North Street Residential Development

Preliminary Functional Servicing Report

Project Location:
246 North Street, Dorchester, ON

Prepared for:
246 North Inc.
627 Maitland Street (Unit 3)
London, ON N5Y 2V7

Prepared by:
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June 26, 2023

MTE File No.: 47030-300

Engineers, Scientists, Surveyors.

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1.0 Introduction

MTE Consultants Inc. (MTE) has been retained by 246 North Inc. to provide this preliminary Functional Servicing Report. This report has been prepared in support of the Draft Plan and re-zoning application for the proposed residential development located at 246 North Street, in the Municipality of Thames Centre, County of Middlesex.

As presented on the Layout Plan (Zelinka Priamo, July 2022) provided in **Appendix A**, the proposed development consists of a Subdivision Area - Single Family Residential Lots (Lots 1-7), Condominium Area – Units 1-25 (Block 8), and SWM Block Area (Block 10).

The development has the following legal description: Concession 4, Part of Lot 11; Registered Plan 33R10461 Parts 2,3 &4. The subject land is bordered by the residential lots to the north and south, Village Gate residential subdivision to the east and North Street to the west.

The land is currently vacant and has been used for agricultural purposes. In addition, a small, wooded area is present at the southeast corner of the property. **Figure 1** shows the site location.

2.0 Sanitary Servicing

There is no existing sanitary sewer on North Street or the vicinity of the development. As part of the Dorchester Preferred Wastewater Servicing Strategy (2019) the following capital projects are proposed:

- Proposed Capital Program WW-D-SS-15 outlines the proposal for 200mmØ sanitary sewer on North St.
- WW-D-SS-14 outlines the proposal for 200mmØ sanitary sewer on North St, Minnie St, and Clara St.
- 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 that will pump the sanitary flows from the North Dorchester Area south to the main Dorchester wastewater treatment plant.

Sanitary flows from the subject development will be conveyed to the future sanitary pumping station on Eva Street through the above noted 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 subdivision population of 81 people is estimated based on the subdivision draft plan. The detailed sanitary peak flow calculation is shown on the sanitary sewer design sheet, provided in **Appendix B.**

The sanitary peak flow was calculated by multiplying the total population of 81 people by the average usage of 0.00422 litres per second per capita and the Harmon peaking factor “M”. The total sanitary flow to the receiving future North St 200mmØ sanitary sewer was calculated by increasing the calculated sanitary flow by 10% (factor of safety) and adding the infiltration allowance of 0.11 litres per second per hectare. The sanitary flow from single family development portion will be conveyed to North Street via a future 200mmØ sanitary sewer, to

be constructed within the subdivision. The sanitary flows from the medium density portion will be conveyed to North Street sanitary sewer via a future (private) 200mmØ sanitary sewer.

Review of the Thames Centre Water and Wastewater Master Plan Update, by GM Blue Plan Engineering, dated September 2019 indicates that the subject site is the part of the wastewater (and water) Development Area 12 (refer to Figure 1-9 of the GM Blue Plan Report). 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 38 ppl/ha (81 people / 2.13 ha) which is less the density allowed in the overall master plan (50 ppl/ha).

FIGURE 1

Date: FEB. 17/23
Scale: N.T.S

LOCATION PLAN

246 NORTH STREET,
DORCHESTER, MIDDELSEX COUNTY

MTE

Engineers, Scientists, Surveyors

Project No.: 47030-300

3.0 Storm Servicing and Stormwater Management

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 as well as located in within 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' and 'Significant Groundwater Recharge Area'.

3.1 Existing Conditions

A brief description of the existing drainage conditions is outlined below. The pre-development drainage conditions are presented in **Figure 3**.

3.1.1 Existing Drainage

The subject land is currently bordered by the residential lots to the north and south; Village Gate residential subdivision to the east; and North Street to the west.

The majority of the site (Catchment 101, 1.56 Ha) slopes to the east to the existing catchbasin manhole (CBMH-3), located within the existing Village Gate Subdivision, within an existing easement between Lot 46 and Lot 47.

Pre-Development Catchment 102 (0.23 Ha) slopes to the west to the existing ditch on North Street

Pre-Development Catchment 103 (0.31 Ha) slopes to the existing residential lot to the south.

As shown on the topographical survey, the subject site has relatively gentle slopes of approximately 1.4%.

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. The preliminary geotechnical information completed by MTE Consultants Inc, (Clara Street and North Street Development Geotechnical Investigation, dated December 2020) is consistent with AgMaps.

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
101	Agricultural drains to Ex. C.B.M.H-3	1.56	0	75
102	Agricultural drains to North Street Ditch	0.23	0	75
103	Agricultural drains to the ex. residential lands to the southeast	0.31	0	75

[1]CN value of 75 was estimated in accordance with NRCS guidelines considering HSG'B' and Agricultural Land (small, good hydrologic condition)

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 parameters provided in **Table 1** and shown on **Figure 3** 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. Note that the flows from the existing catchments 102 and 103 were conservatively ignored for the existing conditions assessment.

The pre-development conditions VO6 input parameters and corresponding model output are presented in **Appendix C**. 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)
2-year	0.045
5-year	0.047
10-year	0.065
25-year	0.089
50-year	0.109
100-year	0.129

The pre-development flows shown in **Table 2** were compared to the Village Gate Subdivision storm sewer system available capacity, presented below.

3.1.3 Allowable Outflow Assessment

In order to match pre-development conditions, the controlled storm flow from the proposed development is proposed to outlet to the existing Village Gate subdivision storm sewer, located close to the property line, within the existing 5m easement between Lots 46 and 47. These flows were not identified in the Village Gate Storm Drainage Area and Design Sheet (Record Drawing

TC-0036). MTE's review of the Record Drawing TC-0036 indicates that there is approximately 48 L/s of available capacity in the Village Gate Subdivision sewer system.

It is proposed that the post development flows from the development (from 2-year to 100-year) be controlled to **40 L/s** at outlet to the existing CBMH-3. The highlighted Record Drawing TC-0036 is provided in **Appendix D.**

Record Drawing TC-0036 also shows that the existing 300 mm storm sewer run from CBMH-3 to ST-4 has not been identified in the Village Gate Subdivision Storm Design Sheet. Therefore, it was necessary to confirm if the existing 300mm sewer has sufficient capacity to convey a controlled flow of 40 L/s from the North Street Development as well as any existing flows from Village Gate Subdivision. As shown on the highlighted Village Gate Subdivision grading plan (Record Drawing TC-00345), approximately 1,300 m^2 (portion of Lots 43-46 backyards) is tributary to CBMH-3 (see attached in Appendix D). As per the Municipality's Record Drawing TC-00340, the 300mm storm sewer (from CBMH-3 to ST-4) has a slope of 2.5%. MTE's calculations provided in **Appendix D** show that the total flow to C.B.M.H-3 during the 2-year storm is 54 L/s (14 L/s from Village Gate Subdivision + North Street Development controlled flow of 40 L/s) while the 300mm storm sewer capacity is 153 L/s. Therefore, 300mm sewer has sufficient capacity (i.e. 153 L/s > 54 L/s).

Furthermore, by looking at the existing Village Gate Subdivision Storm Design Sheet the downstream storm sewers also have sufficient capacity for the proposed 40 L/s site outflow.

All relevant drawings are provided in **Appendix D**.

3.2 Post-Development Conditions

The proposed subject development consists of the subdivision area - Single Family Residential Lots (Lots 1-7), Condominium Area – Units 1-25 (Block 8), and SWM Block Area (Block 10). The subject site post-development conditions are presented in **Figure 4**. A SWM strategy was developed to accommodate the stormwater from the proposed development without negative impacts to the subject site, neighbouring properties and the receiving Village Gate Subdivision storm sewer system.

3.2.1 Proposed SWM Strategy

The proposed drainage plan and SWM strategy are shown in **Figure 4.**

It was determined that the most efficient SWM system for the proposed development is through the implementation of dry SWM Pond Faciality (SWMF) with one oil/grit (OGS) separator.

As shown on the proposed drainage plan (**Figure 4**), storm runoff from the proposed drainage areas 201 and 202 during the minor storm events will be collected and conveyed by proposed storm sewers to the proposed OGS unit for quality control and further SWMF for a quantity control, before releasing to the existing Village Gate Subdivision storm sewer system. Similarly, major flows will be conveyed to the SWMF via surface flows on the proposed subdivision and condominium roads.

The proposed drainage areas are shown on **Figure 4**, while the proposed drainage parameters are presented in **Table 3,** below.

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 Subdivision Area	0.700	55	61[1]
202	Proposed Medium Density Development (condominium)	1.217	70	61[1]
203	Proposed SWM Block Area (Grass)	0.218	0	61[1]
Total Area to SWMF		2.135		

[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 preliminary SWMF layout and preliminary design parameters are shown on **Figure 5**. 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 10) has allocated area of approximately 0.22 ha. The SWMF was conceptually designed as a dry pond with side slopes of 4:1 H:V and maximum storage depth of 2.05m. The proposed SWMF will outlet to the Village Gate Subdivision sewer system with a maximum peak flow of 40 L/s.

High Ground Water Consideration. The hydrogeological investigation (Preliminary Hydrogeological Assessment Report by MTE, dated March 15, 2023) indicates high ground water of approximately 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 a maximum allowable flow of 0.040 m³/s (40 l/s). A comparison of the pre-development and the post-development flow rates provided in **Table 4** shows that the proposed subdivision quantity control requirements are satisfied.

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

Storm Event	Allowable Peak Flows (m^3/s)	Controlled Post-Development Peak Flows Discharge to Village Gate Subdivision Storm Sewer System (m^3/s)
2-year	0.040	0.027
5-year	0.040	0.027
10-year	0.040	0.030
25-year	0.040	0.033
50-year	0.040	0.034
100-year	0.040	0.037

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 while providing 0.3 m free board. The complete conceptual stage-storage-discharge relationship and SWMF hydraulic are provided in **Appendix F**.

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)
259.70	0		Bottom of the Pond
259.95	83		
260.20	186		
260.45	309		
260.70	456		
260.95	627		
261.13	768	0.037	1:100-Year WSE[1]
261.20	825		
261.30	910	0.39	1:250-Year WSE[1]
261.45	1051		
261.75	1362		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 areas 201 and 202 will be conveyed to the proposed CDS Stormwater Treatment Unit Model PMSU 3020_6 oil/grit separator prior to discharging to SWMF. The preliminary sizing calculations provided in **Appendix G** show that this model provides 80.5% (TSS) removal, which exceeds the required 'Normal' Level (70% TSS removal) of stormwater quality control and treats 96.8% of the annual rainfall.

CDS Stormwater Treatment Unit details are provided in **Appendix G**.

3.2.6 Low Impact Development (LID) Consideration

Based on the preliminary geotechnical and hydrogeological investigations 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 catchbasins and manholes where it is collected and conveyed via local storm sewers to the proposed OGS unit (CDS Stormwater Treatment Unit Model PMSU 3020_6 oil/grit separator) for quality control and then conveyed to SWMF for quantity control.

For the proposed storm servicing, refer to **Figure 4**, attached to this report. The detailed storm servicing will be provided during the detailed design stage of the process.

As shown in Figure 4, it is proposed to outlet the subdivision area (Catchment 201) to the Medium Density Block (Catchment 202) and then to an OGS unit and dry pond. A municipal easement will be provided for the storm sewer connection through the medium density block as well as the OGS unit and the dry pond.

There are two options with regards to the ownership of the dry pond and OGS unit:

- They could be privately owned/maintained by the condo corporation with access/use/maintenance agreements with the municipality, or
- They could be publicly owned/maintained by the municipality with access/use/ maintenance agreements with the condo corporation.

