0.500    3.69 | 1.500  124.99 | 2.500    5.98 |  3.50    2.89
              0.583    4.50 | 1.583   41.93 | 2.583    5.07 |  3.58    2.66
              0.667    4.50 | 1.667   41.93 | 2.667    5.07 |  3.67    2.66
              0.750    5.79 | 1.750   20.16 | 2.750    4.40 |  3.75    2.47
              0.833    5.79 | 1.833   20.16 | 2.833    4.40 |  3.83    2.47
              0.917    8.10 | 1.917   12.86 | 2.917    3.88 |  3.92    2.31
              1.000    8.10 | 2.000   12.86 | 3.000    3.88 |  4.00    2.31

     Unit Hyd Qpeak  (cms)=   0.199

     PEAK FLOW       (cms)=   0.039 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=   9.345
     TOTAL RAINFALL   (mm)=  54.733
     RUNOFF COEFFICIENT   =   0.171

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

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     5.42   0.109     2.08    10.63
      + ID2= 2 (  0102):     1.88   0.039     1.92     9.35
        ==================================================
        ID = 3 (  0003):     7.30   0.147     2.00    10.30

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\25a2ec51-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\25a2ec51-
```

DATE: 05-26-2023 TIME: 10:48:19

USER:

COMMENTS: _____

****
** SIMULATION : 100 Year 4 Hour Chicago **
****

| CHICAGO STORM |
| Ptotal= 79.35 mm |

IDF curve parameters: A=2619.363
B= 10.500
C= 0.884
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.57	1.17	19.62	2.17	13.42	3.17	4.65
0.33	4.15	1.33	51.70	2.33	10.32	3.33	4.18
0.50	4.95	1.50	181.39	2.50	8.33	3.50	3.80
0.67	6.14	1.67	63.45	2.67	6.97	3.67	3.48
0.83	8.04	1.83	30.15	2.83	5.98	3.83	3.22
1.00	11.54	2.00	18.84	3.00	5.23	4.00	2.99

| CALIB |
| NASHYD (0101) |
|ID= 1 DT= 5.0 min |

Area (ha)= 5.42 Curve Number (CN)= 63.0
Ia (mm)= 9.24 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.47

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.57	1.083	19.62	2.083	13.42	3.08	4.65
0.167	3.57	1.167	19.62	2.167	13.42	3.17	4.65
0.250	4.15	1.250	51.70	2.250	10.32	3.25	4.18
0.333	4.15	1.333	51.70	2.333	10.32	3.33	4.18
0.417	4.95	1.417	181.39	2.417	8.33	3.42	3.80
0.500	4.95	1.500	181.39	2.500	8.33	3.50	3.80
0.583	6.14	1.583	63.45	2.583	6.97	3.58	3.48
0.667	6.14	1.667	63.45	2.667	6.97	3.67	3.48
0.750	8.04	1.750	30.15	2.750	5.98	3.75	3.22
0.833	8.04	1.833	30.15	2.833	5.98	3.83	3.22
0.917	11.54	1.917	18.84	2.917	5.23	3.92	2.99
1.000	11.54	2.000	18.84	3.000	5.23	4.00	2.99

Unit Hyd Qpeak (cms)= 0.440

PEAK FLOW (cms)= 0.243 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 22.415
TOTAL RAINFALL (mm)= 79.353
RUNOFF COEFFICIENT = 0.282

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

| CALIB |
| NASHYD (0102) |
|ID= 1 DT= 5.0 min |

Area (ha)= 1.88 Curve Number (CN)= 60.0
Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.36

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr

```
                0.083    3.57 | 1.083   19.62 | 2.083   13.42 |  3.08    4.65
                0.167    3.57 | 1.167   19.62 | 2.167   13.42 |  3.17    4.65
                0.250    4.15 | 1.250   51.70 | 2.250   10.32 |  3.25    4.18
                0.333    4.15 | 1.333   51.70 | 2.333   10.32 |  3.33    4.18
                0.417    4.95 | 1.417  181.39 | 2.417    8.33 |  3.42    3.80
                0.500    4.95 | 1.500  181.39 | 2.500    8.33 |  3.50    3.80
                0.583    6.14 | 1.583   63.45 | 2.583    6.97 |  3.58    3.48
                0.667    6.14 | 1.667   63.45 | 2.667    6.97 |  3.67    3.48
                0.750    8.04 | 1.750   30.15 | 2.750    5.98 |  3.75    3.22
                0.833    8.04 | 1.833   30.15 | 2.833    5.98 |  3.83    3.22
                0.917   11.54 | 1.917   18.84 | 2.917    5.23 |  3.92    2.99
                1.000   11.54 | 2.000   18.84 | 3.000    5.23 |  4.00    2.99

     Unit Hyd Qpeak  (cms)=   0.199

     PEAK FLOW       (cms)=   0.090 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=  20.147
     TOTAL RAINFALL   (mm)=  79.353
     RUNOFF COEFFICIENT   =   0.254

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

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     5.42   0.243     2.08    22.42
      + ID2= 2 (  0102):     1.88   0.090     1.92    20.15
        ================================================
        ID = 3 (  0003):     7.30   0.330     2.00    21.83

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


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  Output  filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\8d9343fb-
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DATE: 05-26-2023                          TIME: 10:48:19

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : 2 Year 4 Hour Chicago        **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1290.000
| Ptotal= 44.93 mm |                          B=   8.500
--------------------                          C=   0.860
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.38
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.21	1.17	10.77	2.17	7.53	3.17	2.82
0.33	2.54	1.33	27.78	2.33	5.89	3.33	2.56
0.50	2.99	1.50	104.91	2.50	4.83	3.50	2.34
0.67	3.64	1.67	34.08	2.67	4.10	3.67	2.16
0.83	4.68	1.83	16.26	2.83	3.56	3.83	2.01
1.00	6.54	2.00	10.36	3.00	3.15	4.00	1.87

CALIB NASHYD (0101) | ID= 1 DT= 5.0 min	Area (ha)= 5.42	Curve Number (CN)= 63.0
	Ia (mm)= 9.24	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.47	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.21	1.083	10.77	2.083	7.53	3.08	2.82
0.167	2.21	1.167	10.77	2.167	7.53	3.17	2.82
0.250	2.54	1.250	27.78	2.250	5.89	3.25	2.56
0.333	2.54	1.333	27.78	2.333	5.89	3.33	2.56
0.417	2.99	1.417	104.91	2.417	4.83	3.42	2.34
0.500	2.99	1.500	104.91	2.500	4.83	3.50	2.34
0.583	3.64	1.583	34.08	2.583	4.10	3.58	2.16
0.667	3.64	1.667	34.08	2.667	4.10	3.67	2.16
0.750	4.68	1.750	16.26	2.750	3.56	3.75	2.01
0.833	4.68	1.833	16.26	2.833	3.56	3.83	2.01
0.917	6.54	1.917	10.36	2.917	3.15	3.92	1.87
1.000	6.54	2.000	10.36	3.000	3.15	4.00	1.87

Unit Hyd Qpeak (cms)= 0.440

PEAK FLOW (cms)= 0.070 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 6.889
TOTAL RAINFALL (mm)= 44.928
RUNOFF COEFFICIENT = 0.153

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

CALIB NASHYD (0102) | ID= 1 DT= 5.0 min	Area (ha)= 1.88	Curve Number (CN)= 60.0
	Ia (mm)= 10.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.36	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.21	1.083	10.77	2.083	7.53	3.08	2.82
0.167	2.21	1.167	10.77	2.167	7.53	3.17	2.82
0.250	2.54	1.250	27.78	2.250	5.89	3.25	2.56
0.333	2.54	1.333	27.78	2.333	5.89	3.33	2.56
0.417	2.99	1.417	104.91	2.417	4.83	3.42	2.34
0.500	2.99	1.500	104.91	2.500	4.83	3.50	2.34
0.583	3.64	1.583	34.08	2.583	4.10	3.58	2.16
0.667	3.64	1.667	34.08	2.667	4.10	3.67	2.16
0.750	4.68	1.750	16.26	2.750	3.56	3.75	2.01
0.833	4.68	1.833	16.26	2.833	3.56	3.83	2.01
0.917	6.54	1.917	10.36	2.917	3.15	3.92	1.87
1.000	6.54	2.000	10.36	3.000	3.15	4.00	1.87

Unit Hyd Qpeak (cms)= 0.199

PEAK FLOW (cms)= 0.024 (i)
TIME TO PEAK (hrs)= 1.917
RUNOFF VOLUME (mm)= 5.971
TOTAL RAINFALL (mm)= 44.928
RUNOFF COEFFICIENT = 0.133

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

```
--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     5.42   0.070     2.08     6.89
     + ID2= 2 (  0102):     1.88   0.024     1.92     5.97
       ================================================
       ID = 3 (  0003):     7.30   0.093     2.08     6.65

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\7cae1806-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\7cae1806-


DATE: 05-26-2023                          TIME: 10:48:19

USER:


COMMENTS: _____________________________________________________________


-------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 25 Year 4 Hour Chicago        **
  ************************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2019.372
| Ptotal= 64.45 mm |                          B=   9.824
--------------------                          C=   0.875
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 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
               0.17    3.00 |  1.17   15.79 |  2.17   10.89 |  3.17    3.89
               0.33    3.48 |  1.33   41.28 |  2.33    8.42 |  3.33    3.51
               0.50    4.13 |  1.50  147.97 |  2.50    6.85 |  3.50    3.20
               0.67    5.09 |  1.67   50.64 |  2.67    5.76 |  3.67    2.94
               0.83    6.61 |  1.83   24.12 |  2.83    4.96 |  3.83    2.72
               1.00    9.40 |  2.00   15.18 |  3.00    4.36 |  4.00    2.53


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   5.42   Curve Number   (CN)= 63.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.24   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.47

         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	3.00	1.083	15.79	2.083	10.89	3.08	3.89
0.167	3.00	1.167	15.79	2.167	10.89	3.17	3.89
0.250	3.48	1.250	41.28	2.250	8.42	3.25	3.51
0.333	3.48	1.333	41.28	2.333	8.42	3.33	3.51
0.417	4.13	1.417	147.97	2.417	6.85	3.42	3.20
0.500	4.13	1.500	147.97	2.500	6.85	3.50	3.20
0.583	5.09	1.583	50.64	2.583	5.76	3.58	2.94
0.667	5.09	1.667	50.64	2.667	5.76	3.67	2.94
0.750	6.61	1.750	24.12	2.750	4.96	3.75	2.72
0.833	6.61	1.833	24.12	2.833	4.96	3.83	2.72
0.917	9.40	1.917	15.18	2.917	4.36	3.92	2.53
1.000	9.40	2.000	15.18	3.000	4.36	4.00	2.53

Unit Hyd Qpeak (cms)= 0.440

PEAK FLOW (cms)= 0.158 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 14.911
TOTAL RAINFALL (mm)= 64.446
RUNOFF COEFFICIENT = 0.231

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

CALIB NASHYD (0102) | ID= 1 DT= 5.0 min	Area (ha)= 1.88 Curve Number (CN)= 60.0 Ia (mm)= 10.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.36

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.00	1.083	15.79	2.083	10.89	3.08	3.89
0.167	3.00	1.167	15.79	2.167	10.89	3.17	3.89
0.250	3.48	1.250	41.28	2.250	8.42	3.25	3.51
0.333	3.48	1.333	41.28	2.333	8.42	3.33	3.51
0.417	4.13	1.417	147.97	2.417	6.85	3.42	3.20
0.500	4.13	1.500	147.97	2.500	6.85	3.50	3.20
0.583	5.09	1.583	50.64	2.583	5.76	3.58	2.94
0.667	5.09	1.667	50.64	2.667	5.76	3.67	2.94
0.750	6.61	1.750	24.12	2.750	4.96	3.75	2.72
0.833	6.61	1.833	24.12	2.833	4.96	3.83	2.72
0.917	9.40	1.917	15.18	2.917	4.36	3.92	2.53
1.000	9.40	2.000	15.18	3.000	4.36	4.00	2.53

Unit Hyd Qpeak (cms)= 0.199

PEAK FLOW (cms)= 0.058 (i)
TIME TO PEAK (hrs)= 1.917
RUNOFF VOLUME (mm)= 13.244
TOTAL RAINFALL (mm)= 64.446
RUNOFF COEFFICIENT = 0.206

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

ADD HYD (0003) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	5.42	0.158	2.08	14.91
+ ID2= 2 (0102):	1.88	0.058	1.92	13.24
ID = 3 (0003):	7.30	0.214	2.00	14.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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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Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\08ac7c4c-
Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\08ac7c4c-

DATE: 05-26-2023 TIME: 10:48:19

USER:

COMMENTS: _____

****
** SIMULATION : 250 Year 4 Hour Chicago **
****

| CHICAGO STORM |
| Ptotal= 90.48 mm |

IDF curve parameters: A=3048.220
B= 10.030
C= 0.888
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.93	1.17	21.88	2.17	14.90	3.17	5.13
0.33	4.57	1.33	58.58	2.33	11.43	3.33	4.61
0.50	5.46	1.50	212.89	2.50	9.22	3.50	4.19
0.67	6.78	1.67	72.12	2.67	7.70	3.67	3.83
0.83	8.89	1.83	33.80	2.83	6.60	3.83	3.54
1.00	12.80	2.00	20.99	3.00	5.77	4.00	3.28

| CALIB |
| NASHYD (0101)| Area (ha)= 5.42 Curve Number (CN)= 63.0
|ID= 1 DT= 5.0 min | Ia (mm)= 9.24 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.47

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.93	1.083	21.88	2.083	14.90	3.08	5.13
0.167	3.93	1.167	21.88	2.167	14.90	3.17	5.13
0.250	4.57	1.250	58.58	2.250	11.43	3.25	4.61
0.333	4.57	1.333	58.58	2.333	11.43	3.33	4.61
0.417	5.46	1.417	212.89	2.417	9.22	3.42	4.19
0.500	5.46	1.500	212.89	2.500	9.22	3.50	4.19
0.583	6.78	1.583	72.12	2.583	7.70	3.58	3.83
0.667	6.78	1.667	72.12	2.667	7.70	3.67	3.83
0.750	8.89	1.750	33.80	2.750	6.60	3.75	3.54
0.833	8.89	1.833	33.80	2.833	6.60	3.83	3.54
0.917	12.80	1.917	20.99	2.917	5.77	3.92	3.28
1.000	12.80	2.000	20.99	3.000	5.77	4.00	3.28

Unit Hyd Qpeak (cms)= 0.440

PEAK FLOW (cms)= 0.318 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 28.641
TOTAL RAINFALL (mm)= 90.479
RUNOFF COEFFICIENT = 0.317

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

```
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.88   Curve Number   (CN)= 60.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