4.0 Water Servicing

4.1 Existing Conditions

There is no existing municipal watermain infrastructure on North Street in front of the proposed development. Based on the Village of Dorchester Water System Map, there is an existing 150mmØ diameter municipal watermain on North Street to the south of proposed development, and 200mmØ watermains on Village Gate Crescent and Village Gate Drive. These watermains are connected to the Dorchester Elevated Water tank via a 150mmØ watermain on Minnie Street, 150mmØ watermain on Catherine Street and a 250mmØ watermain on Clara Street.

Based on the hydrant flow tests received from the municipality, the available flows at 20 psi in the Village Gate Subdivision area and Minnie Street ranges from approximately 58 l/s to approximately 80 l/s. Static pressure in this area ranges from approximately 54 psi to approximately 58.8 psi, which corresponds to the hydraulic grade line of 300.03 m to 302.57 m.

These conditions were used as inputs 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 capital projects are proposed: Capital Programs W-D-WM-04, W-D-WM-05, and W-D-WM-06 that are in the vicinity of the proposed North Street development. Proposed capital programs consist of new 200mmØ watermain on Marion St, new 200mmØ watermain on North Street and connection to 200mmØ watermain on Marion St and upgrading the existing 150mmØ watermain on North Street and Minnie Street. Additionally, a future local watermain was planned on Village Gate Drive extension to connect Village Gate Drive and North Street watermains.

The proposed Capital Programs are presented in Figure ES-2 and in the Table ES-1 in the WWMP. Figure ES-2 and Table ES-1 are included in **Appendix H.**

4.3 Proposed Conditions

The proposed development water distribution system will be provided by the proposed 200mmØ watermain within the medium density block and a 200mmØ watermain on the Village Gate Drive extension as shown on the conceptual water distribution plan 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 D407 is located at 69 Village Gate Drive. Flow test from August 2015 reported a static pressure of 54.1 psi or 38.03 metres of head, and the calculated maximum flow of 58.85 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 300.03 m. Flow tests from the other hydrant tests in the area resulted in hydraulic grade line in the range of 301.14 m to 302.57 m. The breakdown of hydrant flow test results is presented in **Appendix H.**

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, D407 hydrant flow test results are lower than the Elevated Tank operating levels and will be used in the model as the boundary condition. Hydraulic grade line of 300.03 m will be used in the model as the boundary condition.

4.6 Water Network Analysis

We have completed a detailed analysis to see if the proposed development can be serviced by the existing watermain system, without the need for the future capital watermain upgrades and extensions. A detailed water network analysis for the existing watermain system plus the proposed 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 100mmØ and 150mmØ watermains;
- Hazen-Williams friction factor C of 110 for 200mmØ and 250mmØ watermains;

4.6.1 Average Day Demand Scenario

Under this scenario, the minimum pressure in the system for development was computed to be 352 kPa (>275 kPa minimum required). Please refer to **Appendix H** for the detailed water supply model results.

Under this scenario, the maximum residual pressure in the system for development was computed to be 362 kPa (maximum residual pressure should not exceed 80psi or 550 kPa), Please refer to **Appendix H** 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 348 kPa (>275 kPa minimum required). Maximum velocity = 0.04 m/s (<1.5m/s maximum allowed). Please refer to **Appendix H** 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.

Fire protection flow of 76 l/s for low density residential units and 90 l/s for medium density units was not available within in the existing system at residual pressures above the minimum required pressure of 140 kPa and under the maximum watermain velocity of 2.4m. The available fire flow of 55 l/s matches the hydrant flow tests from the Village Gate subdivision.

As such, the existing watermain system (without the future capital watermain upgrades/extensions), is not sufficient to service the proposed development. The future capital watermain upgrades/extensions are required to service the proposed development.

5.0 Conclusions and Recommendations

Based on the foregoing analysis, it is concluded that:

i. The development is dependent on future capital sanitary and watermain projects to provide sanitary and water servicing for the property.

ii. In order to match the existing drainage conditions, the development storm system is proposed to outlet to the existing CBMH located in the Village Gate subdivision. Post-development outflow from the development will be controlled to below pre-development rates. A dry pond is proposed for quantity control and an OGS unit is proposed for quality control.

It is recommended that:

iii. The engineering design for the grading, SWM facility, OGS unit, 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.

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DXS:cmg

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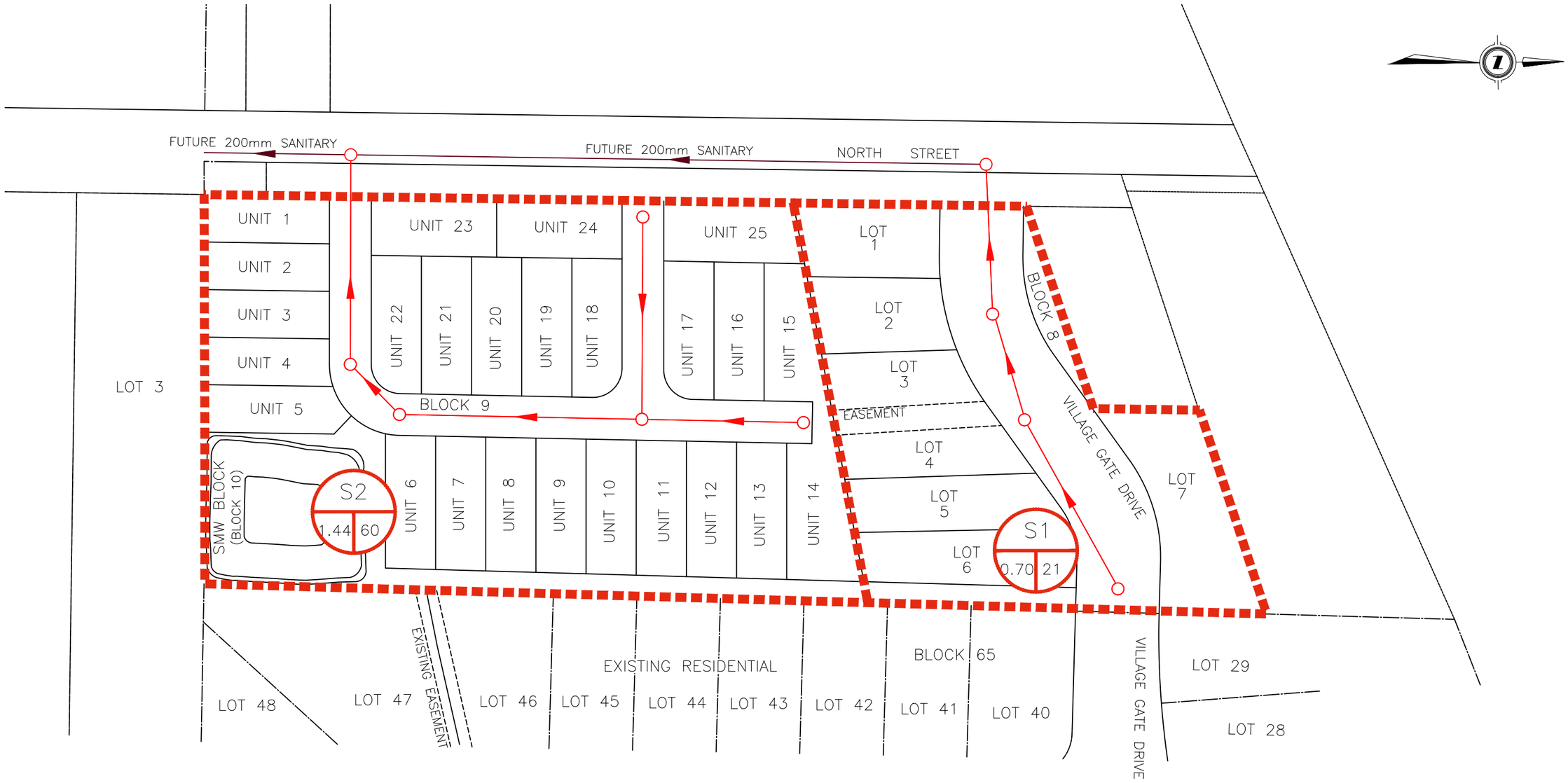

LEGEND

PROP. SANITARY SEWERS

SANITARY DRAINAGE AREA

KEY

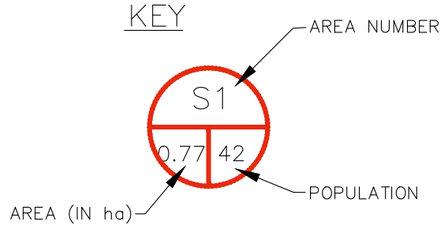

FIGURE 2

Date: FEB. 15/23

Scale: 1:1000

CONCEPTUAL SANITARY SERVICING PLAN

MTE

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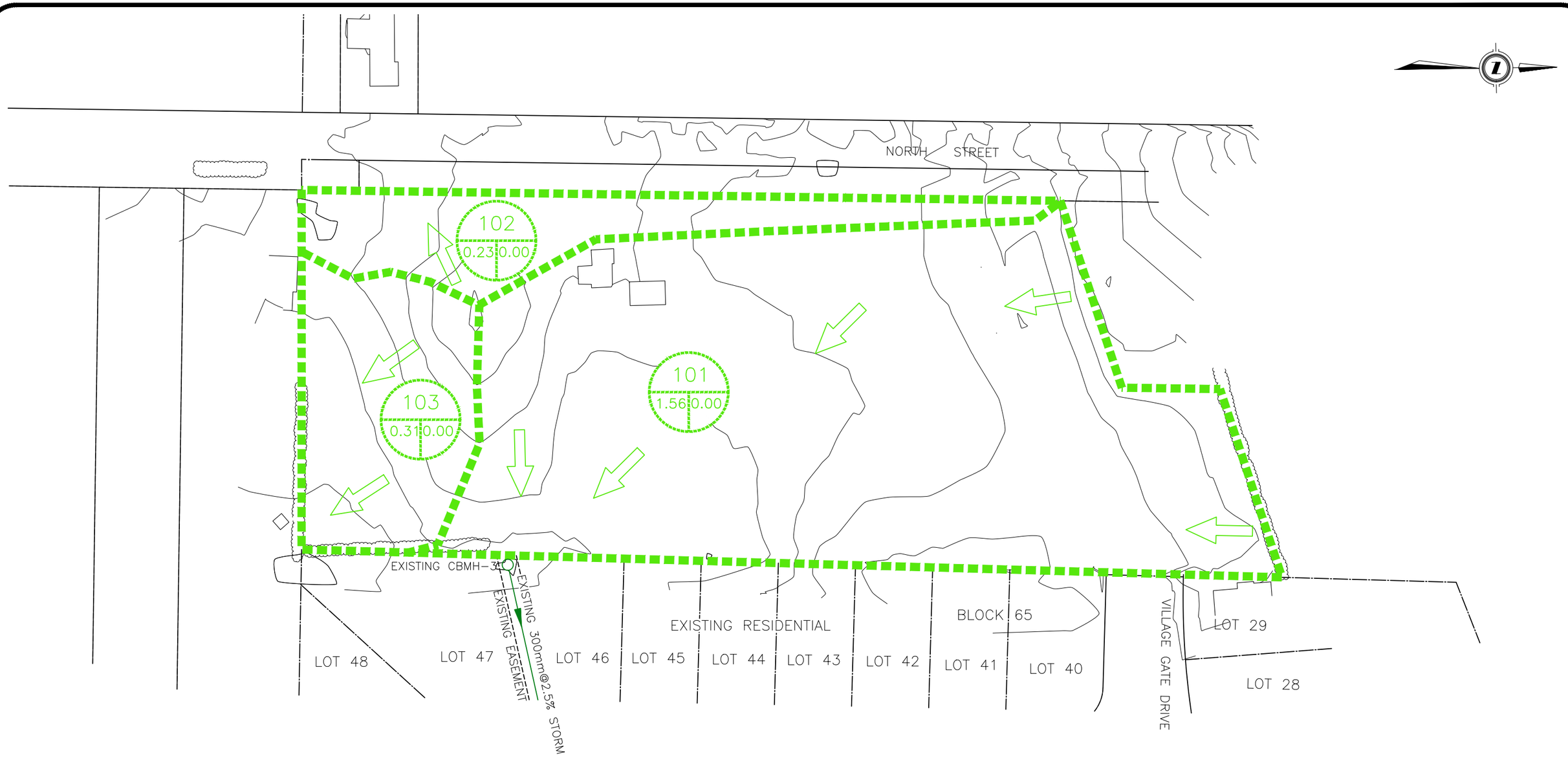