         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    3.93 | 1.083   21.88 | 2.083   14.90 |  3.08    5.13
               0.167    3.93 | 1.167   21.88 | 2.167   14.90 |  3.17    5.13
               0.250    4.57 | 1.250   58.58 | 2.250   11.43 |  3.25    4.61
               0.333    4.57 | 1.333   58.58 | 2.333   11.43 |  3.33    4.61
               0.417    5.46 | 1.417  212.89 | 2.417    9.22 |  3.42    4.19
               0.500    5.46 | 1.500  212.89 | 2.500    9.22 |  3.50    4.19
               0.583    6.78 | 1.583   72.12 | 2.583    7.70 |  3.58    3.83
               0.667    6.78 | 1.667   72.12 | 2.667    7.70 |  3.67    3.83
               0.750    8.89 | 1.750   33.80 | 2.750    6.60 |  3.75    3.54
               0.833    8.89 | 1.833   33.80 | 2.833    6.60 |  3.83    3.54
               0.917   12.80 | 1.917   20.99 | 2.917    5.77 |  3.92    3.28
               1.000   12.80 | 2.000   20.99 | 3.000    5.77 |  4.00    3.28

     Unit Hyd Qpeak  (cms)=   0.199

     PEAK FLOW       (cms)=   0.119 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=  25.921
     TOTAL RAINFALL   (mm)=  90.479
     RUNOFF COEFFICIENT   =   0.286

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

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     5.42   0.318     2.00    28.64
     + ID2= 2 (  0102):     1.88   0.119     1.92    25.92
       ================================================
       ID = 3 (  0003):     7.30   0.433     2.00    27.94

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

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

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\6b5b93cd-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\6b5b93cd-


DATE: 05-26-2023                          TIME: 10:48:19

USER:


COMMENTS: _____________________________________________________________
```

```
  ********************************************
  ** SIMULATION : 5 Year 4 Hour Chicago      **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1183.740
| Ptotal= 46.68 mm |                          B=   7.641
--------------------                          C=   0.838
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.38
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.52	1.17	11.25	2.17	8.02	3.17	3.18
0.33	2.88	1.33	28.00	2.33	6.36	3.33	2.90
0.50	3.36	1.50	106.82	2.50	5.28	3.50	2.67
0.67	4.05	1.67	34.20	2.67	4.52	3.67	2.47
0.83	5.12	1.83	16.67	2.83	3.96	3.83	2.31
1.00	7.02	2.00	10.85	3.00	3.52	4.00	2.16

```
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   5.42   Curve Number   (CN)= 63.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.24   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.47

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.52	1.083	11.25	2.083	8.02	3.08	3.18
0.167	2.52	1.167	11.25	2.167	8.02	3.17	3.18
0.250	2.88	1.250	28.00	2.250	6.36	3.25	2.90
0.333	2.88	1.333	28.00	2.333	6.36	3.33	2.90
0.417	3.36	1.417	106.82	2.417	5.28	3.42	2.67
0.500	3.36	1.500	106.82	2.500	5.28	3.50	2.67
0.583	4.05	1.583	34.20	2.583	4.52	3.58	2.47
0.667	4.05	1.667	34.20	2.667	4.52	3.67	2.47
0.750	5.12	1.750	16.67	2.750	3.96	3.75	2.31
0.833	5.12	1.833	16.67	2.833	3.96	3.83	2.31
0.917	7.02	1.917	10.85	2.917	3.52	3.92	2.16
1.000	7.02	2.000	10.85	3.000	3.52	4.00	2.16

```
    Unit Hyd Qpeak  (cms)=   0.440

    PEAK FLOW       (cms)=   0.074 (i)
    TIME TO PEAK    (hrs)=   2.083
    RUNOFF VOLUME    (mm)=   7.511
    TOTAL RAINFALL   (mm)=  46.680
    RUNOFF COEFFICIENT   =   0.161

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

--------------------
| CALIB            |
| NASHYD   (  0102)|   Area    (ha)=   1.88   Curve Number   (CN)= 60.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.52	1.083	11.25	2.083	8.02	3.08	3.18
0.167	2.52	1.167	11.25	2.167	8.02	3.17	3.18
0.250	2.88	1.250	28.00	2.250	6.36	3.25	2.90
0.333	2.88	1.333	28.00	2.333	6.36	3.33	2.90
0.417	3.36	1.417	106.82	2.417	5.28	3.42	2.67
0.500	3.36	1.500	106.82	2.500	5.28	3.50	2.67
0.583	4.05	1.583	34.20	2.583	4.52	3.58	2.47
0.667	4.05	1.667	34.20	2.667	4.52	3.67	2.47

```
                0.750    5.12 | 1.750   16.67 | 2.750    3.96 |  3.75    2.31
                0.833    5.12 | 1.833   16.67 | 2.833    3.96 |  3.83    2.31
                0.917    7.02 | 1.917   10.85 | 2.917    3.52 |  3.92    2.16
                1.000    7.02 | 2.000   10.85 | 3.000    3.52 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.199

     PEAK FLOW       (cms)=   0.026 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=   6.529
     TOTAL RAINFALL   (mm)=  46.680
     RUNOFF COEFFICIENT   =   0.140

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

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     5.42   0.074     2.08     7.51
      + ID2= 2 (  0102):     1.88   0.026     1.92     6.53
        ================================================
        ID = 3 (  0003):     7.30   0.099     2.08     7.26

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\f49530a3-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\f49530a3-


DATE: 05-26-2023                          TIME: 10:48:19

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : 50 Year 4 Hour Chicago        **
  ***********************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2270.665
| Ptotal= 72.03 mm |                          B=   9.984
--------------------                          C=   0.876
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 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
                0.17    3.35 |  1.17   17.72 |  2.17   12.20 |  3.17    4.34
                0.33    3.88 |  1.33   46.29 |  2.33    9.44 |  3.33    3.91
                0.50    4.61 |  1.50  164.72 |  2.50    7.66 |  3.50    3.57
                0.67    5.68 |  1.67   56.78 |  2.67    6.44 |  3.67    3.27
                0.83    7.40 |  1.83   27.07 |  2.83    5.54 |  3.83    3.03
```

1.00	10.53	2.00	17.03	3.00	4.87	4.00	2.82

CALIB NASHYD (0101) ID= 1 DT= 5.0 min	Area (ha)= 5.42	Curve Number (CN)= 63.0
	Ia (mm)= 9.24	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.47	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.35	1.083	17.72	2.083	12.20	3.08	4.34
0.167	3.35	1.167	17.72	2.167	12.20	3.17	4.34
0.250	3.88	1.250	46.29	2.250	9.44	3.25	3.91
0.333	3.88	1.333	46.29	2.333	9.44	3.33	3.91
0.417	4.61	1.417	164.72	2.417	7.66	3.42	3.57
0.500	4.61	1.500	164.72	2.500	7.66	3.50	3.57
0.583	5.68	1.583	56.78	2.583	6.44	3.58	3.27
0.667	5.68	1.667	56.78	2.667	6.44	3.67	3.27
0.750	7.40	1.750	27.07	2.750	5.54	3.75	3.03
0.833	7.40	1.833	27.07	2.833	5.54	3.83	3.03
0.917	10.53	1.917	17.03	2.917	4.87	3.92	2.82
1.000	10.53	2.000	17.03	3.000	4.87	4.00	2.82

Unit Hyd Qpeak (cms)= 0.440

PEAK FLOW (cms)= 0.199 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 18.597
TOTAL RAINFALL (mm)= 72.026
RUNOFF COEFFICIENT = 0.258

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

CALIB NASHYD (0102) ID= 1 DT= 5.0 min	Area (ha)= 1.88	Curve Number (CN)= 60.0
	Ia (mm)= 10.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.36	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.35	1.083	17.72	2.083	12.20	3.08	4.34
0.167	3.35	1.167	17.72	2.167	12.20	3.17	4.34
0.250	3.88	1.250	46.29	2.250	9.44	3.25	3.91
0.333	3.88	1.333	46.29	2.333	9.44	3.33	3.91
0.417	4.61	1.417	164.72	2.417	7.66	3.42	3.57
0.500	4.61	1.500	164.72	2.500	7.66	3.50	3.57
0.583	5.68	1.583	56.78	2.583	6.44	3.58	3.27
0.667	5.68	1.667	56.78	2.667	6.44	3.67	3.27
0.750	7.40	1.750	27.07	2.750	5.54	3.75	3.03
0.833	7.40	1.833	27.07	2.833	5.54	3.83	3.03
0.917	10.53	1.917	17.03	2.917	4.87	3.92	2.82
1.000	10.53	2.000	17.03	3.000	4.87	4.00	2.82

Unit Hyd Qpeak (cms)= 0.199

PEAK FLOW (cms)= 0.073 (i)
TIME TO PEAK (hrs)= 1.917
RUNOFF VOLUME (mm)= 16.625
TOTAL RAINFALL (mm)= 72.026
RUNOFF COEFFICIENT = 0.231

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

ADD HYD (0003)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0101):	5.42	0.199	2.08	18.60
	+ ID2= 2 (0102):	1.88	0.073	1.92	16.63
	==========				

```
        ID = 3 (  0003):     7.30   0.270     2.00    18.09

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

Appendix E

Post-Development Conditions - VO6 Hydrologic Modelling Results

```
V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
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
```


***** 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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\1a7838a0-
Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\1a7838a0-

DATE: 05-26-2023 TIME: 10:49:31

USER:

COMMENTS: _____

****
** SIMULATION : 10 Year 4 Hour Chicago **
****

| CHICAGO STORM |
| Ptotal= 54.73 mm |

IDF curve parameters: A=1574.382
B= 9.025
C= 0.860
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.72	1.17	13.36	2.17	9.34	3.17	3.48
0.33	3.13	1.33	34.24	2.33	7.30	3.33	3.16
0.50	3.69	1.50	124.99	2.50	5.98	3.50	2.89
0.67	4.50	1.67	41.93	2.67	5.07	3.67	2.66
0.83	5.79	1.83	20.16	2.83	4.40	3.83	2.47
1.00	8.10	2.00	12.86	3.00	3.88	4.00	2.31

| CALIB |
| NASHYD (0202) |
|ID= 1 DT= 2.0 min |

Area (ha)= 0.15 Curve Number (CN)= 61.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	2.72	1.033	13.36	2.033	9.34	3.03	3.48
0.067	2.72	1.067	13.36	2.067	9.34	3.07	3.48
0.100	2.72	1.100	13.36	2.100	9.34	3.10	3.48
0.133	2.72	1.133	13.36	2.133	9.34	3.13	3.48
0.167	2.72	1.167	13.36	2.167	9.34	3.17	3.48
0.200	3.13	1.200	34.24	2.200	7.30	3.20	3.16
0.233	3.13	1.233	34.24	2.233	7.30	3.23	3.16
0.267	3.13	1.267	34.24	2.267	7.30	3.27	3.16
0.300	3.13	1.300	34.24	2.300	7.30	3.30	3.16
0.333	3.13	1.333	34.24	2.333	7.30	3.33	3.16
0.367	3.69	1.367	124.99	2.367	5.98	3.37	2.89
0.400	3.69	1.400	124.99	2.400	5.98	3.40	2.89

0.433	3.69	1.433	124.99	2.433	5.98	3.43	2.89
0.467	3.69	1.467	124.99	2.467	5.98	3.47	2.89
0.500	3.69	1.500	124.99	2.500	5.98	3.50	2.89
0.533	4.50	1.533	41.93	2.533	5.07	3.53	2.66
0.567	4.50	1.567	41.93	2.567	5.07	3.57	2.66
0.600	4.50	1.600	41.93	2.600	5.07	3.60	2.66
0.633	4.50	1.633	41.93	2.633	5.07	3.63	2.66
0.667	4.50	1.667	41.93	2.667	5.07	3.67	2.66
0.700	5.79	1.700	20.16	2.700	4.40	3.70	2.47
0.733	5.79	1.733	20.16	2.733	4.40	3.73	2.47
0.767	5.79	1.767	20.16	2.767	4.40	3.77	2.47
0.800	5.79	1.800	20.16	2.800	4.40	3.80	2.47
0.833	5.79	1.833	20.16	2.833	4.40	3.83	2.47
0.867	8.10	1.867	12.86	2.867	3.88	3.87	2.31
0.900	8.10	1.900	12.86	2.900	3.88	3.90	2.31
0.933	8.10	1.933	12.86	2.933	3.88	3.93	2.31
0.967	8.10	1.967	12.86	2.967	3.88	3.97	2.31
1.000	8.10	2.000	12.86	3.000	3.88	4.00	2.31

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 11.656
TOTAL RAINFALL (mm)= 54.733
RUNOFF COEFFICIENT = 0.213

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

CALIB NASHYD (0203) ID= 1 DT= 5.0 min	Area (ha)= 4.60 Curve Number (CN)= 64.0 Ia (mm)= 9.11 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.42

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.72	1.083	13.36	2.083	9.34	3.08	3.48
0.167	2.72	1.167	13.36	2.167	9.34	3.17	3.48
0.250	3.13	1.250	34.24	2.250	7.30	3.25	3.16
0.333	3.13	1.333	34.24	2.333	7.30	3.33	3.16
0.417	3.69	1.417	124.99	2.417	5.98	3.42	2.89
0.500	3.69	1.500	124.99	2.500	5.98	3.50	2.89
0.583	4.50	1.583	41.93	2.583	5.07	3.58	2.66
0.667	4.50	1.667	41.93	2.667	5.07	3.67	2.66
0.750	5.79	1.750	20.16	2.750	4.40	3.75	2.47
0.833	5.79	1.833	20.16	2.833	4.40	3.83	2.47
0.917	8.10	1.917	12.86	2.917	3.88	3.92	2.31
1.000	8.10	2.000	12.86	3.000	3.88	4.00	2.31

Unit Hyd Qpeak (cms)= 0.418

PEAK FLOW (cms)= 0.104 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 11.041
TOTAL RAINFALL (mm)= 54.733
RUNOFF COEFFICIENT = 0.202

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

CALIB STANDHYD (0201) ID= 1 DT= 2.0 min	Area (ha)= 2.55 Total Imp(%)= 56.00 Dir. Conn.(%)= 46.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.43	1.12
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	130.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr

0.033	2.72	1.033	13.36	2.033	9.34	3.03	3.48
0.067	2.72	1.067	13.36	2.067	9.34	3.07	3.48
0.100	2.72	1.100	13.36	2.100	9.34	3.10	3.48
0.133	2.72	1.133	13.36	2.133	9.34	3.13	3.48
0.167	2.72	1.167	13.36	2.167	9.34	3.17	3.48
0.200	3.13	1.200	34.24	2.200	7.30	3.20	3.16
0.233	3.13	1.233	34.24	2.233	7.30	3.23	3.16
0.267	3.13	1.267	34.24	2.267	7.30	3.27	3.16
0.300	3.13	1.300	34.24	2.300	7.30	3.30	3.16
0.333	3.13	1.333	34.24	2.333	7.30	3.33	3.16
0.367	3.69	1.367	124.99	2.367	5.98	3.37	2.89
0.400	3.69	1.400	124.99	2.400	5.98	3.40	2.89
0.433	3.69	1.433	124.99	2.433	5.98	3.43	2.89
0.467	3.69	1.467	124.99	2.467	5.98	3.47	2.89
0.500	3.69	1.500	124.99	2.500	5.98	3.50	2.89
0.533	4.50	1.533	41.93	2.533	5.07	3.53	2.66
0.567	4.50	1.567	41.93	2.567	5.07	3.57	2.66
0.600	4.50	1.600	41.93	2.600	5.07	3.60	2.66
0.633	4.50	1.633	41.93	2.633	5.07	3.63	2.66
0.667	4.50	1.667	41.93	2.667	5.07	3.67	2.66
0.700	5.79	1.700	20.16	2.700	4.40	3.70	2.47
0.733	5.79	1.733	20.16	2.733	4.40	3.73	2.47
0.767	5.79	1.767	20.16	2.767	4.40	3.77	2.47
0.800	5.79	1.800	20.16	2.800	4.40	3.80	2.47
0.833	5.79	1.833	20.16	2.833	4.40	3.83	2.47
0.867	8.10	1.867	12.86	2.867	3.88	3.87	2.31
0.900	8.10	1.900	12.86	2.900	3.88	3.90	2.31
0.933	8.10	1.933	12.86	2.933	3.88	3.93	2.31
0.967	8.10	1.967	12.86	2.967	3.88	3.97	2.31
1.000	8.10	2.000	12.86	3.000	3.88	4.00	2.31

Max.Eff.Inten.(mm/hr)=	124.99	********		
over (min)	5.00	10.00		
Storage Coeff. (min)=	2.74 (ii)	9.08 (ii)		
Unit Hyd. Tpeak (min)=	4.00	10.00		
Unit Hyd. peak (cms)=	0.35	0.12		
			TOTALS	
PEAK FLOW (cms)=	0.39	0.07	0.440 (iii)	
TIME TO PEAK (hrs)=	1.50	1.63	1.50	
RUNOFF VOLUME (mm)=	52.73	14.03	31.83	
TOTAL RAINFALL (mm)=	54.73	54.73	54.73	
RUNOFF COEFFICIENT =	0.96	0.26	0.58	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):		2.55	0.440	1.50	31.83
+ ID2= 2 (0202):		0.15	0.006	1.70	11.66
ID = 3 (0003):		2.70	0.443	1.50	30.71

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0003):		2.70	0.443	1.50	30.71
+ ID2= 2 (0203):		4.60	0.104	2.00	11.04
ID = 1 (0003):		7.30	0.461	1.50	18.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0004)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0641	0.0501
	0.0090	0.0029	0.0675	0.0577
	0.0230	0.0062	0.0708	0.0658
	0.0310	0.0100	0.0739	0.0744

```
                        0.0380     0.0143   |   0.0798      0.0930
                        0.0430     0.0191   |   0.0825      0.1035
                        0.0480     0.0243   |   0.0852      0.1151
                        0.0525     0.0300   |   0.4371      0.1272
                        0.0567     0.0362   |   1.1416      0.1399
                        0.0605     0.0429   |   2.1405      0.1531

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      7.300      0.461      1.50      18.31
   OUTFLOW: ID= 1 (  0004)      7.300      0.074      2.77      18.30

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.04
                  TIME SHIFT OF PEAK FLOW         (min)= 76.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0747

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------
================================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\98aa2e8c-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\98aa2e8c-


DATE: 05-26-2023                          TIME: 10:49:31

USER:


COMMENTS: _____________________________________________________________


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  ************************************************
  ** SIMULATION : 100 Year 4 Hour Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2619.363
| Ptotal= 79.35 mm |                          B=  10.500
--------------------                          C=   0.884
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 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
                0.17    3.57 |  1.17   19.62 |  2.17   13.42 |  3.17    4.65
                0.33    4.15 |  1.33   51.70 |  2.33   10.32 |  3.33    4.18
                0.50    4.95 |  1.50  181.39 |  2.50    8.33 |  3.50    3.80
                0.67    6.14 |  1.67   63.45 |  2.67    6.97 |  3.67    3.48
                0.83    8.04 |  1.83   30.15 |  2.83    5.98 |  3.83    3.22
                1.00   11.54 |  2.00   18.84 |  3.00    5.23 |  4.00    2.99


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0202)|   Area    (ha)=   0.15   Curve Number   (CN)= 61.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20
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NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	3.57	1.033	19.62	2.033	13.42	3.03	4.65
0.067	3.57	1.067	19.62	2.067	13.42	3.07	4.65
0.100	3.57	1.100	19.62	2.100	13.42	3.10	4.65
0.133	3.57	1.133	19.62	2.133	13.42	3.13	4.65
0.167	3.57	1.167	19.62	2.167	13.42	3.17	4.65
0.200	4.15	1.200	51.70	2.200	10.32	3.20	4.18
0.233	4.15	1.233	51.70	2.233	10.32	3.23	4.18
0.267	4.15	1.267	51.70	2.267	10.32	3.27	4.18
0.300	4.15	1.300	51.70	2.300	10.32	3.30	4.18
0.333	4.15	1.333	51.70	2.333	10.32	3.33	4.18
0.367	4.95	1.367	181.39	2.367	8.33	3.37	3.80
0.400	4.95	1.400	181.39	2.400	8.33	3.40	3.80
0.433	4.95	1.433	181.39	2.433	8.33	3.43	3.80
0.467	4.95	1.467	181.39	2.467	8.33	3.47	3.80
0.500	4.95	1.500	181.39	2.500	8.33	3.50	3.80
0.533	6.14	1.533	63.45	2.533	6.97	3.53	3.48
0.567	6.14	1.567	63.45	2.567	6.97	3.57	3.48
0.600	6.14	1.600	63.45	2.600	6.97	3.60	3.48
0.633	6.14	1.633	63.45	2.633	6.97	3.63	3.48
0.667	6.14	1.667	63.45	2.667	6.97	3.67	3.48
0.700	8.04	1.700	30.15	2.700	5.98	3.70	3.22
0.733	8.04	1.733	30.15	2.733	5.98	3.73	3.22
0.767	8.04	1.767	30.15	2.767	5.98	3.77	3.22
0.800	8.04	1.800	30.15	2.800	5.98	3.80	3.22
0.833	8.04	1.833	30.15	2.833	5.98	3.83	3.22
0.867	11.54	1.867	18.84	2.867	5.23	3.87	2.99
0.900	11.54	1.900	18.84	2.900	5.23	3.90	2.99
0.933	11.54	1.933	18.84	2.933	5.23	3.93	2.99
0.967	11.54	1.967	18.84	2.967	5.23	3.97	2.99
1.000	11.54	2.000	18.84	3.000	5.23	4.00	2.99

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.012 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 23.347
TOTAL RAINFALL (mm)= 79.353
RUNOFF COEFFICIENT = 0.294

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

CALIB NASHYD (0203) ID= 1 DT= 5.0 min	Area (ha)= 4.60	Curve Number (CN)= 64.0
	Ia (mm)= 9.11	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.42	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.57	1.083	19.62	2.083	13.42	3.08	4.65
0.167	3.57	1.167	19.62	2.167	13.42	3.17	4.65
0.250	4.15	1.250	51.70	2.250	10.32	3.25	4.18
0.333	4.15	1.333	51.70	2.333	10.32	3.33	4.18
0.417	4.95	1.417	181.39	2.417	8.33	3.42	3.80
0.500	4.95	1.500	181.39	2.500	8.33	3.50	3.80
0.583	6.14	1.583	63.45	2.583	6.97	3.58	3.48
0.667	6.14	1.667	63.45	2.667	6.97	3.67	3.48
0.750	8.04	1.750	30.15	2.750	5.98	3.75	3.22
0.833	8.04	1.833	30.15	2.833	5.98	3.83	3.22
0.917	11.54	1.917	18.84	2.917	5.23	3.92	2.99
1.000	11.54	2.000	18.84	3.000	5.23	4.00	2.99

Unit Hyd Qpeak (cms)= 0.418

PEAK FLOW (cms)= 0.231 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 23.149
TOTAL RAINFALL (mm)= 79.353
RUNOFF COEFFICIENT = 0.292

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

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--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   2.55
|ID= 1 DT= 2.0 min |   Total Imp(%)=  56.00   Dir. Conn.(%)=  46.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.43          1.12
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     130.38         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
              0.033     3.57 | 1.033    19.62 | 2.033    13.42 |  3.03     4.65
              0.067     3.57 | 1.067    19.62 | 2.067    13.42 |  3.07     4.65
              0.100     3.57 | 1.100    19.62 | 2.100    13.42 |  3.10     4.65
              0.133     3.57 | 1.133    19.62 | 2.133    13.42 |  3.13     4.65
              0.167     3.57 | 1.167    19.62 | 2.167    13.42 |  3.17     4.65
              0.200     4.15 | 1.200    51.70 | 2.200    10.32 |  3.20     4.18
              0.233     4.15 | 1.233    51.70 | 2.233    10.32 |  3.23     4.18
              0.267     4.15 | 1.267    51.70 | 2.267    10.32 |  3.27     4.18
              0.300     4.15 | 1.300    51.70 | 2.300    10.32 |  3.30     4.18
              0.333     4.15 | 1.333    51.70 | 2.333    10.32 |  3.33     4.18
              0.367     4.95 | 1.367   181.39 | 2.367     8.33 |  3.37     3.80
              0.400     4.95 | 1.400   181.39 | 2.400     8.33 |  3.40     3.80
              0.433     4.95 | 1.433   181.39 | 2.433     8.33 |  3.43     3.80
              0.467     4.95 | 1.467   181.39 | 2.467     8.33 |  3.47     3.80
              0.500     4.95 | 1.500   181.39 | 2.500     8.33 |  3.50     3.80
              0.533     6.14 | 1.533    63.45 | 2.533     6.97 |  3.53     3.48
              0.567     6.14 | 1.567    63.45 | 2.567     6.97 |  3.57     3.48
              0.600     6.14 | 1.600    63.45 | 2.600     6.97 |  3.60     3.48
              0.633     6.14 | 1.633    63.45 | 2.633     6.97 |  3.63     3.48
              0.667     6.14 | 1.667    63.45 | 2.667     6.97 |  3.67     3.48
              0.700     8.04 | 1.700    30.15 | 2.700     5.98 |  3.70     3.22
              0.733     8.04 | 1.733    30.15 | 2.733     5.98 |  3.73     3.22
              0.767     8.04 | 1.767    30.15 | 2.767     5.98 |  3.77     3.22
              0.800     8.04 | 1.800    30.15 | 2.800     5.98 |  3.80     3.22
              0.833     8.04 | 1.833    30.15 | 2.833     5.98 |  3.83     3.22
              0.867    11.54 | 1.867    18.84 | 2.867     5.23 |  3.87     2.99
              0.900    11.54 | 1.900    18.84 | 2.900     5.23 |  3.90     2.99
              0.933    11.54 | 1.933    18.84 | 2.933     5.23 |  3.93     2.99
              0.967    11.54 | 1.967    18.84 | 2.967     5.23 |  3.97     2.99
              1.000    11.54 | 2.000    18.84 | 3.000     5.23 |  4.00     2.99

     Max.Eff.Inten.(mm/hr)=     181.39     ********
               over (min)          5.00          8.00
     Storage Coeff.  (min)=       2.36 (ii)     7.82 (ii)
     Unit Hyd. Tpeak (min)=       4.00          8.00
     Unit Hyd. peak  (cms)=       0.38          0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.58          0.16          0.705 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.60           1.50
     RUNOFF VOLUME    (mm)=      77.35         27.30          50.32
     TOTAL RAINFALL   (mm)=      79.35         79.35          79.35
     RUNOFF COEFFICIENT   =       0.97          0.34           0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  61.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0201):     2.55   0.705     1.50     50.32
     + ID2= 2 (  0202):     0.15   0.012     1.70     23.35
       ================================================
       ID = 3 (  0003):     2.70   0.711     1.50     48.82

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

--------------------
| ADD HYD  (  0003)|
```

```
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0003):     2.70   0.711     1.50    48.82
      + ID2= 2 (  0203):     4.60   0.231     2.00    23.15
        ================================================
        ID = 1 (  0003):     7.30   0.760     1.50    32.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0004)|     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   |   0.0641      0.0501
                          0.0090     0.0029   |   0.0675      0.0577
                          0.0230     0.0062   |   0.0708      0.0658
                          0.0310     0.0100   |   0.0739      0.0744
                          0.0380     0.0143   |   0.0798      0.0930
                          0.0430     0.0191   |   0.0825      0.1035
                          0.0480     0.0243   |   0.0852      0.1151
                          0.0525     0.0300   |   0.4371      0.1272
                          0.0567     0.0362   |   1.1416      0.1399
                          0.0605     0.0429   |   2.1405      0.1531

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      7.300      0.760      1.50      32.64
   OUTFLOW: ID= 1 (  0004)      7.300      0.278      2.23      32.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 36.58
                  TIME SHIFT OF PEAK FLOW         (min)= 44.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1218

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\59e1abab-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\59e1abab-


DATE: 05-26-2023                          TIME: 10:49:31

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : 2 Year 4 Hour Chicago        **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1290.000
| Ptotal= 44.93 mm |                          B=   8.500
--------------------                          C=   0.860
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.38
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.21	1.17	10.77	2.17	7.53	3.17	2.82
0.33	2.54	1.33	27.78	2.33	5.89	3.33	2.56
0.50	2.99	1.50	104.91	2.50	4.83	3.50	2.34
0.67	3.64	1.67	34.08	2.67	4.10	3.67	2.16
0.83	4.68	1.83	16.26	2.83	3.56	3.83	2.01
1.00	6.54	2.00	10.36	3.00	3.15	4.00	1.87