LEGEND

EXISTING FLOW ROUTE

STORM DRAINAGE AREA

KEY

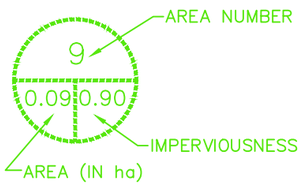

FIGURE 3

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PRE-DEVELOPMENT STORM DRAINAGE PLAN

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Project No.: 47030-300

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LEGEND

- PROP. STORM SEWERS
- STORM DRAINAGE AREA
- OLF

KEY

9 — AREA NUMBER

0.09 — AREA (IN ha)

0.90 — IMPERVIOUSNESS

FIGURE 4

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Scale: 1:1000

CONCEPTUAL POST DEVELOPMENT STORM DRAINAGE PLAN

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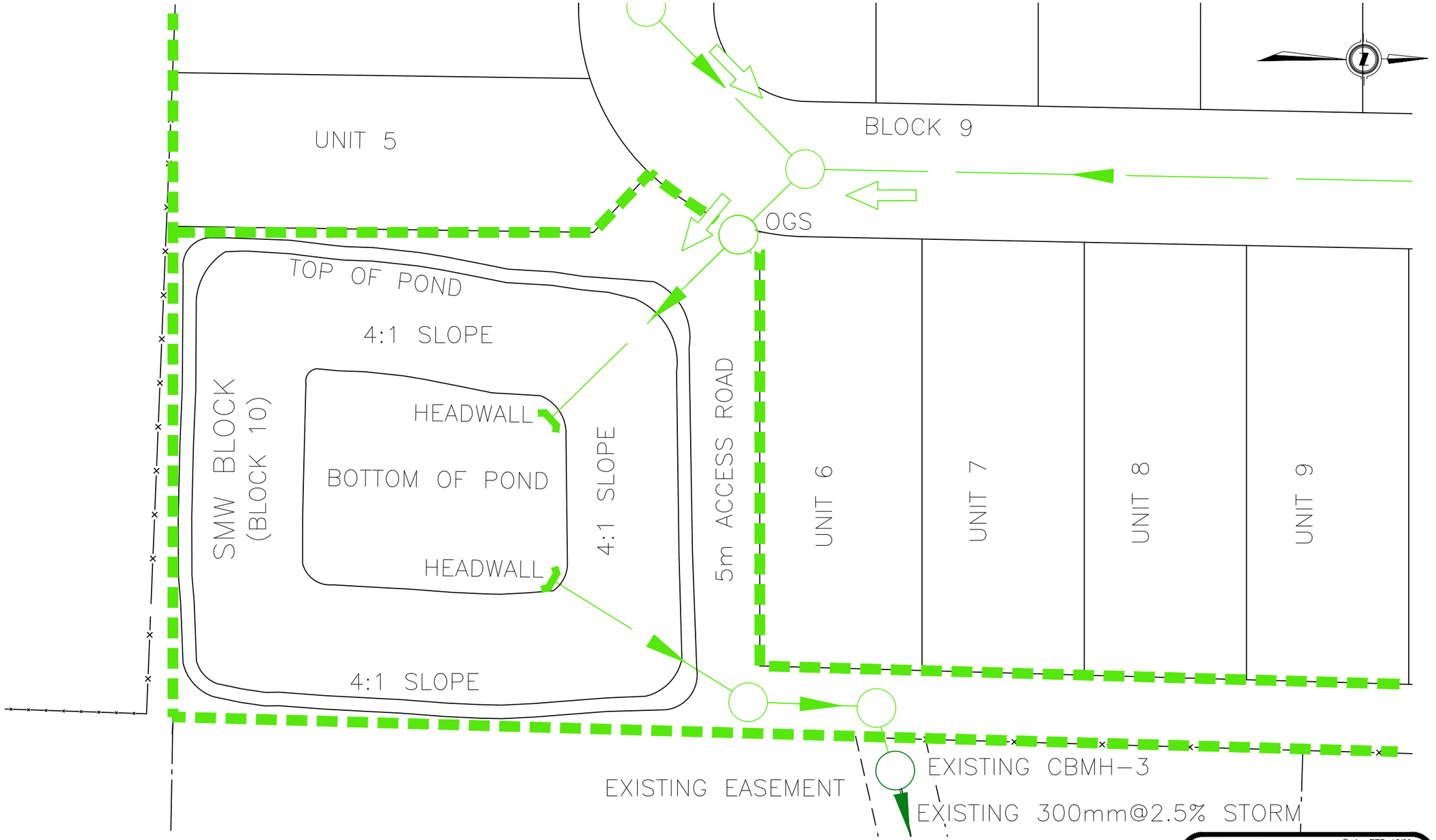

LEGEND

- PROP. STORM SEWERS
- CATCHMENT AREA
- OLF

FIGURE 5

Date: FEB. 15/23
Scale: 1:300

CONCEPTUAL
SWM POND

MTE
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Project No.: 47030-300

LEGEND

- SITE BOUNDARY
- PROPOSED WATERMAIN
- REDUCER
- EXISTING WATERMAIN

FIGURE 6

Date: FEB. 15/23
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CONCEPTUAL WATER DISTRIBUTION PLAN

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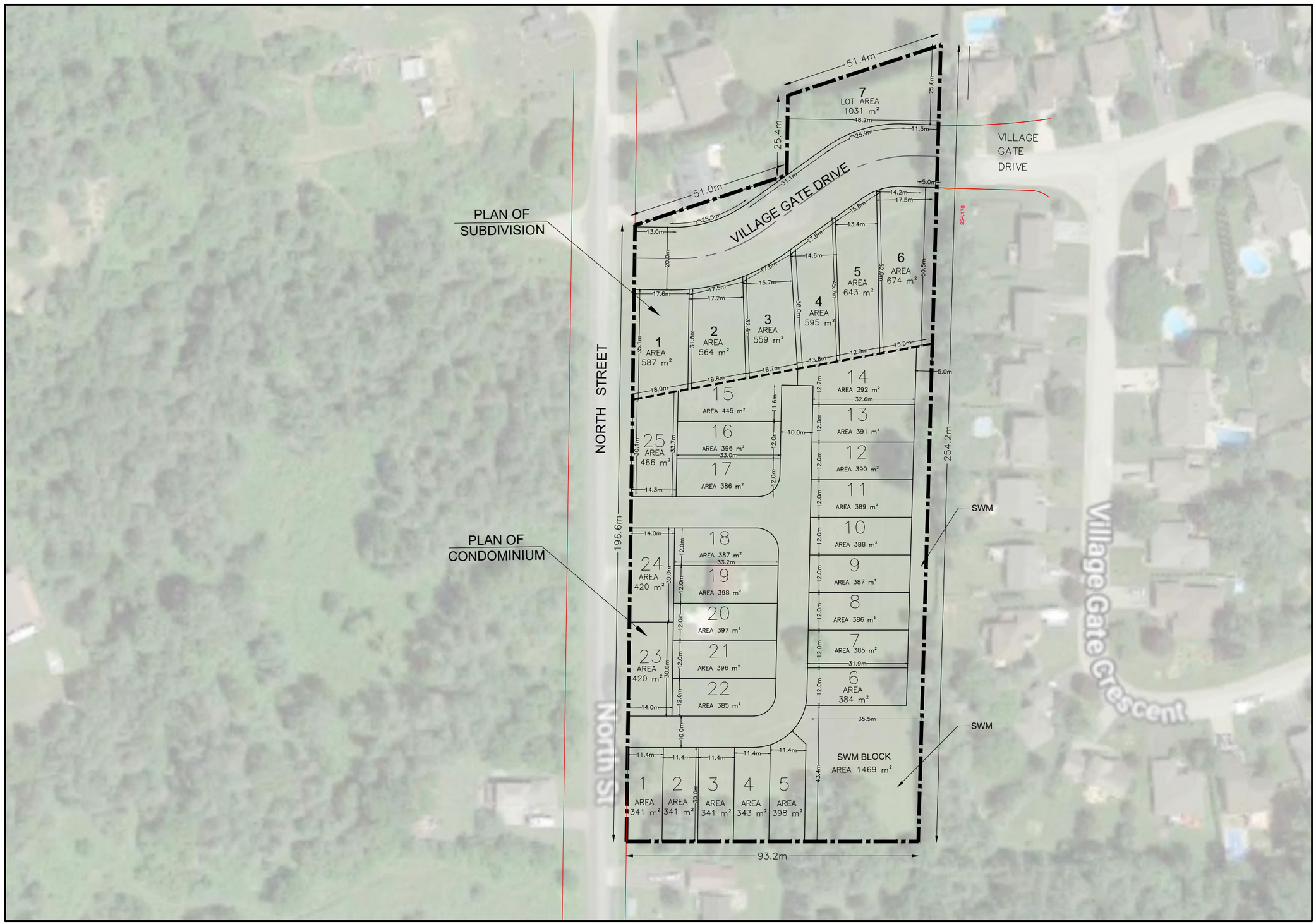
Appendix A

Layout Plan



KEY PLAN

CONCEPTUAL PLAN

CON 4 NRT PT LOT 11 RP 33R10461 PARTS 2 3 & 4

MUNICIPALITY OF THAMES CENTRE
COUNTY OF MIDDLESEX

EXISTING ZONE: R1

TOTAL LOT AREA	2.1351 ha
LOT FRONTAGE	196.6 m

SUBDIVISION LANDS

	REQUIRED	PROPOSED
TOTAL SUBDIVISION LAND AREA		0.6977 ha
LOT AREA	700 m²	*564 m²
LOT FRONTAGE	15.0 m	>15.0 m
NUMBER OF LOT	N/A	7

CONDOMINIUM LANDS

	REQUIRED	PROPOSED
TOTAL CONDOMINIUM AREA		1.2197 ha
LOT AREA	700 m²	*480 m²
LOT FRONTAGE	15.0 m	*11.4 m
NUMBER OF UNIT	N/A	19

SWM AREA	2178 m²

*DENOTES ZONING BY LAW AMENDMENT REQUIRED

NO.	REVISION	DATE	INITIAL

246 NORTH INC.

246 NORTH ST.

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DRAWN BY	PROJECT NO.
SN	CCI/THC/20-01
DATE	SCALE
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Appendix B

Sanitary Sewer Design Sheet and Relevant WWMP Figures

Municipality of Thames Centre

Water and Wastewater Master Plan Update

new sanitary pumping station

new 250mm Sanitary

new 200mm Sanitary

WW-D-SS-13
WW-D-SS-16
WW-D-SPS-01B
WW-D-SS-12
WW-D-SPS-02
WW-D-SS-01B
WW-D-SS-15
WW-D-FM-04
WW-D-SS-02
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-FM-06
WW-D-SS-05B-ALT-2
WW-D-SS-06B-ALT-1
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

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

0 1 Kilometers

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

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-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

SANITARY SEWER DESIGN SHEET

MUNICIPALITY OF THAMES CENTRE

RESIDENTIAL POPULATION DENSITIES

THE FOLLOWING POPULATION ALLOWANCES WILL APPLY WHEN DESIGNING SANITARY SEWERS:

(A) HECTARE BASIS

LOW DENSITY (SINGLE FAMILY/SEMI-DETACHED)	*= 30 UNITS/HA @ 3 PEOPLE/UNIT*
MEDIUM DENSITY (TOWNHOUSES)	*= 75 UNITS/HA @ 2.4 PEOPLE/UNIT*
HIGH DENSITY (APARTMENTS)	*= 150-300 UNITS/HA @ 1.6 PEOPLE/UNIT*
COMMERCIAL / INSTITUTIONAL / CHURCH	*= 100 PEOPLE/HA*
ELEMENTARY SCHOOL	*= 400 PEOPLE*
SECONDARY SCHOOL	*= 1500 PEOPLE*

(B) LOT BASIS

SINGLE FAMILY	*= 3 PEOPLE*
DUPLEX / SEMI	*= 6 PEOPLE*

- FUTURE/EXTERNAL/EXISTING DESIGN

PROJECT NAME : *246 North St., Dorchester, ON.*

DATE : ***February 22, 2023***
DESIGNED BY : ***DXS***
CHECKED BY : ***DXS***
FILE No : ***47030-300***
SHEET :

DESIGN CRITERIA

SEWAGE = 350 L/DAY/CAP = 0.00405 x 1.1 l/s/person
INFILTRATION = 8640 L/HA/DAY = infilt. of 0.100 l/s/ha
PEAKING FACTOR = HARMON FORMULA $M = 1 + \frac{14}{4 + P^{0.5}}$

LOCATION				***AREA (HECTARES)***			***POPULATION***					***SEWAGE FLOW***				***SEWER DESIGN***					***PROFILE***					
AREA	*STREET*	*FROM*	*TO*	*NET OR*	*DELTA*	*TOTAL*	*PER*	*PER*	*No. OF*	*DELTA*	*TOTAL*	*M*	*SEWAGE*	*INFILT.*	*TOTAL*	*DIA.*	*SLOPE*		*VELOCITY*	*CAP.*	*LENGTH*	*FALL IN*		*DROP IN*	*INVERT ELEV.*	
No.		*M.H.*	*M.H.*	*GROSS*	*AREA ha*	*AREA ha*	*ha*	*LOT/UNIT*	*LOTS/UNITS*	*POP.*	*POP.*	*Min.2.0*	*l/s*	*l/s*	*l/s*	*mm*	*%*	*n*	*m / s*	*l / s*	*M*	*SEWER*	*HEADLOSS*	*MANHOLE*	*U.S.*	*D.S.*
1	SINGLE DEVELOPMENT				0.70	0.70		3	7	21.00	21	4.38	0.41	0.07	**0.48**	200	0.65	0.013	0.84	26.44						
2	CONDO DEVELOPMENT				1.44	1.44		2.4	25	60.00	60	4.30	1.15	0.14	**1.29**	150	0.50	0.013	0.61	10.77						
TOTAL TO FUTURE NORTH ST. SANITARY SEWER											**81**				**1.77**											

Appendix C

Pre-Development Conditions -VO6 Hydrologic Modelling Results

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

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

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


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  Summary filename:
C:\Users\dsredojevic\AppData\Local\Civica\VH5\a1fe4a80-3784-4643-a828-f657184a1ad1\d740a436
-34c1-4909-909b-f3fd0ec4c5a9\


DATE: 02/22/2023                          TIME: 06:59:52

USER:



COMMENTS: _____________________________________________________________


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


--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1574.382
| Ptotal= 54.73 mm |                          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)	Area (ha)=	1.56	Curve Number (CN)= 74.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.37	

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)= 0.161

PEAK FLOW (cms)= 0.065 (i)
TIME TO PEAK (hrs)= 1.917
RUNOFF VOLUME (mm)= 17.793
TOTAL RAINFALL (mm)= 54.733
RUNOFF COEFFICIENT = 0.325

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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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Summary filename:
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DATE: 02/22/2023 TIME: 06:59:52

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)|   Area    (ha)=   1.56   Curve Number   (CN)= 74.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.37

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.57 | 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)=   0.161

     PEAK FLOW       (cms)=   0.129 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=  33.786
     TOTAL RAINFALL   (mm)=  79.353
     RUNOFF COEFFICIENT   =   0.426

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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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DATE: 02/22/2023 TIME: 06:59:52

USER:

COMMENTS: _____

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

| CHICAGO STORM |
| Ptotal= 44.93 mm |

IDF curve parameters: A=1290.000
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)= 1.56 Curve Number (CN)= 74.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.37

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)= 0.161

PEAK FLOW (cms)= 0.045 (i)
TIME TO PEAK (hrs)= 1.917
RUNOFF VOLUME (mm)= 12.340
TOTAL RAINFALL (mm)= 44.928
RUNOFF COEFFICIENT = 0.275

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

FINISH

==========

==========

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

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       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 02/22/2023 TIME: 06:59:52

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

Area (ha)= 1.56 Curve Number (CN)= 74.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.37

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)= 0.161

PEAK FLOW (cms)= 0.089 (i)
TIME TO PEAK (hrs)= 1.917
RUNOFF VOLUME (mm)= 23.762
TOTAL RAINFALL (mm)= 64.446
RUNOFF COEFFICIENT = 0.369

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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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DATE: 02/22/2023 TIME: 06:59:52

USER:

COMMENTS: _____

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

CHICAGO STORM
Ptotal= 46.68 mm

IDF curve parameters: A=1183.740
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)
ID= 1 DT= 5.0 min

Area (ha)= 1.56 Curve Number (CN)= 74.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.37

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)=   0.161

     PEAK FLOW       (cms)=   0.047 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=  13.266
     TOTAL RAINFALL   (mm)=  46.680
     RUNOFF COEFFICIENT   =   0.284

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

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       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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DATE: 02/22/2023                          TIME: 06:59:52

USER:



COMMENTS: _____________________________________________________________
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  ***********************************************
  ** SIMULATION : 50 Year 4 Hour Chicago        **
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| 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


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| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=   1.56   Curve Number   (CN)= 74.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.37

         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    3.35 | 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)=   0.161

     PEAK FLOW       (cms)=   0.109 (i)
     TIME TO PEAK    (hrs)=   1.917
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     RUNOFF VOLUME    (mm)=  28.743
     TOTAL RAINFALL   (mm)=  72.026
     RUNOFF COEFFICIENT   =   0.399

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

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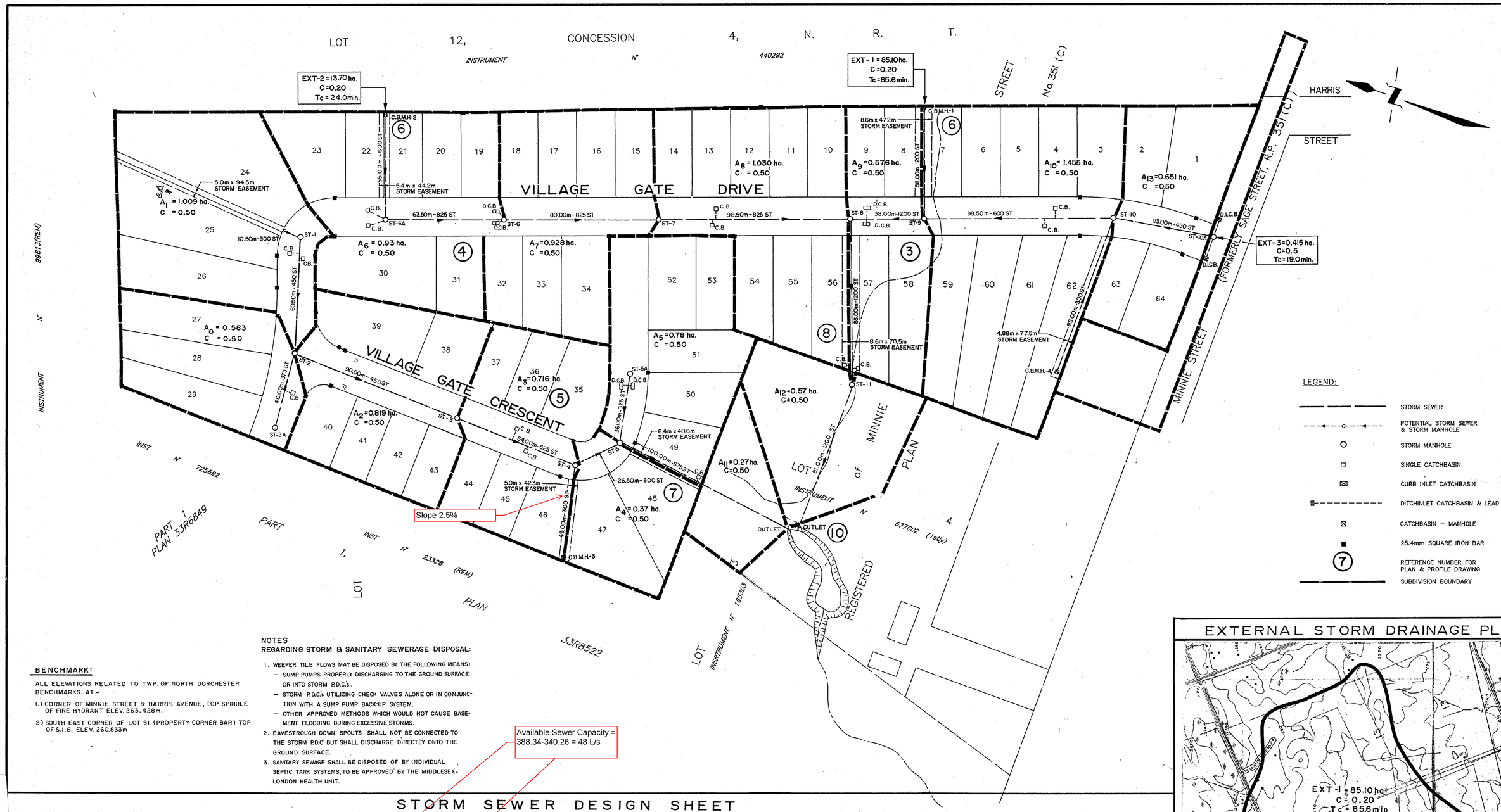
Appendix D

Village Gate Subdivision Sewer System Assessment



BENCHMARK:

ALL ELEVATIONS RELATED TO TWP. OF NORTH DORCHESTER BENCHMARKS. AT –

1.) CORNER OF MINNIE STREET & HARRIS AVENUE, TOP SPINDLE OF FIRE HYDRANT ELEV. 263.428m.

2.) SOUTH EAST CORNER OF LOT 51 (PROPERTY CORNER BAR) TOP OF S.I.B. ELEV. 260.833m

NOTES REGARDING STORM & SANITARY SEWERAGE DISPOSAL:

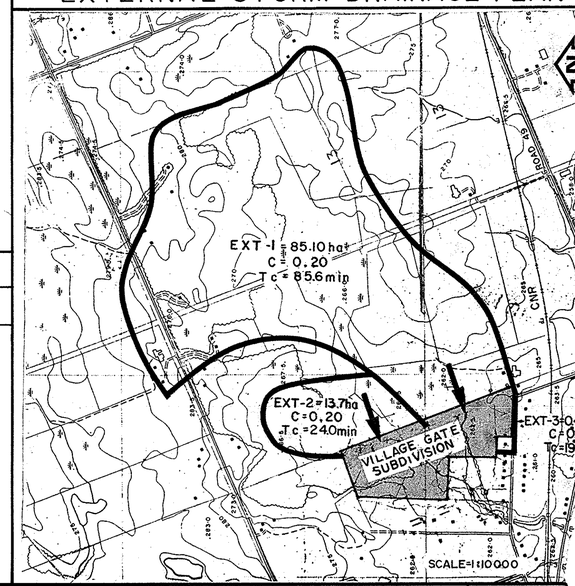
1. WEEPER TILE FLOWS MAY BE DISPOSED BY THE FOLLOWING MEANS:
   - SUMP PUMPS PROPERLY DISCHARGING TO THE GROUND SURFACE OR INTO STORM P.D.C's.
   - STORM P.D.C's UTILIZING CHECK VALVES ALONE OR IN CONJUNCTION WITH A SUMP PUMP BACK-UP SYSTEM.
   - OTHER APPROVED METHODS WHICH WOULD NOT CAUSE BASEMENT FLOODING DURING EXCESSIVE STORMS.
2. EAVESTROUGH DOWN SPOUTS SHALL NOT BE CONNECTED TO THE STORM P.D.C. BUT SHALL DISCHARGE DIRECTLY ONTO THE GROUND SURFACE.
3. SANITARY SEWAGE SHALL BE DISPOSED OF BY INDIVIDUAL SEPTIC TANK SYSTEMS, TO BE APPROVED BY THE MIDDLESEX-LONDON HEALTH UNIT.