CALIB NASHYD (0202) ID= 1 DT= 2.0 min			
	Area (ha)=	0.15	Curve Number (CN)= 61.0
	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	2.21	1.033	10.77	2.033	7.53	3.03	2.82
0.067	2.21	1.067	10.77	2.067	7.53	3.07	2.82
0.100	2.21	1.100	10.77	2.100	7.53	3.10	2.82
0.133	2.21	1.133	10.77	2.133	7.53	3.13	2.82
0.167	2.21	1.167	10.77	2.167	7.53	3.17	2.82
0.200	2.54	1.200	27.78	2.200	5.89	3.20	2.56
0.233	2.54	1.233	27.78	2.233	5.89	3.23	2.56
0.267	2.54	1.267	27.78	2.267	5.89	3.27	2.56
0.300	2.54	1.300	27.78	2.300	5.89	3.30	2.56
0.333	2.54	1.333	27.78	2.333	5.89	3.33	2.56
0.367	2.99	1.367	104.91	2.367	4.83	3.37	2.34
0.400	2.99	1.400	104.91	2.400	4.83	3.40	2.34
0.433	2.99	1.433	104.91	2.433	4.83	3.43	2.34
0.467	2.99	1.467	104.91	2.467	4.83	3.47	2.34
0.500	2.99	1.500	104.91	2.500	4.83	3.50	2.34
0.533	3.64	1.533	34.08	2.533	4.10	3.53	2.16
0.567	3.64	1.567	34.08	2.567	4.10	3.57	2.16
0.600	3.64	1.600	34.08	2.600	4.10	3.60	2.16
0.633	3.64	1.633	34.08	2.633	4.10	3.63	2.16
0.667	3.64	1.667	34.08	2.667	4.10	3.67	2.16
0.700	4.68	1.700	16.26	2.700	3.56	3.70	2.01
0.733	4.68	1.733	16.26	2.733	3.56	3.73	2.01
0.767	4.68	1.767	16.26	2.767	3.56	3.77	2.01
0.800	4.68	1.800	16.26	2.800	3.56	3.80	2.01
0.833	4.68	1.833	16.26	2.833	3.56	3.83	2.01
0.867	6.54	1.867	10.36	2.867	3.15	3.87	1.87
0.900	6.54	1.900	10.36	2.900	3.15	3.90	1.87
0.933	6.54	1.933	10.36	2.933	3.15	3.93	1.87
0.967	6.54	1.967	10.36	2.967	3.15	3.97	1.87
1.000	6.54	2.000	10.36	3.000	3.15	4.00	1.87

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.004 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 7.876
TOTAL RAINFALL (mm)= 44.928
RUNOFF COEFFICIENT = 0.175

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

CALIB NASHYD (0203) ID= 1 DT= 5.0 min			
	Area (ha)=	4.60	Curve Number (CN)= 64.0
	Ia (mm)=	9.11	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.42	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.21	1.083	10.77	2.083	7.53	3.08	2.82
0.167	2.21	1.167	10.77	2.167	7.53	3.17	2.82
0.250	2.54	1.250	27.78	2.250	5.89	3.25	2.56
0.333	2.54	1.333	27.78	2.333	5.89	3.33	2.56
0.417	2.99	1.417	104.91	2.417	4.83	3.42	2.34
0.500	2.99	1.500	104.91	2.500	4.83	3.50	2.34

0.583	3.64	1.583	34.08	2.583	4.10	3.58	2.16
0.667	3.64	1.667	34.08	2.667	4.10	3.67	2.16
0.750	4.68	1.750	16.26	2.750	3.56	3.75	2.01
0.833	4.68	1.833	16.26	2.833	3.56	3.83	2.01
0.917	6.54	1.917	10.36	2.917	3.15	3.92	1.87
1.000	6.54	2.000	10.36	3.000	3.15	4.00	1.87

Unit Hyd Qpeak (cms)= 0.418

PEAK FLOW (cms)= 0.066 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 7.179
TOTAL RAINFALL (mm)= 44.928
RUNOFF COEFFICIENT = 0.160

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

CALIB
STANDHYD (0201)| Area (ha)= 2.55
ID= 1 DT= 2.0 min | Total Imp(%)= 56.00 Dir. Conn.(%)= 46.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.43	1.12
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	130.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	2.21	1.033	10.77	2.033	7.53	3.03	2.82
0.067	2.21	1.067	10.77	2.067	7.53	3.07	2.82
0.100	2.21	1.100	10.77	2.100	7.53	3.10	2.82
0.133	2.21	1.133	10.77	2.133	7.53	3.13	2.82
0.167	2.21	1.167	10.77	2.167	7.53	3.17	2.82
0.200	2.54	1.200	27.78	2.200	5.89	3.20	2.56
0.233	2.54	1.233	27.78	2.233	5.89	3.23	2.56
0.267	2.54	1.267	27.78	2.267	5.89	3.27	2.56
0.300	2.54	1.300	27.78	2.300	5.89	3.30	2.56
0.333	2.54	1.333	27.78	2.333	5.89	3.33	2.56
0.367	2.99	1.367	104.91	2.367	4.83	3.37	2.34
0.400	2.99	1.400	104.91	2.400	4.83	3.40	2.34
0.433	2.99	1.433	104.91	2.433	4.83	3.43	2.34
0.467	2.99	1.467	104.91	2.467	4.83	3.47	2.34
0.500	2.99	1.500	104.91	2.500	4.83	3.50	2.34
0.533	3.64	1.533	34.08	2.533	4.10	3.53	2.16
0.567	3.64	1.567	34.08	2.567	4.10	3.57	2.16
0.600	3.64	1.600	34.08	2.600	4.10	3.60	2.16
0.633	3.64	1.633	34.08	2.633	4.10	3.63	2.16
0.667	3.64	1.667	34.08	2.667	4.10	3.67	2.16
0.700	4.68	1.700	16.26	2.700	3.56	3.70	2.01
0.733	4.68	1.733	16.26	2.733	3.56	3.73	2.01
0.767	4.68	1.767	16.26	2.767	3.56	3.77	2.01
0.800	4.68	1.800	16.26	2.800	3.56	3.80	2.01
0.833	4.68	1.833	16.26	2.833	3.56	3.83	2.01
0.867	6.54	1.867	10.36	2.867	3.15	3.87	1.87
0.900	6.54	1.900	10.36	2.900	3.15	3.90	1.87
0.933	6.54	1.933	10.36	2.933	3.15	3.93	1.87
0.967	6.54	1.967	10.36	2.967	3.15	3.97	1.87
1.000	6.54	2.000	10.36	3.000	3.15	4.00	1.87

Max.Eff.Inten.(mm/hr)=	104.91	********		
over (min)	5.00	10.00		
Storage Coeff. (min)=	2.94 (ii)	9.74 (ii)		
Unit Hyd. Tpeak (min)=	4.00	10.00		
Unit Hyd. peak (cms)=	0.34	0.12		
				TOTALS
PEAK FLOW (cms)=	0.33	0.05		0.358 (iii)
TIME TO PEAK (hrs)=	1.50	1.63		1.50
RUNOFF VOLUME (mm)=	42.93	9.64		24.95
TOTAL RAINFALL (mm)=	44.93	44.93		44.93
RUNOFF COEFFICIENT =	0.96	0.21		0.56

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):		2.55	0.358	1.50	24.95
+ ID2= 2 (0202):		0.15	0.004	1.70	7.88
ID = 3 (0003):		2.70	0.359	1.50	24.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0003):		2.70	0.359	1.50	24.00
+ ID2= 2 (0203):		4.60	0.066	2.00	7.18
ID = 1 (0003):		7.30	0.370	1.50	13.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0004)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0641	0.0501
0.0090	0.0029	0.0675	0.0577
0.0230	0.0062	0.0708	0.0658
0.0310	0.0100	0.0739	0.0744
0.0380	0.0143	0.0798	0.0930
0.0430	0.0191	0.0825	0.1035
0.0480	0.0243	0.0852	0.1151
0.0525	0.0300	0.4371	0.1272
0.0567	0.0362	1.1416	0.1399
0.0605	0.0429	2.1405	0.1531

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0003)	7.300	0.370	1.50	13.40
OUTFLOW: ID= 1 (0004)	7.300	0.064	2.60	13.39

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.41
TIME SHIFT OF PEAK FLOW (min)= 66.00
MAXIMUM STORAGE USED (ha.m.)= 0.0506

**** WARNING : SELECTED ROUTING TIME STEP DENIED.

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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
```


***** 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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\7f786fc1-
Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\7f786fc1-

DATE: 05-26-2023 TIME: 10:49:31

USER:

COMMENTS: _____

****
** SIMULATION : 25 Year 4 Hour Chicago **
****

CHICAGO STORM
Ptotal= 64.45 mm

IDF curve parameters: A=2019.372
B= 9.824
C= 0.875
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.00	1.17	15.79	2.17	10.89	3.17	3.89
0.33	3.48	1.33	41.28	2.33	8.42	3.33	3.51
0.50	4.13	1.50	147.97	2.50	6.85	3.50	3.20
0.67	5.09	1.67	50.64	2.67	5.76	3.67	2.94
0.83	6.61	1.83	24.12	2.83	4.96	3.83	2.72
1.00	9.40	2.00	15.18	3.00	4.36	4.00	2.53

CALIB NASHYD (0202) ID= 1 DT= 2.0 min

Area (ha)= 0.15 Curve Number (CN)= 61.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	3.00	1.033	15.79	2.033	10.89	3.03	3.89
0.067	3.00	1.067	15.79	2.067	10.89	3.07	3.89
0.100	3.00	1.100	15.79	2.100	10.89	3.10	3.89
0.133	3.00	1.133	15.79	2.133	10.89	3.13	3.89
0.167	3.00	1.167	15.79	2.167	10.89	3.17	3.89
0.200	3.48	1.200	41.28	2.200	8.42	3.20	3.51
0.233	3.48	1.233	41.28	2.233	8.42	3.23	3.51
0.267	3.48	1.267	41.28	2.267	8.42	3.27	3.51
0.300	3.48	1.300	41.28	2.300	8.42	3.30	3.51
0.333	3.48	1.333	41.28	2.333	8.42	3.33	3.51
0.367	4.13	1.367	147.97	2.367	6.85	3.37	3.20
0.400	4.13	1.400	147.97	2.400	6.85	3.40	3.20
0.433	4.13	1.433	147.97	2.433	6.85	3.43	3.20
0.467	4.13	1.467	147.97	2.467	6.85	3.47	3.20
0.500	4.13	1.500	147.97	2.500	6.85	3.50	3.20
0.533	5.09	1.533	50.64	2.533	5.76	3.53	2.94
0.567	5.09	1.567	50.64	2.567	5.76	3.57	2.94
0.600	5.09	1.600	50.64	2.600	5.76	3.60	2.94
0.633	5.09	1.633	50.64	2.633	5.76	3.63	2.94
0.667	5.09	1.667	50.64	2.667	5.76	3.67	2.94
0.700	6.61	1.700	24.12	2.700	4.96	3.70	2.72
0.733	6.61	1.733	24.12	2.733	4.96	3.73	2.72
0.767	6.61	1.767	24.12	2.767	4.96	3.77	2.72
0.800	6.61	1.800	24.12	2.800	4.96	3.80	2.72
0.833	6.61	1.833	24.12	2.833	4.96	3.83	2.72
0.867	9.40	1.867	15.18	2.867	4.36	3.87	2.53
0.900	9.40	1.900	15.18	2.900	4.36	3.90	2.53
0.933	9.40	1.933	15.18	2.933	4.36	3.93	2.53
0.967	9.40	1.967	15.18	2.967	4.36	3.97	2.53
1.000	9.40	2.000	15.18	3.000	4.36	4.00	2.53

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.008 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 15.926
TOTAL RAINFALL (mm)= 64.446
RUNOFF COEFFICIENT = 0.247

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

```
--------------------
| CALIB            |
| NASHYD   (  0203)|   Area    (ha)=   4.60   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.11   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.42

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.00	1.083	15.79	2.083	10.89	3.08	3.89
0.167	3.00	1.167	15.79	2.167	10.89	3.17	3.89
0.250	3.48	1.250	41.28	2.250	8.42	3.25	3.51
0.333	3.48	1.333	41.28	2.333	8.42	3.33	3.51
0.417	4.13	1.417	147.97	2.417	6.85	3.42	3.20
0.500	4.13	1.500	147.97	2.500	6.85	3.50	3.20
0.583	5.09	1.583	50.64	2.583	5.76	3.58	2.94
0.667	5.09	1.667	50.64	2.667	5.76	3.67	2.94
0.750	6.61	1.750	24.12	2.750	4.96	3.75	2.72
0.833	6.61	1.833	24.12	2.833	4.96	3.83	2.72
0.917	9.40	1.917	15.18	2.917	4.36	3.92	2.53
1.000	9.40	2.000	15.18	3.000	4.36	4.00	2.53

```
     Unit Hyd Qpeak  (cms)=   0.418

     PEAK FLOW       (cms)=   0.151 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  15.447
     TOTAL RAINFALL   (mm)=  64.446
     RUNOFF COEFFICIENT   =   0.240

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   2.55
|ID= 1 DT= 2.0 min |   Total Imp(%)=  56.00   Dir. Conn.(%)=  46.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.43         1.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     130.38        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	3.00	1.033	15.79	2.033	10.89	3.03	3.89
0.067	3.00	1.067	15.79	2.067	10.89	3.07	3.89
0.100	3.00	1.100	15.79	2.100	10.89	3.10	3.89
0.133	3.00	1.133	15.79	2.133	10.89	3.13	3.89
0.167	3.00	1.167	15.79	2.167	10.89	3.17	3.89
0.200	3.48	1.200	41.28	2.200	8.42	3.20	3.51
0.233	3.48	1.233	41.28	2.233	8.42	3.23	3.51
0.267	3.48	1.267	41.28	2.267	8.42	3.27	3.51
0.300	3.48	1.300	41.28	2.300	8.42	3.30	3.51
0.333	3.48	1.333	41.28	2.333	8.42	3.33	3.51
0.367	4.13	1.367	147.97	2.367	6.85	3.37	3.20
0.400	4.13	1.400	147.97	2.400	6.85	3.40	3.20
0.433	4.13	1.433	147.97	2.433	6.85	3.43	3.20
0.467	4.13	1.467	147.97	2.467	6.85	3.47	3.20
0.500	4.13	1.500	147.97	2.500	6.85	3.50	3.20
0.533	5.09	1.533	50.64	2.533	5.76	3.53	2.94
0.567	5.09	1.567	50.64	2.567	5.76	3.57	2.94
0.600	5.09	1.600	50.64	2.600	5.76	3.60	2.94
0.633	5.09	1.633	50.64	2.633	5.76	3.63	2.94
0.667	5.09	1.667	50.64	2.667	5.76	3.67	2.94
0.700	6.61	1.700	24.12	2.700	4.96	3.70	2.72
0.733	6.61	1.733	24.12	2.733	4.96	3.73	2.72
0.767	6.61	1.767	24.12	2.767	4.96	3.77	2.72
0.800	6.61	1.800	24.12	2.800	4.96	3.80	2.72
0.833	6.61	1.833	24.12	2.833	4.96	3.83	2.72
0.867	9.40	1.867	15.18	2.867	4.36	3.87	2.53
0.900	9.40	1.900	15.18	2.900	4.36	3.90	2.53
0.933	9.40	1.933	15.18	2.933	4.36	3.93	2.53
0.967	9.40	1.967	15.18	2.967	4.36	3.97	2.53
1.000	9.40	2.000	15.18	3.000	4.36	4.00	2.53

```
     Max.Eff.Inten.(mm/hr)=     147.97     ********
                 over (min)       5.00       10.00
     Storage Coeff.  (min)=       2.56 (ii)    8.49 (ii)
     Unit Hyd. Tpeak (min)=       4.00       10.00
     Unit Hyd. peak  (cms)=       0.36        0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.47        0.11          0.537 (iii)
     TIME TO PEAK    (hrs)=       1.50        1.63           1.50
     RUNOFF VOLUME    (mm)=      62.45       18.91          38.94
     TOTAL RAINFALL   (mm)=      64.45       64.45          64.45
     RUNOFF COEFFICIENT   =       0.97        0.29           0.60


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  61.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0201):     2.55   0.537     1.50    38.94
     + ID2= 2 (  0202):     0.15   0.008     1.70    15.93
       ================================================
       ID = 3 (  0003):     2.70   0.541     1.50    37.66

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

--------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0003):     2.70   0.541     1.50    37.66
     + ID2= 2 (  0203):     4.60   0.151     2.00    15.45
       ================================================
       ID = 1 (  0003):     7.30   0.570     1.50    23.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0004)|     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   |   0.0641      0.0501
                          0.0090     0.0029   |   0.0675      0.0577
                          0.0230     0.0062   |   0.0708      0.0658
                          0.0310     0.0100   |   0.0739      0.0744
                          0.0380     0.0143   |   0.0798      0.0930
                          0.0430     0.0191   |   0.0825      0.1035
                          0.0480     0.0243   |   0.0852      0.1151
                          0.0525     0.0300   |   0.4371      0.1272
                          0.0567     0.0362   |   1.1416      0.1399
                          0.0605     0.0429   |   2.1405      0.1531

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      7.300      0.570      1.50      23.66
   OUTFLOW: ID= 1 (  0004)      7.300      0.083      2.90      23.65

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.50
                  TIME SHIFT OF PEAK FLOW         (min)= 84.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1041

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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
```

***** 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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\dcba1105-
Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\dcba1105-

DATE: 05-26-2023 TIME: 10:49:32

USER:

COMMENTS: _____

** SIMULATION : 250 Year 4 Hour Chicago **

| CHICAGO STORM |
| Ptotal= 90.48 mm |

IDF curve parameters: A=3048.220
B= 10.030
C= 0.888
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.93	1.17	21.88	2.17	14.90	3.17	5.13
0.33	4.57	1.33	58.58	2.33	11.43	3.33	4.61
0.50	5.46	1.50	212.89	2.50	9.22	3.50	4.19
0.67	6.78	1.67	72.12	2.67	7.70	3.67	3.83
0.83	8.89	1.83	33.80	2.83	6.60	3.83	3.54
1.00	12.80	2.00	20.99	3.00	5.77	4.00	3.28

| CALIB |
| NASHYD (0202) |
|ID= 1 DT= 2.0 min |

Area (ha)= 0.15 Curve Number (CN)= 61.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	3.93	1.033	21.88	2.033	14.90	3.03	5.13
0.067	3.93	1.067	21.88	2.067	14.90	3.07	5.13
0.100	3.93	1.100	21.88	2.100	14.90	3.10	5.13
0.133	3.93	1.133	21.88	2.133	14.90	3.13	5.13
0.167	3.93	1.167	21.88	2.167	14.90	3.17	5.13
0.200	4.57	1.200	58.58	2.200	11.43	3.20	4.61
0.233	4.57	1.233	58.58	2.233	11.43	3.23	4.61
0.267	4.57	1.267	58.58	2.267	11.43	3.27	4.61
0.300	4.57	1.300	58.58	2.300	11.43	3.30	4.61
0.333	4.57	1.333	58.58	2.333	11.43	3.33	4.61
0.367	5.46	1.367	212.89	2.367	9.22	3.37	4.19
0.400	5.46	1.400	212.89	2.400	9.22	3.40	4.19
0.433	5.46	1.433	212.89	2.433	9.22	3.43	4.19
0.467	5.46	1.467	212.89	2.467	9.22	3.47	4.19
0.500	5.46	1.500	212.89	2.500	9.22	3.50	4.19
0.533	6.78	1.533	72.12	2.533	7.70	3.53	3.83
0.567	6.78	1.567	72.12	2.567	7.70	3.57	3.83
0.600	6.78	1.600	72.12	2.600	7.70	3.60	3.83
0.633	6.78	1.633	72.12	2.633	7.70	3.63	3.83
0.667	6.78	1.667	72.12	2.667	7.70	3.67	3.83
0.700	8.89	1.700	33.80	2.700	6.60	3.70	3.54
0.733	8.89	1.733	33.80	2.733	6.60	3.73	3.54
0.767	8.89	1.767	33.80	2.767	6.60	3.77	3.54
0.800	8.89	1.800	33.80	2.800	6.60	3.80	3.54

0.833	8.89	1.833	33.80	2.833	6.60	3.83	3.54
0.867	12.80	1.867	20.99	2.867	5.77	3.87	3.28
0.900	12.80	1.900	20.99	2.900	5.77	3.90	3.28
0.933	12.80	1.933	20.99	2.933	5.77	3.93	3.28
0.967	12.80	1.967	20.99	2.967	5.77	3.97	3.28
1.000	12.80	2.000	20.99	3.000	5.77	4.00	3.28

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 29.472
TOTAL RAINFALL (mm)= 90.478
RUNOFF COEFFICIENT = 0.326

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

CALIB			
NASHYD (0203)	Area (ha)=	4.60	Curve Number (CN)= 64.0
ID= 1 DT= 5.0 min	Ia (mm)=	9.11	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.42	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.93	1.083	21.88	2.083	14.90	3.08	5.13
0.167	3.93	1.167	21.88	2.167	14.90	3.17	5.13
0.250	4.57	1.250	58.58	2.250	11.43	3.25	4.61
0.333	4.57	1.333	58.58	2.333	11.43	3.33	4.61
0.417	5.46	1.417	212.89	2.417	9.22	3.42	4.19
0.500	5.46	1.500	212.89	2.500	9.22	3.50	4.19
0.583	6.78	1.583	72.12	2.583	7.70	3.58	3.83
0.667	6.78	1.667	72.12	2.667	7.70	3.67	3.83
0.750	8.89	1.750	33.80	2.750	6.60	3.75	3.54
0.833	8.89	1.833	33.80	2.833	6.60	3.83	3.54
0.917	12.80	1.917	20.99	2.917	5.77	3.92	3.28
1.000	12.80	2.000	20.99	3.000	5.77	4.00	3.28

Unit Hyd Qpeak (cms)= 0.418

PEAK FLOW (cms)= 0.301 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 29.522
TOTAL RAINFALL (mm)= 90.479
RUNOFF COEFFICIENT = 0.326

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

CALIB			
STANDHYD (0201)	Area (ha)=	2.55	
ID= 1 DT= 2.0 min	Total Imp(%)=	56.00	Dir. Conn.(%)= 46.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.43	1.12
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	130.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	3.93	1.033	21.88	2.033	14.90	3.03	5.13
0.067	3.93	1.067	21.88	2.067	14.90	3.07	5.13
0.100	3.93	1.100	21.88	2.100	14.90	3.10	5.13
0.133	3.93	1.133	21.88	2.133	14.90	3.13	5.13
0.167	3.93	1.167	21.88	2.167	14.90	3.17	5.13
0.200	4.57	1.200	58.58	2.200	11.43	3.20	4.61
0.233	4.57	1.233	58.58	2.233	11.43	3.23	4.61
0.267	4.57	1.267	58.58	2.267	11.43	3.27	4.61
0.300	4.57	1.300	58.58	2.300	11.43	3.30	4.61
0.333	4.57	1.333	58.58	2.333	11.43	3.33	4.61
0.367	5.46	1.367	212.89	2.367	9.22	3.37	4.19
0.400	5.46	1.400	212.89	2.400	9.22	3.40	4.19

0.433	5.46	1.433	212.89	2.433	9.22	3.43	4.19
0.467	5.46	1.467	212.89	2.467	9.22	3.47	4.19
0.500	5.46	1.500	212.89	2.500	9.22	3.50	4.19
0.533	6.78	1.533	72.12	2.533	7.70	3.53	3.83
0.567	6.78	1.567	72.12	2.567	7.70	3.57	3.83
0.600	6.78	1.600	72.12	2.600	7.70	3.60	3.83
0.633	6.78	1.633	72.12	2.633	7.70	3.63	3.83
0.667	6.78	1.667	72.12	2.667	7.70	3.67	3.83
0.700	8.89	1.700	33.80	2.700	6.60	3.70	3.54
0.733	8.89	1.733	33.80	2.733	6.60	3.73	3.54
0.767	8.89	1.767	33.80	2.767	6.60	3.77	3.54
0.800	8.89	1.800	33.80	2.800	6.60	3.80	3.54
0.833	8.89	1.833	33.80	2.833	6.60	3.83	3.54
0.867	12.80	1.867	20.99	2.867	5.77	3.87	3.28
0.900	12.80	1.900	20.99	2.900	5.77	3.90	3.28
0.933	12.80	1.933	20.99	2.933	5.77	3.93	3.28
0.967	12.80	1.967	20.99	2.967	5.77	3.97	3.28
1.000	12.80	2.000	20.99	3.000	5.77	4.00	3.28

Max.Eff.Inten.(mm/hr)=	212.89	********	
over (min)	5.00	8.00	
Storage Coeff. (min)=	2.21 (ii)	7.34 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.39	0.15	
			TOTALS
PEAK FLOW (cms)=	0.68	0.22	0.852 (iii)
TIME TO PEAK (hrs)=	1.50	1.57	1.50
RUNOFF VOLUME (mm)=	88.48	34.13	59.13
TOTAL RAINFALL (mm)=	90.48	90.48	90.48
RUNOFF COEFFICIENT =	0.98	0.38	0.65

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):		2.55	0.852	1.50	59.13
+ ID2= 2 (0202):		0.15	0.016	1.70	29.47
ID = 3 (0003):		2.70	0.860	1.50	57.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0003):		2.70	0.860	1.50	57.48
+ ID2= 2 (0203):		4.60	0.301	2.00	29.52
ID = 1 (0003):		7.30	0.929	1.50	39.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0004)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0641	0.0501
	0.0090	0.0029	0.0675	0.0577
	0.0230	0.0062	0.0708	0.0658
	0.0310	0.0100	0.0739	0.0744
	0.0380	0.0143	0.0798	0.0930
	0.0430	0.0191	0.0825	0.1035
	0.0480	0.0243	0.0852	0.1151
	0.0525	0.0300	0.4371	0.1272
	0.0567	0.0362	1.1416	0.1399
	0.0605	0.0429	2.1405	0.1531

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0003)	7.300	0.929	1.50	39.86
OUTFLOW: ID= 1 (0004)	7.300	0.424	2.03	39.85

```
                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.63
                  TIME SHIFT OF PEAK FLOW         (min)= 32.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1268

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------

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

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\cbd7bbb2-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\cbd7bbb2-


DATE: 05-26-2023                          TIME: 10:49:31

USER:


COMMENTS: _____________________________________________________


--------------------------------------------------------------------------------------------------------------
  ********************************************
  ** SIMULATION : 5 Year 4 Hour Chicago      **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1183.740
| Ptotal= 46.68 mm |                          B=   7.641
--------------------                          C=   0.838
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 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
               0.17    2.52 |  1.17   11.25 |  2.17    8.02 |  3.17    3.18
               0.33    2.88 |  1.33   28.00 |  2.33    6.36 |  3.33    2.90
               0.50    3.36 |  1.50  106.82 |  2.50    5.28 |  3.50    2.67
               0.67    4.05 |  1.67   34.20 |  2.67    4.52 |  3.67    2.47
               0.83    5.12 |  1.83   16.67 |  2.83    3.96 |  3.83    2.31
               1.00    7.02 |  2.00   10.85 |  3.00    3.52 |  4.00    2.16