Available Sewer Capacity = 388.34-340.26 = 48 L/s

STORM SEWER DESIGN SHEET

AREA NO	STREET	FROM	TO	LAND USE	AREA ha.	TOTAL AREA	COEF. C	INCR. AxC	TOT.SECT AxC	TOT.SWR AxC	TOTAL ACx2.78	TIME SECT.	TIME ACCUM.	INTEN I	PEAK FLOW	PIPE DIA.	SLOPE %	n	ACTUAL CAPACITY	VEL. m/s	LENGTH m	FLOW TIME	LOSSES MH	PIPE DIF.	FALL IN SEWER	INVERT UPSTREAM	INVERT DOWNSTREAM	FROM MANHOLE	TO MANHOLE	AVG DEPTH TO INV	APPURTENANCES MANHOLE	APPURTENANCES CATCHBASINS	OTHER
A0	VIL.GATE DR.	ST-2A	ST-2	RES	0.583	0.583	0.50	0.292	0.292	0.292	0.810	M/A	19.00	76	61.588	375	0.50	0.015	107.447	0.973	40.00	0.69	N/A	0.000	0.200	259.600	259.400	ST-2A (APPROX. 42.0m W OF CENTRELINE VILLAGE GATE CRS.)	ST-2 (APPROX. 1.5m W OF CENTRELINE VILLAGE GATE CRS.)	3.2	1	1	
A1	VIL.GATE DR.	ST-1	ST-2	RES	1.009	1.009	0.50	0.505	0.505	0.505	1.403	M/A	19.00	76	106.591	450	0.35	0.015	146.182	0.919	60.50	1.10	N/A	0.000	0.212	259.393	259.181	ST-1 (APPROX. 57.5m E OF CENTRELINE VILLAGE GATE CRS.)	ST-2 (APPROX. 1.5m W OF CENTRELINE VILLAGE GATE CRS.)	2.7	1	2	1-300 PDC
A2	VIL.GATE CRS.	ST-2	ST-3	RES	0.819	2.411	0.50	0.410	1.206	1.206	3.351		19.95	74	247.995	450	1.20	0.015	270.676	1.702	90.00	0.88	0.100	0.000	1.080	259.081	258.001	ST-2 (APPROX. 4.5m S OF CENTRELINE VILLAGE GATE DR.)	ST-3 (APPROX. 94.5m S OF CENTRELINE VILLAGE GATE DR.)	4.0	1		
A3	VIL.GATE CRS.	ST-3	ST-4	RES	0.716	3.127	0.50	0.358	1.564	1.564	4.347	0.88	20.83	71	308.604	525	0.65	0.013	346.728	1.602	64.00	0.67	0.000	0.075	0.416	257.926	257.510	ST-3 (APPROX. 94.5m S OF CENTRELINE VILLAGE GATE DR.)	ST-4 (APPROX. 161.5m S OF CENTRELINE VILLAGE GATE DR.)	3.2	1	2	
A4	VIL.GATE CRS.	ST-4	ST-5	RES	0.370	3.497	0.50	0.185	1.749	1.749	4.861	0.67	21.49	70	340.258	600	0.40	0.013	388.336	1.373	26.50	0.32	0.161	0.075	0.106	257.274	257.168	ST-4 (APPROX. 161.5m S OF CENTRELINE VILLAGE GATE DR.)	ST-5 (APPROX. 117.0m W OF CENTRELINE VILLAGE GATE DR.)	2.7	1		1-CBMH
A5	VIL.GATE CRS.	ST-5A	ST-5	RES	0.780	0.780	0.50	0.390	0.390	0.390	1.084	M/A	19.00	76	82.399	375	0.43	0.015	99.642	0.902	36.00	0.67	0.000	0.000	0.155	257.548	257.393	ST-5A (APPROX. 81.0m W OF CENTRELINE VILLAGE GATE DR.)	ST-5 (APPROX. 117.0m W OF CENTRELINE VILLAGE GATE DR.)	2.3	1		2-DCB
A11	EASEMENT	ST-5	OUTLET	RES	9.270	4.547	0.50	0.135	2.274	2.274	6.320	0.32	21.82	70	442.423	675	0.35	0.013	497.300	1.390	100.00	1.20	0.150	- 0.075	0.350	256.943	256.593	ST-5 (APPROX. 117.0m W OF VIL.GATE DR.,102.5m S OF VIL.GATE CRS)	OUTLET (APPROX. 117.0m W OF VIL.GATE DR.	2.0	1	1	
EXT-1	EASEMENT	CBMH-1	ST-9	FIELD	85.100	85.100	0.20	17.020	17.020	17.020	47.316	M/A	85.60	27	1277.521	1200	0.15	0.013	1509.975	1.335	58.00	0.72	N/A	0.000	0.087	257.787	257.700	CBMH-1 (APPROX. 153.5m S OF VIL.GATE CRS,56.5m E OF VIL.GATE DR)	ST-9 (APPROX. 153.5m S OF CENTRELINE VILLAGE GATE CRS.)	3.5			1-CBMH
A10	VIL.GATE DR.	ST-10	ST-9	RES	1.455	2.521	0.50	0.728	1.261	1.261	3.504	0.80	19.80	74	259.310	600	0.30	0.013	336.309	1.189	98.50	1.38	0.000	0.150	0.296	258.595	258.300	ST-10 (APPROX. 61.5m N OF CENTRELINE MINNIE STREET)	ST-9 (APPROX. 153.5m S OF CENTRELINE VILLAGE GATE CRS.)	2.7	1	2	
A9	VIL.GATE DR.	ST-9	ST-8	RES	0.576	88.197	0.50	0.288	18.569	18.569	51.620	0.72	86.32	27	1393.752	1200	0.15	0.013	1509.975	1.335	38.00	0.47	0.140	0.000	0.057	257.560	257.503	ST-9 (APPROX. 153.5m S OF CENTRELINE VILLAGE GATE CRS.)	ST-8 (APPROX. 115.5m S OF CENTRELINE VILLAGE GATE CRS.)	3.3	1		2-DCB
EXT-2	EASEMENT	CBMH-2	ST-6A	FIELD	13.700	13.700	0.20	2.740	2.740	2.740	7.617	M/A	24.00	65	495.118	600	1.00	0.013	614.013	2.172	55.00	0.42	N/A	0.000	0.550	259.357	258.807	CBMH-2 (APPROX. 128.0m N OF VIL.GATE CRS,53.5m E OF VIL.GATE DR)	ST-6A (APPROX. 128.0m N OF CENTRELINE VILLAGE GATE CRS.)	2.7			1-CBMH
A6	VIL.GATE DR.	ST-6A	ST-6	RES	0.930	14.630	0.50	0.465	3.205	3.205	8.910	0.42	24.42	64	570.234	825	0.25	0.013	717.719	1.343	63.50	0.79	0.190	0.225	0.159	258.392	258.233	ST-6A (APPROX. 128.0m N OF CENTRELINE VILLAGE GATE CRS.)	ST-6 (APPROX. 64.5m N OF CENTRELINE VILLAGE GATE CRS.)	2.7	1	2	
A7	VIL.GATE DR.	ST-6	ST-7	RES	0.928	15.558	0.50	0.464	3.669	3.669	10.200	0.79	25.21	63	642.589	825	0.30	0.013	786.222	1.471	80.00	0.91	0.000	0.000	0.240	258.233	257.993	ST-6 (APPROX. 64.5m N OF CENTRELINE VILLAGE GATE CRS.)	ST-7 (APPROX. 15.5m S OF CENTRELINE VILLAGE GATE CRS.)	3.0	1		2-DCB
A8	VIL.GATE DR.	ST-7	ST-8	RES	1.030	16.588	0.50	0.515	4.184	4.184	11.632	0.91	26.12	61	709.523	825	0.35	0.013	849.217	1.589	98.50	1.03	0.000	0.000	0.345	257.993	257.649	ST-7 (APPROX. 15.5m S OF CENTRELINE VILLAGE GATE CRS.)	ST-8 (APPROX. 115.5m S OF CENTRELINE VILLAGE GATE CRS.)	3.0	1	2	
-	EASEMENT	ST-8	ST-11	RES	0.000	104.785	0.50	0.000	22.753	22.753	63.252		66.68	33	2087.314	1200	0.35	0.013	2306.524	2.039	86.00	0.70	0.166	0.375	0.301	257.108	256.807	ST-8 (APPROX. 115.5m S OF CENTRELINE VILLAGE GATE CRS.)	ST-11 (APPROX. 115.5m S OF VIL.GATE CRS,87.5m W OF VIL.GATE DR)	3.8	1	2	
A12	EASEMENT	ST-11	OUTLET	RES	0.570	105.355	0.50	0.285	23.038	23.038	64.044	0.70	67.38	33	2113.460	1200	0.35	0.013	2306.524	2.039	81.00	0.66	0.000	0.000	0.284	256.807	256.523	ST-11 (APPROX. 115.5m S OF VIL.GATE CRS,87.5m W OF VIL.GATE DR)	OUTLET (APPROX. 115.5m S OF VIL.GATE DR,168.5m W OF VIL.GATE DR)	2.6	1		
EXT-3	MINNIE ST.	ST-10A	ST-10	RES	0.415	0.415	0.50	0.208	0.208	0.208	0.577	M/A	19.00	76	43.841	450	0.50	0.015	174.721	1.099	53.00	0.80	N/A	0.000	0.265	259.010	258.745	ST-10A (APPROX. 8.5m N OF CENTRELINE MINNIE STREET)	ST-10 (APPROX. 61.5m N OF CENTRELINE MINNIE STREET)	2.8	1		2-DCB
A13	VIL.GATE DR.	ST-10A	ST-10	RES	0.651	1.066	0.50	0.326	0.533	0.533	1.482	M/A	19.00	76	112.617	450	0.50	0.015	174.721	1.099	53.00	0.80	N/A	0.000	0.265	259.010	258.745	ST-10A (APPROX. 8.5m N OF CENTRELINE MINNIE STREET)	ST-10 (APPROX. 61.5m N OF CENTRELINE MINNIE STREET)	-	-	-	-
-	-	OPEN CHANNEL	-	-	0.000	109.902	0.50	0.000	25.311	25.311	70.365	0.66	68.04	33	2322.831	SLOPE +.50%	N=.015	DEPTH=1.0	LENGTH=75	V=1.49				CAPACITY=3725.93								

EXTERNAL STORM DRAINAGE PLAN



AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION
1 SEE DRAWING No. FOR FURTHER DETAIL		
2 SEWER DESIGN; TRANSITION WIDTH OR AS NOTED		
3 REFERENCE B.M. ELEVATION. 263.428 TOP OF F.H. MINNIE ST. AND HARRIS AVE.		

DESIGN	E.C.
DRAWN	V.H.
CHECKED	J.G
APPROVED	K.W.H.
DATE	JUNE' 89
DELCAN PROJECT No.	07-1734

NO	REVISIONS	DATE	BY

CONSULTANT OR DIVISION: DELCAN ENGINEERS PLANNERS ARCHITECTS

ENGR'S STAMP: REGISTERED PROFESSIONAL ENGINEER — K. W. HODGES — PROVINCE OF ONTARIO

TOWNSHIP OF NORTH DORCHESTER

SCALE: 10 m 0 20 m Horizontal 1:1000

VILLAGE GATE SUBDIVISION
HIEMSTRA DEVELOPMENT DORCHESTER, ON

PROJECT No. TC-336

STORM DRAINAGE AREAS AND DESIGN SHEET.