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0202)|   Area    (ha)=   0.15   Curve Number   (CN)= 61.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
              0.033    2.52 | 1.033   11.25 | 2.033    8.02 |  3.03    3.18
              0.067    2.52 | 1.067   11.25 | 2.067    8.02 |  3.07    3.18
```

0.100	2.52	1.100	11.25	2.100	8.02	3.10	3.18
0.133	2.52	1.133	11.25	2.133	8.02	3.13	3.18
0.167	2.52	1.167	11.25	2.167	8.02	3.17	3.18
0.200	2.88	1.200	28.00	2.200	6.36	3.20	2.90
0.233	2.88	1.233	28.00	2.233	6.36	3.23	2.90
0.267	2.88	1.267	28.00	2.267	6.36	3.27	2.90
0.300	2.88	1.300	28.00	2.300	6.36	3.30	2.90
0.333	2.88	1.333	28.00	2.333	6.36	3.33	2.90
0.367	3.36	1.367	106.82	2.367	5.28	3.37	2.67
0.400	3.36	1.400	106.82	2.400	5.28	3.40	2.67
0.433	3.36	1.433	106.82	2.433	5.28	3.43	2.67
0.467	3.36	1.467	106.82	2.467	5.28	3.47	2.67
0.500	3.36	1.500	106.82	2.500	5.28	3.50	2.67
0.533	4.05	1.533	34.20	2.533	4.52	3.53	2.47
0.567	4.05	1.567	34.20	2.567	4.52	3.57	2.47
0.600	4.05	1.600	34.20	2.600	4.52	3.60	2.47
0.633	4.05	1.633	34.20	2.633	4.52	3.63	2.47
0.667	4.05	1.667	34.20	2.667	4.52	3.67	2.47
0.700	5.12	1.700	16.67	2.700	3.96	3.70	2.31
0.733	5.12	1.733	16.67	2.733	3.96	3.73	2.31
0.767	5.12	1.767	16.67	2.767	3.96	3.77	2.31
0.800	5.12	1.800	16.67	2.800	3.96	3.80	2.31
0.833	5.12	1.833	16.67	2.833	3.96	3.83	2.31
0.867	7.02	1.867	10.85	2.867	3.52	3.87	2.16
0.900	7.02	1.900	10.85	2.900	3.52	3.90	2.16
0.933	7.02	1.933	10.85	2.933	3.52	3.93	2.16
0.967	7.02	1.967	10.85	2.967	3.52	3.97	2.16
1.000	7.02	2.000	10.85	3.000	3.52	4.00	2.16

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.004 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 8.509
TOTAL RAINFALL (mm)= 46.680
RUNOFF COEFFICIENT = 0.182

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

CALIB			
NASHYD (0203)	Area (ha)=	4.60	Curve Number (CN)= 64.0
ID= 1 DT= 5.0 min	Ia (mm)=	9.11	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.42	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.52	1.083	11.25	2.083	8.02	3.08	3.18
0.167	2.52	1.167	11.25	2.167	8.02	3.17	3.18
0.250	2.88	1.250	28.00	2.250	6.36	3.25	2.90
0.333	2.88	1.333	28.00	2.333	6.36	3.33	2.90
0.417	3.36	1.417	106.82	2.417	5.28	3.42	2.67
0.500	3.36	1.500	106.82	2.500	5.28	3.50	2.67
0.583	4.05	1.583	34.20	2.583	4.52	3.58	2.47
0.667	4.05	1.667	34.20	2.667	4.52	3.67	2.47
0.750	5.12	1.750	16.67	2.750	3.96	3.75	2.31
0.833	5.12	1.833	16.67	2.833	3.96	3.83	2.31
0.917	7.02	1.917	10.85	2.917	3.52	3.92	2.16
1.000	7.02	2.000	10.85	3.000	3.52	4.00	2.16

Unit Hyd Qpeak (cms)= 0.418

PEAK FLOW (cms)= 0.071 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 7.821
TOTAL RAINFALL (mm)= 46.680
RUNOFF COEFFICIENT = 0.168

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

CALIB				
STANDHYD (0201)	Area (ha)=	2.55		
ID= 1 DT= 2.0 min	Total Imp(%)=	56.00	Dir. Conn.(%)=	46.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.43	1.12
Dep. Storage	(mm)=	2.00	5.00

Average Slope	(%)=	1.00	2.00
Length	(m)=	130.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	2.52	1.033	11.25	2.033	8.02	3.03	3.18
0.067	2.52	1.067	11.25	2.067	8.02	3.07	3.18
0.100	2.52	1.100	11.25	2.100	8.02	3.10	3.18
0.133	2.52	1.133	11.25	2.133	8.02	3.13	3.18
0.167	2.52	1.167	11.25	2.167	8.02	3.17	3.18
0.200	2.88	1.200	28.00	2.200	6.36	3.20	2.90
0.233	2.88	1.233	28.00	2.233	6.36	3.23	2.90
0.267	2.88	1.267	28.00	2.267	6.36	3.27	2.90
0.300	2.88	1.300	28.00	2.300	6.36	3.30	2.90
0.333	2.88	1.333	28.00	2.333	6.36	3.33	2.90
0.367	3.36	1.367	106.82	2.367	5.28	3.37	2.67
0.400	3.36	1.400	106.82	2.400	5.28	3.40	2.67
0.433	3.36	1.433	106.82	2.433	5.28	3.43	2.67
0.467	3.36	1.467	106.82	2.467	5.28	3.47	2.67
0.500	3.36	1.500	106.82	2.500	5.28	3.50	2.67
0.533	4.05	1.533	34.20	2.533	4.52	3.53	2.47
0.567	4.05	1.567	34.20	2.567	4.52	3.57	2.47
0.600	4.05	1.600	34.20	2.600	4.52	3.60	2.47
0.633	4.05	1.633	34.20	2.633	4.52	3.63	2.47
0.667	4.05	1.667	34.20	2.667	4.52	3.67	2.47
0.700	5.12	1.700	16.67	2.700	3.96	3.70	2.31
0.733	5.12	1.733	16.67	2.733	3.96	3.73	2.31
0.767	5.12	1.767	16.67	2.767	3.96	3.77	2.31
0.800	5.12	1.800	16.67	2.800	3.96	3.80	2.31
0.833	5.12	1.833	16.67	2.833	3.96	3.83	2.31
0.867	7.02	1.867	10.85	2.867	3.52	3.87	2.16
0.900	7.02	1.900	10.85	2.900	3.52	3.90	2.16
0.933	7.02	1.933	10.85	2.933	3.52	3.93	2.16
0.967	7.02	1.967	10.85	2.967	3.52	3.97	2.16
1.000	7.02	2.000	10.85	3.000	3.52	4.00	2.16

Max.Eff.Inten.(mm/hr)=	106.82	********		
over (min)	5.00	10.00		
Storage Coeff. (min)=	2.92 (ii)	9.67 (ii)		
Unit Hyd. Tpeak (min)=	4.00	10.00		
Unit Hyd. peak (cms)=	0.34	0.12		
			TOTALS	
PEAK FLOW (cms)=	0.33	0.05	0.366 (iii)	
TIME TO PEAK (hrs)=	1.50	1.63	1.50	
RUNOFF VOLUME (mm)=	44.68	10.38	26.15	
TOTAL RAINFALL (mm)=	46.68	46.68	46.68	
RUNOFF COEFFICIENT =	0.96	0.22	0.56	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):		2.55	0.366	1.50	26.15
+ ID2= 2 (0202):		0.15	0.004	1.70	8.51
ID = 3 (0003):		2.70	0.368	1.50	25.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0003):		2.70	0.368	1.50	25.17
+ ID2= 2 (0203):		4.60	0.071	2.00	7.82
ID = 1 (0003):		7.30	0.379	1.50	14.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0004)|     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   |   0.0641      0.0501
                          0.0090     0.0029   |   0.0675      0.0577
                          0.0230     0.0062   |   0.0708      0.0658
                          0.0310     0.0100   |   0.0739      0.0744
                          0.0380     0.0143   |   0.0798      0.0930
                          0.0430     0.0191   |   0.0825      0.1035
                          0.0480     0.0243   |   0.0852      0.1151
                          0.0525     0.0300   |   0.4371      0.1272
                          0.0567     0.0362   |   1.1416      0.1399
                          0.0605     0.0429   |   2.1405      0.1531

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      7.300      0.379      1.50      14.24
   OUTFLOW: ID= 1 (  0004)      7.300      0.066      2.63      14.23

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.31
                  TIME SHIFT OF PEAK FLOW         (min)= 68.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0535

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2006)
       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\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\5e80ca63-
  Summary filename: C:\Users\BPavlovic\AppData\Local\Civica\VH5\d5e931ed-6bca-4946-96f7-b0c0a135303a\5e80ca63-


DATE: 05-26-2023                          TIME: 10:49:31

USER:


COMMENTS: _____________________________________________________________


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  ************************************************
  ** SIMULATION : 50 Year 4 Hour Chicago        **
  ************************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2270.665
| Ptotal= 72.03 mm |                          B=   9.984
--------------------                          C=   0.876
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 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
                  0.17    3.35 |  1.17   17.72 |  2.17   12.20 |  3.17    4.34
                  0.33    3.88 |  1.33   46.29 |  2.33    9.44 |  3.33    3.91
                  0.50    4.61 |  1.50  164.72 |  2.50    7.66 |  3.50    3.57
                  0.67    5.68 |  1.67   56.78 |  2.67    6.44 |  3.67    3.27
                  0.83    7.40 |  1.83   27.07 |  2.83    5.54 |  3.83    3.03
```

1.00	10.53	2.00	17.03	3.00	4.87	4.00	2.82

CALIB			
NASHYD (0202)	Area (ha)=	0.15	Curve Number (CN)= 61.0
ID= 1 DT= 2.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	3.35	1.033	17.72	2.033	12.20	3.03	4.34
0.067	3.35	1.067	17.72	2.067	12.20	3.07	4.34
0.100	3.35	1.100	17.72	2.100	12.20	3.10	4.34
0.133	3.35	1.133	17.72	2.133	12.20	3.13	4.34
0.167	3.35	1.167	17.72	2.167	12.20	3.17	4.34
0.200	3.88	1.200	46.29	2.200	9.44	3.20	3.91
0.233	3.88	1.233	46.29	2.233	9.44	3.23	3.91
0.267	3.88	1.267	46.29	2.267	9.44	3.27	3.91
0.300	3.88	1.300	46.29	2.300	9.44	3.30	3.91
0.333	3.88	1.333	46.29	2.333	9.44	3.33	3.91
0.367	4.61	1.367	164.72	2.367	7.66	3.37	3.57
0.400	4.61	1.400	164.72	2.400	7.66	3.40	3.57
0.433	4.61	1.433	164.72	2.433	7.66	3.43	3.57
0.467	4.61	1.467	164.72	2.467	7.66	3.47	3.57
0.500	4.61	1.500	164.72	2.500	7.66	3.50	3.57
0.533	5.68	1.533	56.78	2.533	6.44	3.53	3.27
0.567	5.68	1.567	56.78	2.567	6.44	3.57	3.27
0.600	5.68	1.600	56.78	2.600	6.44	3.60	3.27
0.633	5.68	1.633	56.78	2.633	6.44	3.63	3.27
0.667	5.68	1.667	56.78	2.667	6.44	3.67	3.27
0.700	7.40	1.700	27.07	2.700	5.54	3.70	3.03
0.733	7.40	1.733	27.07	2.733	5.54	3.73	3.03
0.767	7.40	1.767	27.07	2.767	5.54	3.77	3.03
0.800	7.40	1.800	27.07	2.800	5.54	3.80	3.03
0.833	7.40	1.833	27.07	2.833	5.54	3.83	3.03
0.867	10.53	1.867	17.03	2.867	4.87	3.87	2.82
0.900	10.53	1.900	17.03	2.900	4.87	3.90	2.82
0.933	10.53	1.933	17.03	2.933	4.87	3.93	2.82
0.967	10.53	1.967	17.03	2.967	4.87	3.97	2.82
1.000	10.53	2.000	17.03	3.000	4.87	4.00	2.82

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.010 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 19.578
TOTAL RAINFALL (mm)= 72.026
RUNOFF COEFFICIENT = 0.272

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

CALIB			
NASHYD (0203)	Area (ha)=	4.60	Curve Number (CN)= 64.0
ID= 1 DT= 5.0 min	Ia (mm)=	9.11	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.42	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.35	1.083	17.72	2.083	12.20	3.08	4.34
0.167	3.35	1.167	17.72	2.167	12.20	3.17	4.34
0.250	3.88	1.250	46.29	2.250	9.44	3.25	3.91
0.333	3.88	1.333	46.29	2.333	9.44	3.33	3.91
0.417	4.61	1.417	164.72	2.417	7.66	3.42	3.57
0.500	4.61	1.500	164.72	2.500	7.66	3.50	3.57
0.583	5.68	1.583	56.78	2.583	6.44	3.58	3.27
0.667	5.68	1.667	56.78	2.667	6.44	3.67	3.27
0.750	7.40	1.750	27.07	2.750	5.54	3.75	3.03
0.833	7.40	1.833	27.07	2.833	5.54	3.83	3.03
0.917	10.53	1.917	17.03	2.917	4.87	3.92	2.82
1.000	10.53	2.000	17.03	3.000	4.87	4.00	2.82

Unit Hyd Qpeak (cms)= 0.418

```
     PEAK FLOW       (cms)=   0.189 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  19.233
     TOTAL RAINFALL   (mm)=  72.026
     RUNOFF COEFFICIENT   =   0.267

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   2.55
|ID= 1 DT= 2.0 min |   Total Imp(%)=  56.00   Dir. Conn.(%)=  46.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.43         1.12
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     130.38        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
              0.033     3.35 | 1.033    17.72 | 2.033    12.20 |  3.03     4.34
              0.067     3.35 | 1.067    17.72 | 2.067    12.20 |  3.07     4.34
              0.100     3.35 | 1.100    17.72 | 2.100    12.20 |  3.10     4.34
              0.133     3.35 | 1.133    17.72 | 2.133    12.20 |  3.13     4.34
              0.167     3.35 | 1.167    17.72 | 2.167    12.20 |  3.17     4.34
              0.200     3.88 | 1.200    46.29 | 2.200     9.44 |  3.20     3.91
              0.233     3.88 | 1.233    46.29 | 2.233     9.44 |  3.23     3.91
              0.267     3.88 | 1.267    46.29 | 2.267     9.44 |  3.27     3.91
              0.300     3.88 | 1.300    46.29 | 2.300     9.44 |  3.30     3.91
              0.333     3.88 | 1.333    46.29 | 2.333     9.44 |  3.33     3.91
              0.367     4.61 | 1.367   164.72 | 2.367     7.66 |  3.37     3.57
              0.400     4.61 | 1.400   164.72 | 2.400     7.66 |  3.40     3.57
              0.433     4.61 | 1.433   164.72 | 2.433     7.66 |  3.43     3.57
              0.467     4.61 | 1.467   164.72 | 2.467     7.66 |  3.47     3.57
              0.500     4.61 | 1.500   164.72 | 2.500     7.66 |  3.50     3.57
              0.533     5.68 | 1.533    56.78 | 2.533     6.44 |  3.53     3.27
              0.567     5.68 | 1.567    56.78 | 2.567     6.44 |  3.57     3.27
              0.600     5.68 | 1.600    56.78 | 2.600     6.44 |  3.60     3.27
              0.633     5.68 | 1.633    56.78 | 2.633     6.44 |  3.63     3.27
              0.667     5.68 | 1.667    56.78 | 2.667     6.44 |  3.67     3.27
              0.700     7.40 | 1.700    27.07 | 2.700     5.54 |  3.70     3.03
              0.733     7.40 | 1.733    27.07 | 2.733     5.54 |  3.73     3.03
              0.767     7.40 | 1.767    27.07 | 2.767     5.54 |  3.77     3.03
              0.800     7.40 | 1.800    27.07 | 2.800     5.54 |  3.80     3.03
              0.833     7.40 | 1.833    27.07 | 2.833     5.54 |  3.83     3.03
              0.867    10.53 | 1.867    17.03 | 2.867     4.87 |  3.87     2.82
              0.900    10.53 | 1.900    17.03 | 2.900     4.87 |  3.90     2.82
              0.933    10.53 | 1.933    17.03 | 2.933     4.87 |  3.93     2.82
              0.967    10.53 | 1.967    17.03 | 2.967     4.87 |  3.97     2.82
              1.000    10.53 | 2.000    17.03 | 3.000     4.87 |  4.00     2.82

     Max.Eff.Inten.(mm/hr)=     164.72      ********
               over (min)          5.00        10.00
     Storage Coeff.  (min)=       2.45 (ii)    8.13 (ii)
     Unit Hyd. Tpeak (min)=       4.00        10.00
     Unit Hyd. peak  (cms)=       0.37         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.53         0.13          0.611 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.63           1.50
     RUNOFF VOLUME    (mm)=      70.03        23.06          44.66
     TOTAL RAINFALL   (mm)=      72.03        72.03          72.03
     RUNOFF COEFFICIENT   =       0.97         0.32           0.62


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  61.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 1 (  0201):     2.55   0.611     1.50    44.66
      + ID2= 2 (  0202):     0.15   0.010     1.70    19.58
        ================================================
        ID = 3 (  0003):     2.70   0.615     1.50    43.27

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


--------------------
| ADD HYD  (  0003)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0003):     2.70   0.615     1.50    43.27
      + ID2= 2 (  0203):     4.60   0.189     2.00    19.23
        ================================================
        ID = 1 (  0003):     7.30   0.654     1.50    28.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0004)|     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   |   0.0641      0.0501
                          0.0090     0.0029   |   0.0675      0.0577
                          0.0230     0.0062   |   0.0708      0.0658
                          0.0310     0.0100   |   0.0739      0.0744
                          0.0380     0.0143   |   0.0798      0.0930
                          0.0430     0.0191   |   0.0825      0.1035
                          0.0480     0.0243   |   0.0852      0.1151
                          0.0525     0.0300   |   0.4371      0.1272
                          0.0567     0.0362   |   1.1416      0.1399
                          0.0605     0.0429   |   2.1405      0.1531

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      7.300      0.654      1.50      28.12
   OUTFLOW: ID= 1 (  0004)      7.300      0.171      2.47      28.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.13
                  TIME SHIFT OF PEAK FLOW         (min)= 58.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1181

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------
```

Appendix F

Conceptual Stormceptor (OGS) Information

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

05/26/2023

Province:	Ontario
City:	Dorchester
Nearest Rainfall Station:	LONDON CS
Climate Station Id:	6144478
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	2.55
% Imperviousness:	56.00

Runoff Coefficient 'c': 0.63

Particle Size Distribution:	Fine
Target TSS Removal (%):	70.0

Project Name:	Eva & Ida
Project Number:	49142
Designer Name:	Bogdan Pavlovic
Designer Company:	MTE Consultants
Designer Email:	bpavlovic@mte85.com
Designer Phone:	519-701-2693
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	59.22
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	61
EFO6	75
EFO8	84
EFO10	89
EFO12	92

Recommended Stormceptor EFO Model: EFO6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 75

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

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Stormceptor® EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	9.0	9.0	2.25	135.0	51.0	100	9.0	9.0
1	18.9	27.8	4.51	271.0	103.0	96	18.1	27.0
2	15.3	43.2	9.02	541.0	206.0	83	12.8	39.8
3	10.8	53.9	13.53	812.0	309.0	78	8.5	48.3
4	7.8	61.7	18.03	1082.0	411.0	73	5.7	54.0
5	5.8	67.5	22.54	1353.0	514.0	69	4.0	58.0
6	4.5	72.0	27.05	1623.0	617.0	65	2.9	60.8
7	3.6	75.6	31.56	1894.0	720.0	64	2.3	63.1
8	3.5	79.1	36.07	2164.0	823.0	63	2.2	65.3
9	3.3	82.4	40.58	2435.0	926.0	62	2.0	67.4
10	2.6	85.0	45.09	2705.0	1029.0	61	1.6	69.0
11	1.7	86.7	49.59	2976.0	1131.0	59	1.0	70.0
12	1.7	88.4	54.10	3246.0	1234.0	56	0.9	70.9
13	1.5	89.8	58.61	3517.0	1337.0	54	0.8	71.7
14	1.2	91.0	63.12	3787.0	1440.0	51	0.6	72.3
15	1.3	92.3	67.63	4058.0	1543.0	48	0.6	72.9
16	0.8	93.0	72.14	4328.0	1646.0	45	0.3	73.2
17	0.8	93.8	76.65	4599.0	1749.0	42	0.3	73.6
18	1.2	95.0	81.15	4869.0	1851.0	40	0.5	74.0
19	0.7	95.7	85.66	5140.0	1954.0	38	0.3	74.3
20	0.9	96.6	90.17	5410.0	2057.0	36	0.3	74.6
21	0.2	96.8	94.68	5681.0	2160.0	34	0.1	74.7
22	0.0	96.8	99.19	5951.0	2263.0	32	0.0	74.7
23	0.4	97.2	103.70	6222.0	2366.0	31	0.1	74.8
24	0.4	97.7	108.21	6492.0	2469.0	30	0.1	75.0
25	0.0	97.7	112.72	6763.0	2571.0	28	0.0	75.0
30	1.3	99.0	135.26	8115.0	3086.0	24	0.3	75.3
35	0.6	99.6	157.80	9468.0	3600.0	20	0.1	75.4
40	0.4	100.0	180.34	10821.0	4114.0	18	0.1	75.5
45	0.0	100.0	202.89	12173.0	4629.0	16	0.0	75.5
Estimated Net Annual Sediment (TSS) Load Reduction =								**75 %**

Climate Station ID: 6144478 *Years of Rainfall Data*: 20

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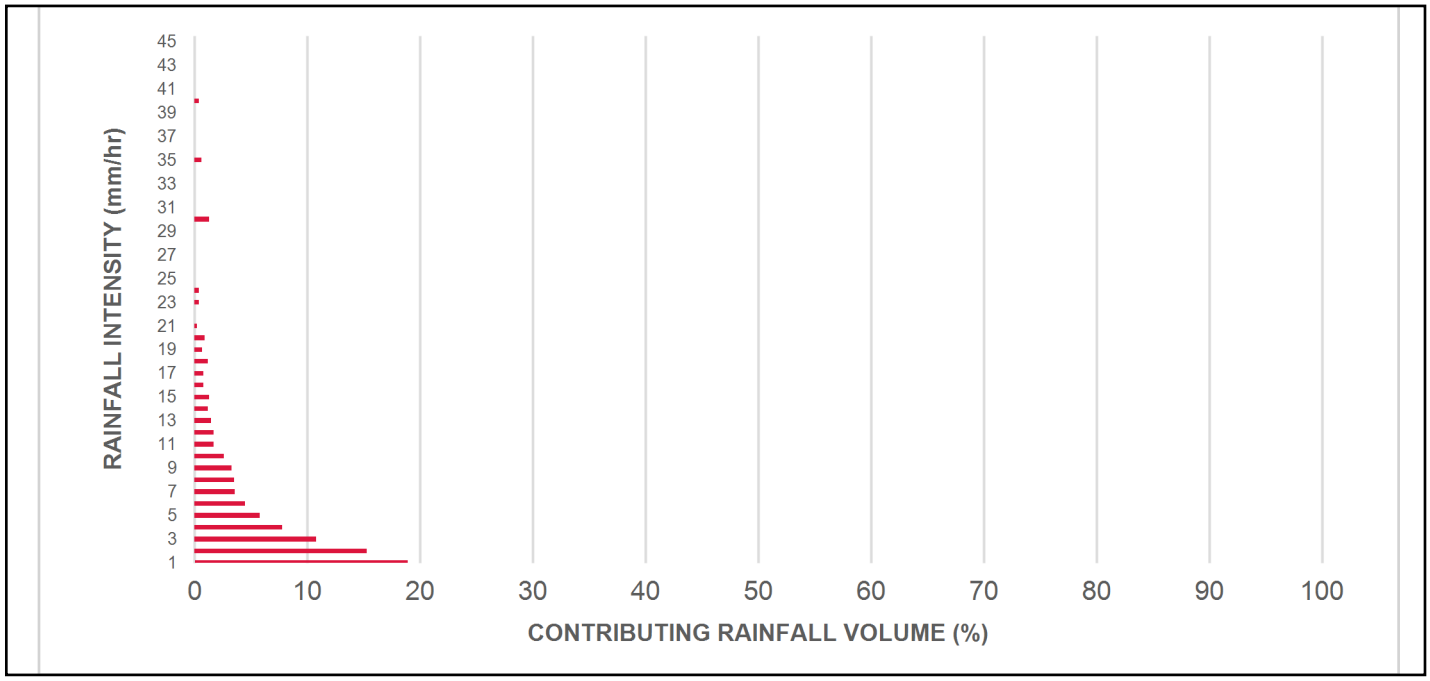
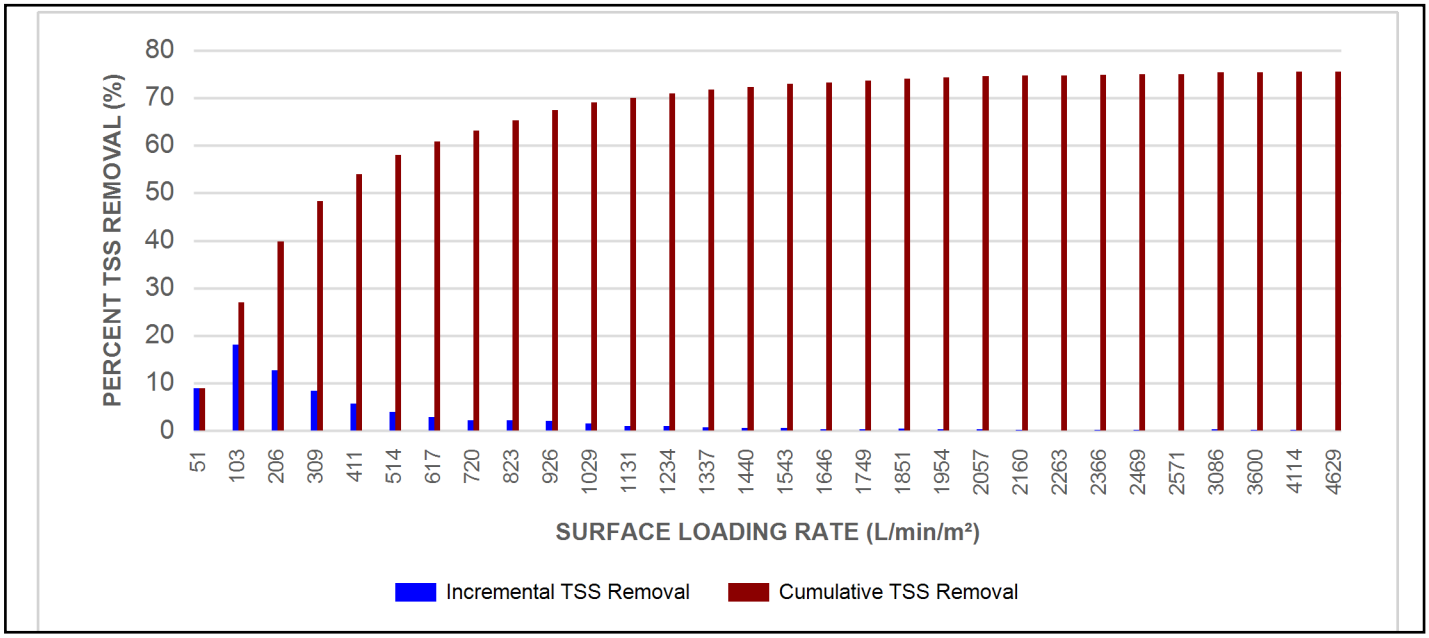
RAINFALL DATA FROM LONDON CS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

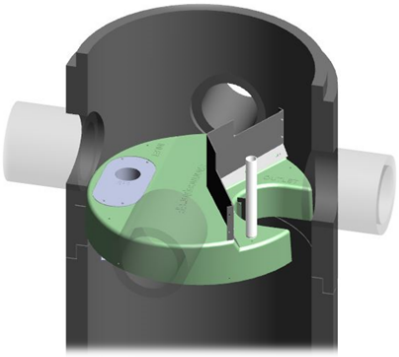
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

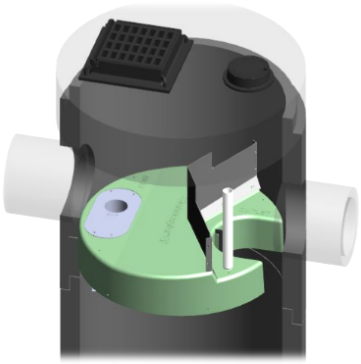
DESIGN FLEXIBILITY

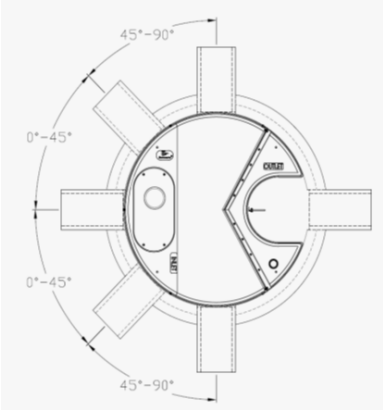
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Appendix G

Relevant WWMP Information, Demand Calculation, Hydrant Test Results, WaterCAD Model and Results

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Dorchester Elevated Tank

Dorchester Water Treatment Plant

W-D-WM-16
W-D-WM-06
W-D-WM-05
W-D-WM-15
W-D-WM-14
W-D-WM-03
W-D-WM-04
W-D-WM-12
W-D-WM-13
W-D-WM-02
W-D-WM-18
W-D-WM-11
W-D-WM-10-Alt2
W-D-WM-10-Alt1
W-D-WM-09-Alt2
W-D-WM-09-Alt1
W-D-WM-08-Alt2
W-D-WM-01
W-D-WM-08-Alt1
W-D-WM-07
W-D-WM-17

SCHAVER RD
HAMILTON RD
BRIDGE ST
MANER ST
CATHERINE ST
ELGIN RD
DORCHESTER RD

0 1 Kilometers

Proposed Water Network

- Capital Program - Benefit to Existing System
- Capital Program - New Watermain
- Capital Program - Upgrade Watermain
- Future Local Watermain

Existing Water Network

- Elevated Tank
- Water Treatment Plant
- Existing Watermain (≤ 150 mm)
- Existing Watermain (200 - 300 mm)

General Features

- Highway
- Arterial Road
- Growth Areas
- Settlement Boundary
- Property Parcel
- Waterbody

Figure ES-2

Preferred Dorchester Water Servicing Strategy

BluePlan Engineering

September 2019
418109-G-007
NAD 1983 UTM Zone 17N

DATE: May 11, 2023
JOB NO.: 49142-104

Client: D. Charabin Holdings Inc.
Project: Eva & Ida Streets Subdivision
Location: Dorchester, ON.

Water Demand Calculations

		Low Density Residential			Medium Density Residential (Multi-Unit)			Demand Summary			
Demand Node	Elevation	Units	Pop	Avg. Day Demand (l/s)	Units	Pop	Avg. Day Demand (l/s)	Avg. Day (l/s)	Max Day (l/s)	Max Hour (l/s)	Min Hour (l/s)
J-25	264	10	30	0.12				0.12	0.33	0.50	0 05
J-26	262	22	66	0.27				0.27	0.74	1.10	0.11
J-36	264				12	29	0.12	0.12	0.32	0.49	0 05
J-37	265				10	24	0.10	0.10	0.27	0.40	0 04
J-38	261				17	41	0.17	0.17	0.46	0.69	0 07
J-39	260.5				4	9	0.04	0.04	0.11	0.17	0.02
J-40	262				14	34	0.14	0.14	0.38	0.57	0 06
J-42	262				15	36	0.15	0.15	0.40	0.60	0 06
J-43	262				18	43	0.18	0.18	0.49	0.74	0 07
Total		32	96	0.39	90	216	0 88	1.27	3.50	5.25	0 51

Highlighted fields note the proposed junctiones for Eva & Ida Street Subdivision

Municipality of Thames Centre Engineering Design Standards

Average Domestic Flow =	350	l/cap/day or	**0.0041** l/cap/s
Max Day Factor =	2.75		
Peak Hour Factor =	4.13		
Minimum Hour Factor =	0.4		
Low Density =	3	ppu	
Medium Density =	2.4	ppu	
High Density =	1.6	ppu	

Hydrant Test Information from the Municipality

Fire Hydrant ID	NFPA 13 Colour Coding	Flow @20 psi (l/s)	Static Pressure (psi)	Static Pressure (m H_20)
D415	BLUE	190	58.9	302.00
D416	BLUE	142	57.1	302.00

Flowmetrix
Technical Services Inc.