DRAWING No.

SHEET No.

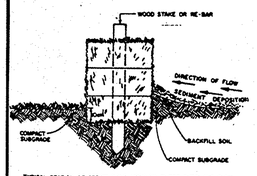
PLAN FILE No.

TC-336

05/03/89

NOTES:

1. ENDS OF ROWS OF STRAW BALES SHALL BE ROUNDED UP TO PREVENT POTENTIAL SILT RUNOFF AROUND ROWS.
2. AREAS DISTURBED BY CONSTRUCTION TO BE RESTORED TO SATISFACTION OF LANDSCAPE ARCHITECT.
3. STRAW BALES TO BE MAINTAINED DURING CONSTRUCTION.
4. TEMPORARY STRAW BALES, AS DIRECTED BY ENGINEER, TO BE USED IN LOCALIZED AREAS ADJACENT TO CONSTRUCTION OF THE TWO ROOF DRAIN OUTLETS.



TYPICAL SECTION OF STRAW BALE USED TO FILTER OVERLAND FLOW

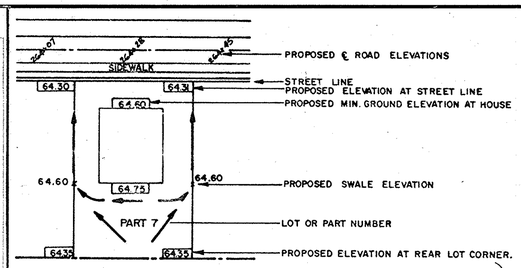
STRAW BALE FILTER

Notes:

1. Add 209 m to all proposed elevations.
2. ⟵ Direction of surface drainage.
3. 65.20 Proposed elevations.
4. (265.20) Existing elevations.
5. Existing drainage of adjacent lands is not to be disturbed.
6. All roof water from houses to be drained towards fronting street where possible.
7. For general notes and lot drainage details, see Dwg. No. .
8. Proposed front and rear ground elevations at house depend on exact shape and location on the lot and may be subject to minor adjustments at issuance of individual lot grading certificates. The general drainage patterns to remain.
9. At least two benchmarks are to be used at all times during construction.

BENCHMARKS:

1. TOP OF SPINDLE OF FIRE HYDRANT AT CORNER OF MINNIE ST. AND HARRIS AVE. ELEVATION 263.428 m.
2. TOP OF S.I.B. AT SOUTHEAST CORNER OF LOT 51. (PROPERTY CORNER BAR) ELEVATION 260.833 m.



TYPICAL LOT
N.T.S.

SEDIMENT CONTROL MEASURES

1. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION.
2. ALL EROSION CONTROL MEASURES TO BE IN PLACE BEFORE STARTING CONSTRUCTION AND REMAIN IN PLACE UNTIL RESTORATION COMPLETE.
3. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION.
4. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION.
5. MINIMIZE AREA DISTURBED DURING CONSTRUCTION.
6. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN.
7. PROTECT ALL CATCHBASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION.
8. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION.
9. PREVENT WIND-BLOWN DUST.
10. STRAW BALES TO BE USED IN LOCALIZED AREAS AS SHOWN AND AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION.

LOT GRADING SPECIFICATIONS

1. YARD SURFACES SHALL HAVE A MINIMUM SLOPE OF 1.0%
2. NO FRONT YARD CATCHBASIN SHALL BE ALLOWED.
3. DRAINAGE FLOWS SHALL BE DIRECTED AWAY FROM HOUSES.
4. DRAINAGE FLOWS WHICH ARE CARRIED AROUND HOUSES ARE TO BE CONFINED IN DEFINED SWALES LOCATED AS FAR FROM THE HOUSES AS POSSIBLE.
5. DESIRABLE SWALE DEPTH TO BE 230 mm. MINIMUM SWALE DEPTH TO BE 150 mm. MAXIMUM SWALE DEPTH TO BE VARIABLE, BUT DEPENDENT ON LOCATION AND SAFETY CONSIDERATIONS.

TC- 345

AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION
1 SEE DRAWING No. FOR FURTHER DETAIL.		
2 SEWER DESIGN: TRANSITION WIDTH OR AS NOTED .		
3 REFERENCE B.M. No. ELEVATION 263.428 TOP OF FH. MINNIE ST. AND HARRIS AVE.		

DESIGN	E.C.
DRAWN	K.B.
CHECKED	J.G.
APPROVED	K.W.H.
DATE	JUNE '89
DELCAN PROJECT No.	07-1734

NO	REVISIONS	DATE	BY

CONSULTANT OR DIVISION

DELCAN ENGINEERS PLANNERS ARCHITECTS

ENGR'S STAMP

REGISTERED PROFESSIONAL ENGINEER — K. W. HODGES — PROVINCE OF ONTARIO

TOWNSHIP OF NORTH DORCHESTER

SCALE

5 m 0 10 m
Horizontal 1:500

VILLAGE GATE SUBDIVISION
HIEMSTRA DEVELOPMENT DORCHESTER, ONT.

LOT GRADING PLAN
VILLAGE GATE DRIVE & VILLAGE GATE CRESCENT

PROJECT No.

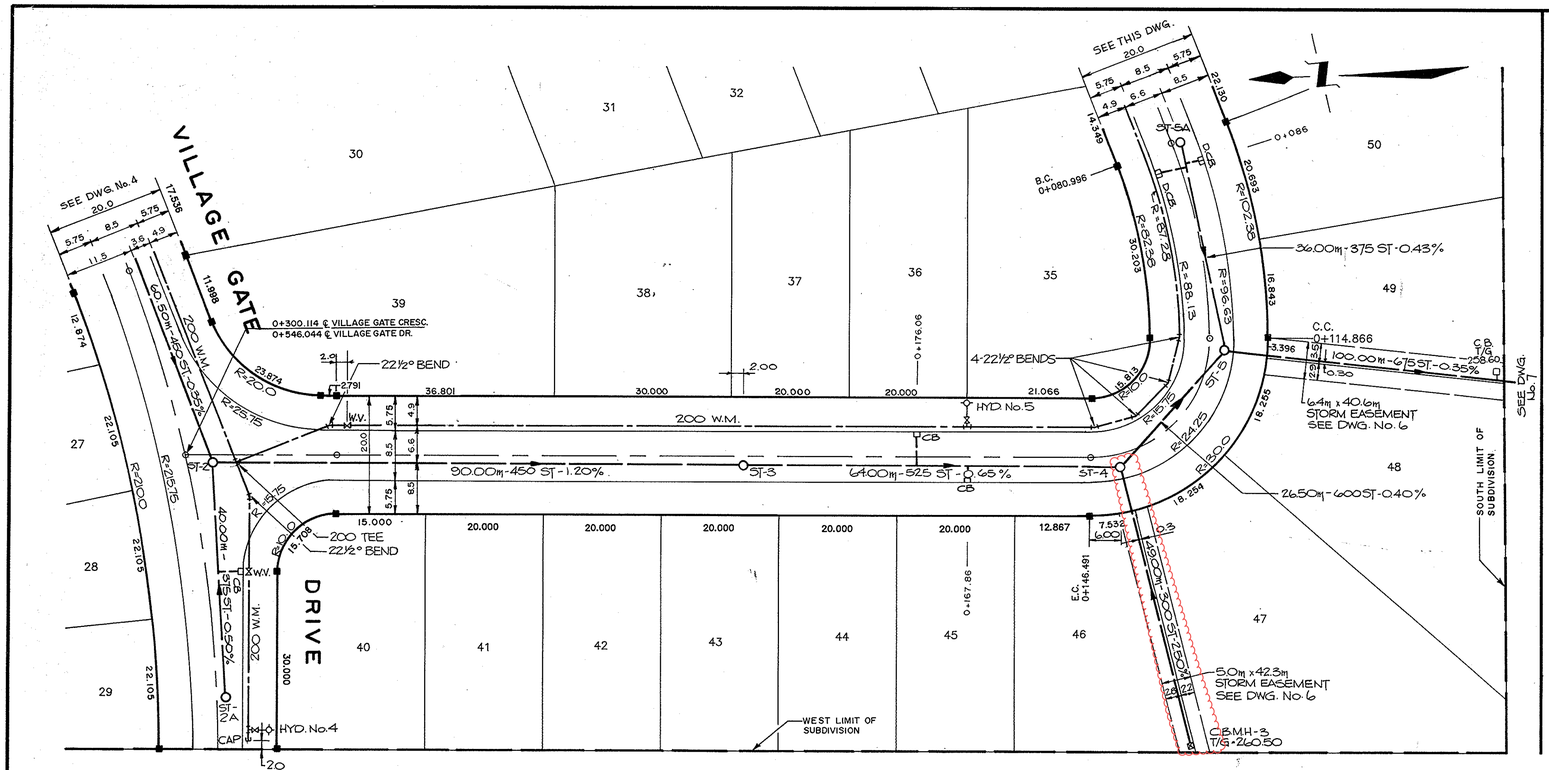
SHEET No.

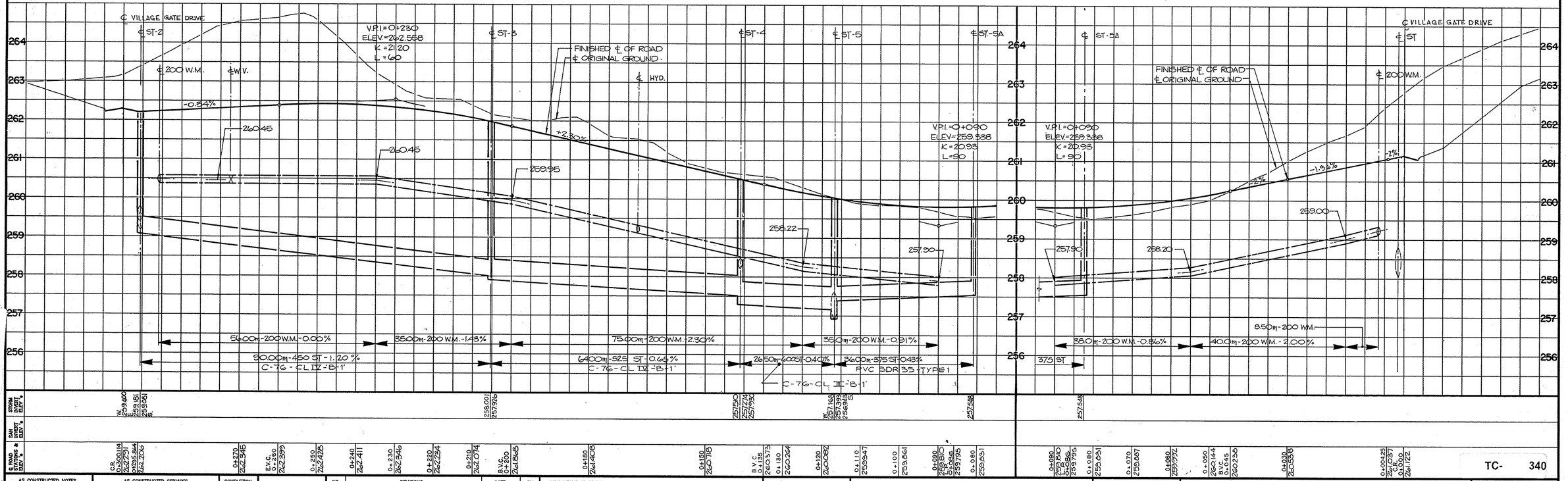
DRAWING No. 10

PLAN FILE No.

TC- 345

VILLAGE GATE CRESCENT





TC- 340

AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION
1 SEE DRAWING No. FOR FURTHER DETAIL		
2 SEWER DESIGN; TRANSITION WIDTH OR AS NOTED		
3 REFERENCE B.M. No. ELEVATION 263.428 TOP OF F.H. MINNIE ST. AND HARRIS AVE.		

DESIGN	E.C., M.L.
DRAWN	K.B.
CHECKED	J.G.
APPROVED	K.W.H.
DATE	JUNE '89
DELCAN PROJECT No.	07-1734

NO	REVISIONS	DATE	BY

CONSULTANT OR DIVISION

DELCAN ENGINEERS PLANNERS ARCHITECTS

ENGR'S STAMP

REGISTERED PROFESSIONAL ENGINEER K. W. HODGES PROVINCE OF ONTARIO

TOWNSHIP OF NORTH DORCHESTER

SCALE

Horizontal 1:500 (5 m 0 10 m)

Vertical 1:50 (0.5 m 0 1 m)

VILLAGE GATE SUBDIVISION

HIEMSTRA DEVELOPMENT DORCHESTER, ONT.

VILLAGE GATE CRESCENT (ALL)

PROJECT No.

SHEET No.

DRAWING No. 5

PLAN FILE No.

MTE Consultants
123 St. George St., London, Ontario N6A 3A1

SWM Calculations

DATE: February 13, 2023
JOB N0.: MTE-47030-300

Client: 246 North Inc.
Project: Single Lots and Condo Development
Location: 246 North St., Dorchester, ON.

Storm Flow from Village Gate Subdivision (Lots 43-46 Backyards) to C.B.M.H-3

	Area (m^2)	C	A*C
Total Area:	1300.00		
Single Lot Area Area and ROWs:	1300.000	0.5	650.00
Concrete/Asphalt:	0.000	0.9	0.00
Gravel:	0.00	0.9	0.00
Landscaped/Open:	0.00	0.2	0.00
Totals:	1300.00		650.00
C_{eq} = Sum(A*C)/Sum(A) =	0.50		

Village Gate Subdivision (Lots 43-46 Backyards) 2-year Post-Development Flows — North Street Residential Developmen

C =	0.50	
Time to concentration t_c =	19	min
Intensity, i (@ t_c) =	74.60	mm/hr
U3 Post Development Flow, Q_r = 2.78*C*i*A =	13.48	l/s

Village Gate Subdivision (Lots 43-46 Backyards) 100-year Post-Development Flows

C =	0.50	
Time to concentration t_c =	19	min
Intensity, i (@ t_c) =	131.48	mm/hr
U3 Post Development Flow, Q_r = 2.78*C*i*A =	23.76	l/s

Controlled Storm Flows from North Street Residential Development (Subject Site) to C.B.M.H-3

2-year to 100-year =	40.00	l/s

Total Storm Flows from North Street Residential Development + Village Gate Subdivision to C.B.M.H-3

2-year =	**54.00**	l/s
100-year =	**64.00**	l/s

CITY OF LONDON-3 CHICAGO RAINFALL DISTRIBUTION PARAMETERS*

Return Period (years)	A,B,C Parameters A	B	C
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

*Intensity i=A/(t+B)^C (mm/hr)

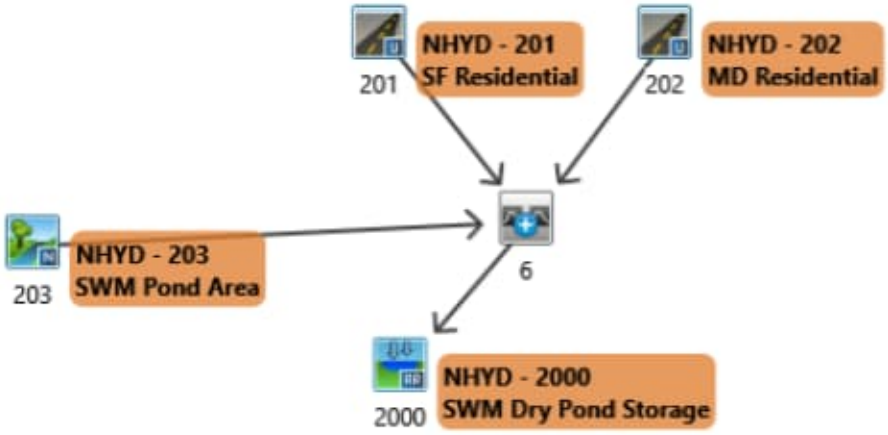
* Municipality of Thames Center 'Engineering Design Standards' (EDS), 2021.

Existing 300mm Storm Sewer Flow (from C.B.M.H-3 to ST-4)- Manning's Calcualations

Manning's n =	0.013	
Pipe Dia., D =	0.3	m
Area, A =	0.0707	m^2
Wetted Perimeter, P =	0.9425	m
Hydraulic Radius, R = A/P =	0.0750	m
Slope, S =	2.50%	
Pipe Flow Q=(1/n)AR^(2/3)S^(1/2)=	0.1529	m^3/s
=	152.90	l/s
Velocity =	2.16	m/s

Appendix E

Post-Development Conditions - VO6 Hydrologic Modelling Results


NHYD - 201
SF Residential
201
NHYD - 202
MD Residential
202
NHYD - 203
SWM Pond Area
203
6
NHYD - 2000
SWM Dry Pond Storage
2000

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

       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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DATE: 02/22/2023                          TIME: 08:09:21

USER:



COMMENTS: _____________________________________________________________


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


--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1574.382
| Ptotal= 54.73 mm |                          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 (0203)	Area (ha)=	0.22	Curve Number (CN)= 59.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

Unit Hyd Qpeak (cms)= 0.042

PEAK FLOW (cms)= 0.008 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 10.647
TOTAL RAINFALL (mm)= 54.733
RUNOFF COEFFICIENT = 0.195

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

CALIB			
STANDHYD (0201)	Area (ha)=	0.70	
ID= 1 DT= 2.0 min	Total Imp(%)=	55.00	Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.31	40.00
Mannings n	=	0.015	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)=	2.03 (ii)	8.79 (ii)		
Unit Hyd. Tpeak (min)=	4.00	10.00		
Unit Hyd. peak (cms)=	0.41	0.12		
			TOTALS	
PEAK FLOW (cms)=	0.10	0.02	0.111 (iii)	
TIME TO PEAK (hrs)=	1.50	1.63	1.50	
RUNOFF VOLUME (mm)=	52.73	14.18	29.59	
TOTAL RAINFALL (mm)=	54.73	54.73	54.73	
RUNOFF COEFFICIENT =	0.96	0.26	0.54	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0202)	Area (ha)=	1.22	
ID= 1 DT= 2.0 min	Total Imp(%)=	70.00	Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.85	0.37
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.07	40.00
Mannings n	=	0.015	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	8.00	
Storage Coeff. (min)=	2.39 (ii)	7.88 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.38	0.14	
			TOTALS
PEAK FLOW (cms)=	0.19	0.05	0.226 (iii)
TIME TO PEAK (hrs)=	1.50	1.60	1.50
RUNOFF VOLUME (mm)=	52.73	18.24	33.76
TOTAL RAINFALL (mm)=	54.73	54.73	54.73
RUNOFF COEFFICIENT =	0.96	0.33	0.62

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 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  (  0006)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0201):     0.70   0.111     1.50    29.59
      + ID2= 2 (  0202):     1.22   0.226     1.50    33.76
        ================================================
        ID = 3 (  0006):     1.92   0.337     1.50    32.24

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

-------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0006):     1.92   0.337     1.50    32.24
      + ID2= 2 (  0203):     0.22   0.008     1.67    10.65
        ================================================
        ID = 1 (  0006):     2.13   0.343     1.50    30.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  2000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0340      0.0630
                         0.0140     0.0080   |   0.0380      0.0820
                         0.0210     0.0190   |   0.0410      0.1050
                         0.0260     0.0310   |   0.0450      0.1360
                         0.0310     0.0460   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0006)      2.135      0.343      1.50      30.03
   OUTFLOW: ID= 1 (  2000)      2.135      0.030      2.38      29.96

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.78
                  TIME SHIFT OF PEAK FLOW         (min)= 53.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0434

--------------------------------------------------------------------------------
================================================================================================
================

       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:
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Summary filename:
C:\Users\dsredojevic\AppData\Local\Civica\VH5\a1fe4a80-3784-4643-a828-f657184a1ad1\5687759b-2a3d-405f-925f-75ec7cd11cf2\

DATE: 02/22/2023 TIME: 08:09:22

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   (  0203)|   Area    (ha)=   0.22   Curve Number   (CN)= 59.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.042

     PEAK FLOW       (cms)=   0.016 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  21.463
     TOTAL RAINFALL   (mm)=  79.353
     RUNOFF COEFFICIENT   =   0.270

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   0.70
|ID= 1 DT= 2.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.39         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      68.31        40.00
     Mannings n           =      0.015        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	3.57	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)=	1.75 (ii)	7.58 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.43	0.15	
			TOTALS
PEAK FLOW (cms)=	0.14	0.05	0.179 (iii)
TIME TO PEAK (hrs)=	1.50	1.60	1.50
RUNOFF VOLUME (mm)=	77.35	27.48	47.42
TOTAL RAINFALL (mm)=	79.35	79.35	79.35
RUNOFF COEFFICIENT =	0.97	0.35	0.60

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0202)	Area (ha)= 1.22
ID= 1 DT= 2.0 min	Total Imp(%)= 70.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.85	0.37
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.07	40.00
Mannings n	=	0.015	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	3.57	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)=	2.06 (ii)	6.79 (ii)		
Unit Hyd. Tpeak (min)=	4.00	8.00		
Unit Hyd. peak (cms)=	0.40	0.16		
			TOTALS	
PEAK FLOW (cms)=	0.27	0.11	0.359 (iii)	
TIME TO PEAK (hrs)=	1.50	1.57	1.50	
RUNOFF VOLUME (mm)=	77.35	33.96	53.48	
TOTAL RAINFALL (mm)=	79.35	79.35	79.35	
RUNOFF COEFFICIENT =	0.97	0.43	0.67	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 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 (0006)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	0.70	0.179	1.50	47.42
+ ID2= 2 (0202):	1.22	0.359	1.50	53.48
ID = 3 (0006):	1.92	0.538	1.50	51.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
| ADD HYD  (  0006)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0006):     1.92   0.538     1.50    51.27
      + ID2= 2 (  0203):     0.22   0.016     1.67    21.46
        ================================================
        ID = 1 (  0006):     2.13   0.551     1.50    48.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  2000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0340      0.0630
                          0.0140     0.0080   |   0.0380      0.0820
                          0.0210     0.0190   |   0.0410      0.1050
                          0.0260     0.0310   |   0.0450      0.1360
                          0.0310     0.0460   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0006)      2.135      0.551      1.50      48.23
   OUTFLOW: ID= 1 (  2000)      2.135      0.037      2.57      48.16

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.63
                  TIME SHIFT OF PEAK FLOW         (min)= 64.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0751

------------------------------------------------------------------------------
==============================================================================
================

       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:
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-f8a4-4830-b625-60330da14db7\

DATE: 02/22/2023 TIME: 08:09:21

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 (0203)| ID= 1 DT=10.0 min |

Area (ha)= 0.22 Curve Number (CN)= 59.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

Unit Hyd Qpeak (cms)= 0.042

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 7.172
TOTAL RAINFALL (mm)= 44.928
RUNOFF COEFFICIENT = 0.160