Western Office
2088 Jetstream Road
London, Ontario
N5V 3P6

Eastern Office
1602 Old Wooler Road
Wooler, Ontario
K0K 3M0

Fire Flow Testing Report and Colour Code

Hydrant # **D415**

NFPA Colour Code **BLUE**

TEST HYDRANT INFO.

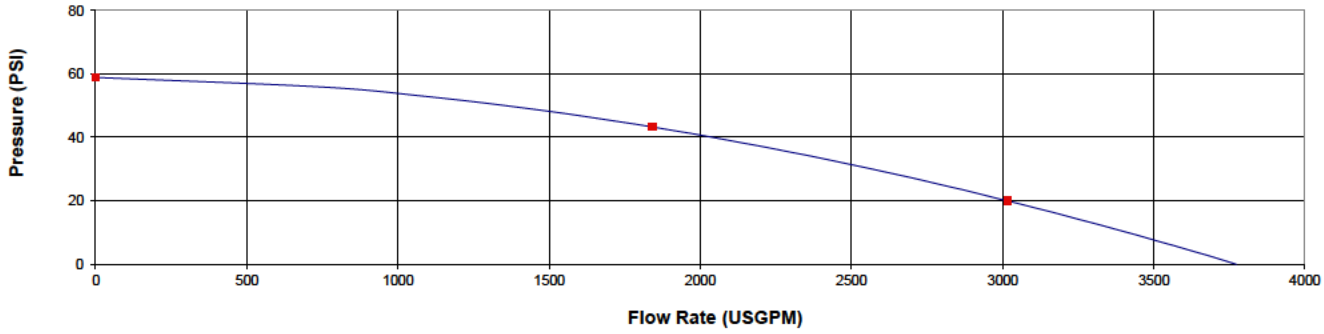
HYDRANT #	D415		
N.F.P.A. COLOUR CODE	BLUE		
STATIC PRESSURE	58.9	psi	
RESIDUAL PRESSURE	43.3	psi	
PRESSURE DROP	15.6	psi	
% PRESSURE DROP	26.5	% psi	
NFPA 291 CONFORMANCE	MEETS NFPA 291 CONFORMANCE FOR REQUIRED PRESSURE DROP		
PRACTICAL DROP (10%)	MEETS PRACTICAL PRESSURE DROP OF 10%		
Flow At Test Hydrant at -	20 psi	3017 USGPM	

CLIENT	Thames Centre Dorchester Ontario
CUSTOMER NAME	Jarrod Craven Area Superintendent 519-494 4845
LOCATION	Dorchester Distribution System 171 Eva at Clara
DATE	25-Aug-15
TIME	8:30am

FLOW HYDRANT(S) INFO.

	HYDRANT #	# PORTS FLOWED	OUTLET DIAMETER (INCHES)	FLOW METER OR DIFFUSER	NOZZLE COEFFICIENT (~0.9)	PITOT READING (psi)	DISCHARGE FLOW (USGPM)
1	D417	2	2.5	SWIVEL BELL	0.90	15.6	1103
2	D419	1	2.5	SWIVEL BELL	0.90	28.0	739
3							
4							
					Total Flow (USGPM)		1842

Pressure - Flow Graph
at Test Hydrant



COMMENTS

OPERATOR	FM	Randy Nichol
OPERATOR	FM	
OPERATOR	SC	Ron,Kevin ,Jeff
PRESSURE ZONE		1
TOWER LEVEL	ft	n/a
PUMPS (ON/OFF)		n/a

Flowmetrix
Technical Services Inc.

Western Office
2088 Jetstream Road
London, Ontario
N5V 3P6

Eastern Office
1602 Old Wooler Road
Wooler, Ontario
K0K 3M0

Fire Flow Testing Report and Colour Code

Hydrant # **D416**

NFPA Colour Code **BLUE**

TEST HYDRANT INFO.

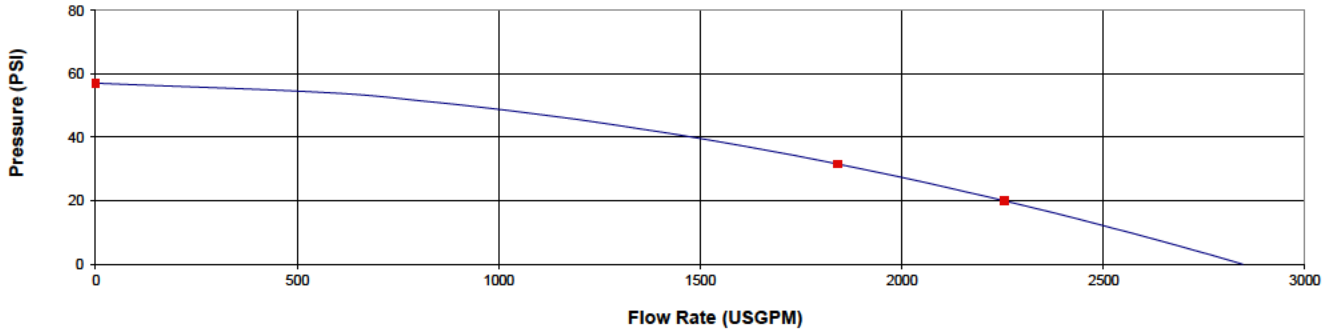
HYDRANT #	D416		
N.F.P.A. COLOUR CODE	BLUE		
STATIC PRESSURE	57.1	psi	
RESIDUAL PRESSURE	31.6	psi	
PRESSURE DROP	25.5	psi	
% PRESSURE DROP	44.7	% psi	
NFPA 291 CONFORMANCE	MEETS NFPA 291 CONFORMANCE FOR REQUIRED PRESSURE DROP		
PRACTICAL DROP (10%)	MEETS PRACTICAL PRESSURE DROP OF 10%		
Flow At Test Hydrant at -	20 psi	2255 USGPM	

CLIENT	Thames Centre Dorchester Ontario
CUSTOMER NAME	Jarrod Craven Area Superintendent 519-494 4845
LOCATION	Dorchester Distribution System 155 Eva St
DATE	25-Aug-15
TIME	8:30am

FLOW HYDRANT(S) INFO.

	HYDRANT #	# PORTS FLOWED	OUTLET DIAMETER (INCHES)	FLOW METER OR DIFFUSER	NOZZLE COEFFICIENT (~0.9)	PITOT READING (psi)	DISCHARGE FLOW (USGPM)
1	D417	2	2.5	SWIVEL BELL	0.90	15.6	1103
2	D419	1	2.5	SWIVEL BELL	0.90	28.0	739
3							
4							
					Total Flow (USGPM)		1842

Pressure - Flow Graph
at Test Hydrant



COMMENTS

OPERATOR	FM	Randy Nichol
OPERATOR	FM	
OPERATOR	SC	Ron,Kevin ,Jeff
PRESSURE ZONE		1
TOWER LEVEL	ft	n/a
PUMPS (ON/OFF)		n/a

Scenario: MDD+FF

Scenario: MDD+FF
Current Time Step: 0.000 h
Fire Flow Node FlexTable: Fire Flow Report

Label	Satisfies Fire Flow Constraints?	Flow (Total Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated Zone Lower Limit) (kPa)	Demand (L/s)	Velocity of Maximum Pipe (m/s)	Pipe w/ Maximum Velocity
J-25	True	90.33	130.94	131.27	140	391	0.33	7.43	P-47
J-26	False	90.74	68.92	69.66	140	330	0.74	3.94	P-48
J-33	True	90.00	141.89	141.89	145	140	0.00	8.07	P-48

Q:\49142\104\WaterCAD\49142-104 Eva & Ida Street Water Supply Model.wtg

Scenario: MDD+FF

Average Day Demand Scenario

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-25	264.00	0.12	302.00	372	(N/A)
J-26	262.00	0.27	302.00	391	(N/A)
J-36	264.00	0.12	302.00	372	(N/A)
J-37	265.00	0.10	302.00	362	(N/A)
J-38	261.00	0.17	302.00	401	(N/A)
J-39	260.50	0.04	302.00	406	(N/A)
J-40	262.00	0.14	302.00	391	(N/A)
J-42	262.00	0.15	302.00	391	(N/A)
J-43	262.00	0.18	302.00	391	(N/A)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-36	41	J-25	J-36	200.0	110.0	0.71	0.02	(N/A)
P-37	100	J-36	J-37	200.0	110.0	0.24	0.01	(N/A)
P-39	74	J-38	J-39	200.0	110.0	-0.15	0.00	(N/A)
P-40	73	J-39	J-26	200.0	110.0	-0.19	0.01	(N/A)
P-41	97	J-38	J-40	200.0	110.0	0.01	0.00	(N/A)
P-38(1)	51	J-37	J-42	200.0	110.0	0.14	0.00	(N/A)
P-38(2)	57	J-42	J-38	200.0	110.0	0.03	0.00	(N/A)
P-42(1)	55	J-40	J-43	200.0	110.0	-0.13	0.00	(N/A)
P-42(2)	53	J-43	J-36	200.0	110.0	-0.35	0.01	(N/A)
P-45	98	J-42	J-43	150.0	100.0	-0.04	0.00	(N/A)

Peak Hour Demand Scenario

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-25	264.00	0.50	301.97	372	(N/A)
J-26	262.00	1.12	301.97	391	(N/A)
J-36	264.00	0.50	301.97	372	(N/A)
J-37	265.00	0.41	301.97	362	(N/A)
J-38	261.00	0.70	301.97	401	(N/A)
J-39	260.50	0.17	301.97	406	(N/A)
J-40	262.00	0.58	301.97	391	(N/A)
J-42	262.00	0.62	301.97	391	(N/A)
J-43	262.00	0.74	301.97	391	(N/A)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-36	41	J-25	J-36	200.0	110.0	2.94	0.09	(N/A)
P-37	100	J-36	J-37	200.0	110.0	1.01	0.03	(N/A)
P-39	74	J-38	J-39	200.0	110.0	-0.61	0.02	(N/A)
P-40	73	J-39	J-26	200.0	110.0	-0.77	0.02	(N/A)
P-41	97	J-38	J-40	200.0	110.0	0.04	0.00	(N/A)
P-38(1)	51	J-37	J-42	200.0	110.0	0.59	0.02	(N/A)
P-38(2)	57	J-42	J-38	200.0	110.0	0.13	0.00	(N/A)
P-42(1)	55	J-40	J-43	200.0	110.0	-0.54	0.02	(N/A)
P-42(2)	53	J-43	J-36	200.0	110.0	-1.44	0.05	(N/A)
P-45	98	J-42	J-43	150.0	100.0	-0.16	0.01	(N/A)

Max Day Demand + Fire Flow Scenario

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-25	264.00	0.33	301.99	372	(N/A)
J-26	262.00	0.74	301.98	391	(N/A)
J-36	264.00	0.33	301.99	372	(N/A)
J-37	265.00	0.28	301.98	362	(N/A)
J-38	261.00	0.47	301.98	401	(N/A)
J-39	260.50	0.11	301.98	406	(N/A)
J-40	262.00	0.38	301.98	391	(N/A)
J-42	262.00	0.41	301.98	391	(N/A)
J-43	262.00	0.50	301.98	391	(N/A)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-36	41	J-25	J-36	200.0	110.0	1.96	0.06	(N/A)
P-37	100	J-36	J-37	200.0	110.0	0.67	0.02	(N/A)
P-39	74	J-38	J-39	200.0	110.0	-0.41	0.01	(N/A)
P-40	73	J-39	J-26	200.0	110.0	-0.52	0.02	(N/A)
P-41	97	J-38	J-40	200.0	110.0	0.03	0.00	(N/A)
P-38(1)	51	J-37	J-42	200.0	110.0	0.40	0.01	(N/A)
P-38(2)	57	J-42	J-38	200.0	110.0	0.09	0.00	(N/A)
P-42(1)	55	J-40	J-43	200.0	110.0	-0.36	0.01	(N/A)
P-42(2)	53	J-43	J-36	200.0	110.0	-0.96	0.03	(N/A)
P-45	98	J-42	J-43	150.0	100.0	-0.11	0.01	(N/A)

Water Age Analysis

Junction Table - Time: 336.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-25	264.00	0.12	302.00	372	0.276
J-26	262.00	0.27	302.00	391	1.762
J-36	264.00	0.12	302.00	372	0.779
J-37	265.00	0.10	302.00	362	4.353
J-38	261.00	0.17	302.00	401	12.207
J-39	260.50	0.04	302.00	406	5.167
J-40	262.00	0.14	302.00	391	12.315
J-42	262.00	0.15	302.00	391	8.943
J-43	262.00	0.18	302.00	391	2.113

Pipe Table - Time: 336.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-36	41	J-25	J-36	200.0	110.0	0.71	0.02	0.478
P-37	100	J-36	J-37	200.0	110.0	0.24	0.01	2.517
P-39	74	J-38	J-39	200.0	110.0	-0.15	0.00	7.308
P-40	73	J-39	J-26	200.0	110.0	-0.19	0.01	3.415
P-41	97	J-38	J-40	200.0	110.0	0.01	0.00	55.013
P-38(1)	51	J-37	J-42	200.0	110.0	0.14	0.00	5.851
P-38(2)	57	J-42	J-38	200.0	110.0	0.03	0.00	16.574
P-42(1)	55	J-40	J-43	200.0	110.0	-0.13	0.00	3.909
P-42(2)	53	J-43	J-36	200.0	110.0	-0.35	0.01	1.397
P-45	98	J-42	J-43	150.0	100.0	-0.04	0.00	8.259

Scenario: MDD+FF
Current Time Step: 0.000 h
Fire Flow Node FlexTable: Fire Flow Report

Label	Satisfies Fire Flow Constraints?	Flow (Total Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated Zone Lower Limit) (kPa)	Demand (L/s)	Velocity of Maximum Pipe (m/s)	Pipe w/ Maximum Velocity
J-25	True	90.33	185.89	186.22	140	143	0.33	1.83	P-40
J-26	True	90.74	128.17	128.91	224	256	0.74	2.40	P-36
J-33	True	90.00	203.73	203.73	140	273	0.00	2.00	P-36
J-36	True	90.33	109.71	110.04	273	265	0.33	2.40	P-36
J-37	True	90.27	111.13	111.40	243	273	0.28	2.40	P-36
J-38	True	90.47	114.35	114.82	284	256	0.47	2.40	P-36
J-39	True	90.11	121.14	121.25	264	256	0.11	2.40	P-36
J-40	True	90.38	112.07	112.45	269	259	0.38	2.40	P-36
J-42	True	90.41	112.14	112.55	275	251	0.41	2.40	P-36
J-43	True	90.49	111.10	111.59	279	262	0.50	2.40	P-36

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