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   0.70
|ID= 1 DT= 2.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.39         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      68.31        40.00
     Mannings n           =      0.015        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)=       2.17 (ii)    9.43 (ii)
     Unit Hyd. Tpeak (min)=       4.00        10.00
```

Unit Hyd. peak (cms)=	0.39	0.12		
			TOTALS	
PEAK FLOW (cms)=	0.08	0.02	0.090 (iii)	
TIME TO PEAK (hrs)=	1.50	1.63	1.50	
RUNOFF VOLUME (mm)=	42.93	9.77	23.03	
TOTAL RAINFALL (mm)=	44.93	44.93	44.93	
RUNOFF COEFFICIENT =	0.96	0.22	0.51	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0202)| Area (ha)= 1.22
ID= 1 DT= 2.0 min | Total Imp(%)= 70.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.85	0.37
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.07	40.00
Mannings n	=	0.015	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)=       2.56 (ii)    8.45 (ii)
     Unit Hyd. Tpeak (min)=       4.00        10.00
     Unit Hyd. peak  (cms)=       0.36         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.04          0.178 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.63           1.50
     RUNOFF VOLUME    (mm)=      42.93        12.86          26.39
     TOTAL RAINFALL   (mm)=      44.93        44.93          44.93
     RUNOFF COEFFICIENT   =       0.96         0.29           0.59


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    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  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0201):     0.70   0.090     1.50    23.03
      + ID2= 2 (  0202):     1.22   0.178     1.50    26.39
        ================================================
        ID = 3 (  0006):     1.92   0.268     1.50    25.16

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

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0006):     1.92   0.268     1.50    25.16
      + ID2= 2 (  0203):     0.22   0.005     1.67     7.17
        ================================================
        ID = 1 (  0006):     2.13   0.272     1.50    23.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  2000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
```

```
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0340      0.0630
                          0.0140     0.0080   |   0.0380      0.0820
                          0.0210     0.0190   |   0.0410      0.1050
                          0.0260     0.0310   |   0.0450      0.1360
                          0.0310     0.0460   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0006)      2.135      0.272      1.50      23.32
   OUTFLOW: ID= 1 (  2000)      2.135      0.027      2.30      23.26

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.80
                  TIME SHIFT OF PEAK FLOW         (min)= 48.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0328

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       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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DATE: 02/22/2023                          TIME: 08:09:22

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   (  0203)|   Area    (ha)=   0.22   Curve Number   (CN)= 59.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.042

     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  14.586
     TOTAL RAINFALL   (mm)=  64.446
     RUNOFF COEFFICIENT   =   0.226

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   0.70
|ID= 1 DT= 2.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  40.00
--------------------

                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.39         0.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      68.31        40.00
```

Mannings n = 0.015 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)=	1.89 (ii)	8.22 (ii)		
Unit Hyd. Tpeak (min)=	4.00	10.00		
Unit Hyd. peak (cms)=	0.42	0.13		
			TOTALS	
PEAK FLOW (cms)=	0.11	0.03	0.135 (iii)	
TIME TO PEAK (hrs)=	1.50	1.63	1.50	
RUNOFF VOLUME (mm)=	62.45	19.08	36.42	
TOTAL RAINFALL (mm)=	64.45	64.45	64.45	
RUNOFF COEFFICIENT =	0.97	0.30	0.57	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0202)	Area (ha)= 1.22
ID= 1 DT= 2.0 min	Total Imp(%)= 70.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.85	0.37
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.07	40.00
Mannings n	=	0.015	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	8.00
Storage Coeff. (min)=		2.24 (ii)	7.37 (ii)

```
     Unit Hyd. Tpeak (min)=       4.00         8.00
     Unit Hyd. peak  (cms)=       0.39         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.07          0.278 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.57           1.50
     RUNOFF VOLUME    (mm)=      62.45        24.11          41.36
     TOTAL RAINFALL   (mm)=      64.45        64.45          64.45
     RUNOFF COEFFICIENT   =       0.97         0.37           0.64


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    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  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0201):     0.70   0.135     1.50    36.42
      + ID2= 2 (  0202):     1.22   0.278     1.50    41.36
        ====================================================
        ID = 3 (  0006):     1.92   0.414     1.50    39.55

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

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0006):     1.92   0.414     1.50    39.55
      + ID2= 2 (  0203):     0.22   0.011     1.67    14.59
        ====================================================
        ID = 1 (  0006):     2.13   0.422     1.50    37.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  2000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0340      0.0630
                          0.0140     0.0080   |   0.0380      0.0820
                          0.0210     0.0190   |   0.0410      0.1050
                          0.0260     0.0310   |   0.0450      0.1360
                          0.0310     0.0460   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0006)      2.135      0.422      1.50      37.00
   OUTFLOW: ID= 1 (  2000)      2.135      0.033      2.47      36.94
```

```
                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.74
                  TIME SHIFT OF PEAK FLOW         (min)= 58.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0555

--------------------------------------------------------------------------------
================================================================================
================

       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:
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  Summary filename:
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-fe5b-4722-b56a-0ccbec87a289\


DATE: 02/22/2023                          TIME: 08:09:22

USER:



COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : 250 Year Regional Storm       **
  ***********************************************


--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3048.220
| Ptotal= 90.48 mm |                          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 (0203)	Area (ha)=	0.22	Curve Number (CN)= 59.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

Unit Hyd Qpeak (cms)= 0.042

PEAK FLOW (cms)= 0.021 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 27.162
TOTAL RAINFALL (mm)= 90.478
RUNOFF COEFFICIENT = 0.300

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

CALIB			
STANDHYD (0201)	Area (ha)=	0.70	
ID= 1 DT= 2.0 min	Total Imp(%)=	55.00	Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.31	40.00
Mannings n	=	0.015	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)=	1.64 (ii)	7.11 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.44	0.15	
			TOTALS
PEAK FLOW (cms)=	0.16	0.07	0.218 (iii)
TIME TO PEAK (hrs)=	1.50	1.57	1.50
RUNOFF VOLUME (mm)=	88.48	34.33	55.98
TOTAL RAINFALL (mm)=	90.48	90.48	90.48
RUNOFF COEFFICIENT =	0.98	0.38	0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (0202)	Area (ha)=	1.22
ID= 1 DT= 2.0 min	Total Imp(%)=	70.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.85	0.37
Dep. Storage	(mm)=	2.00	5.00

Average Slope	(%)=	1.00	2.00
Length	(m)=	90.07	40.00
Mannings n	=	0.015	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)=		1.93 (ii)	6.37 (ii)	
Unit Hyd. Tpeak (min)=		4.00	8.00	
Unit Hyd. peak (cms)=		0.41	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.32	0.14	0.435 (iii)
TIME TO PEAK	(hrs)=	1.50	1.57	1.50
RUNOFF VOLUME	(mm)=	88.48	41.84	62.83
TOTAL RAINFALL	(mm)=	90.48	90.48	90.48
RUNOFF COEFFICIENT	=	0.98	0.46	0.69

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0201):     0.70   0.218     1.50    55.98
      + ID2= 2 (  0202):     1.22   0.435     1.50    62.83
        ====================================================
        ID = 3 (  0006):     1.92   0.653     1.50    60.33

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

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0006):     1.92   0.653     1.50    60.33
      + ID2= 2 (  0203):     0.22   0.021     1.67    27.16
        ====================================================
        ID = 1 (  0006):     2.13   0.670     1.50    56.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  2000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0340      0.0630
                          0.0140     0.0080   |   0.0380      0.0820
                          0.0210     0.0190   |   0.0410      0.1050
                          0.0260     0.0310   |   0.0450      0.1360
                          0.0310     0.0460   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0006)      2.135      0.670      1.50      56.94
   OUTFLOW: ID= 1 (  2000)      2.135      0.039      2.62      56.87

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.84
                  TIME SHIFT OF PEAK FLOW         (min)= 67.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0909

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 FINISH
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       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

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  Summary filename:
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-5380-47cd-8139-971f9c1a8533\


DATE: 02/22/2023                          TIME: 08:09:22

USER:



COMMENTS: _____________________________________________________________


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


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| 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 (0203)	Area (ha)= 0.22	Curve Number (CN)= 59.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.20		

Unit Hyd Qpeak (cms)= 0.042

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 7.752
TOTAL RAINFALL (mm)= 46.680
RUNOFF COEFFICIENT = 0.166

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

CALIB			
STANDHYD (0201)	Area (ha)= 0.70		
ID= 1 DT= 2.0 min	Total Imp(%)= 55.00	Dir. Conn.(%)= 40.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.31	40.00
Mannings n	=	0.015	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)=	2.16 (ii)	9.36 (ii)	
Unit Hyd. Tpeak (min)=	4.00	10.00	
Unit Hyd. peak (cms)=	0.39	0.12	
			TOTALS
PEAK FLOW (cms)=	0.08	0.02	0.092 (iii)
TIME TO PEAK (hrs)=	1.50	1.63	1.50
RUNOFF VOLUME (mm)=	44.68	10.51	24.17
TOTAL RAINFALL (mm)=	46.68	46.68	46.68
RUNOFF COEFFICIENT =	0.96	0.23	0.52

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (0202)	Area (ha)=	1.22
ID= 1 DT= 2.0 min	Total Imp(%)=	70.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.85	0.37
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.07	40.00
Mannings n	=	0.015	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)=	2.55 (ii)	8.39 (ii)		
Unit Hyd. Tpeak (min)=	4.00	10.00		
Unit Hyd. peak (cms)=	0.36	0.13		
			TOTALS	
PEAK FLOW (cms)=	0.16	0.04	0.182 (iii)	
TIME TO PEAK (hrs)=	1.50	1.63	1.50	
RUNOFF VOLUME (mm)=	44.68	13.78	27.68	
TOTAL RAINFALL (mm)=	46.68	46.68	46.68	
RUNOFF COEFFICIENT =	0.96	0.30	0.59	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 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  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0201):     0.70   0.092     1.50    24.17
      + ID2= 2 (  0202):     1.22   0.182     1.50    27.68
        ================================================
        ID = 3 (  0006):     1.92   0.274     1.50    26.40

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

--------------------
| ADD HYD  (  0006)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0006):     1.92   0.274     1.50    26.40
      + ID2= 2 (  0203):     0.22   0.005     1.67     7.75
        ================================================
        ID = 1 (  0006):     2.13   0.278     1.50    24.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  2000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0340      0.0630
                         0.0140     0.0080   |   0.0380      0.0820
                         0.0210     0.0190   |   0.0410      0.1050
                         0.0260     0.0310   |   0.0450      0.1360
                         0.0310     0.0460   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0006)      2.135      0.278      1.50      24.49
   OUTFLOW: ID= 1 (  2000)      2.135      0.027      2.35      24.43

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.71
                    TIME SHIFT OF PEAK FLOW         (min)= 51.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0341

--------------------------------------------------------------------------------
================================================================================================
================

       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\dsredojevic\AppData\Local\Civica\VH5\a1fe4a80-3784-4643-a828-f657184a1ad1\8ea85054-3e4e-4b79-afb7-647be8bfedaf\
Summary filename:
C:\Users\dsredojevic\AppData\Local\Civica\VH5\a1fe4a80-3784-4643-a828-f657184a1ad1\8ea85054-3e4e-4b79-afb7-647be8bfedaf\

DATE: 02/22/2023 TIME: 08:09:22

USER:

COMMENTS: _____

** SIMULATION : 50 Year 4 Hour Chicago **

| CHICAGO STORM |
| Ptotal= 72.03 mm |

IDF curve parameters: A=2270.665
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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN 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 (0203)| Area (ha)= 0.22 Curve Number (CN)= 59.0
|ID= 1 DT=10.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
--- U.H. Tp(hrs)= 0.20

Unit Hyd Qpeak (cms)= 0.042

PEAK FLOW (cms)= 0.013 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 17.966
TOTAL RAINFALL (mm)= 72.026
RUNOFF COEFFICIENT = 0.249

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

| CALIB |
| STANDHYD (0201)| Area (ha)= 0.70
|ID= 1 DT= 2.0 min | Total Imp(%)= 55.00 Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.39	0.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	68.31	40.00
Mannings n	=	0.015	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	3.35	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	8.00	
Storage Coeff. (min)=	1.81 (ii)	7.87 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.43	0.14	
			TOTALS
PEAK FLOW (cms)=	0.13	0.04	0.159 (iii)
TIME TO PEAK (hrs)=	1.50	1.60	1.50
RUNOFF VOLUME (mm)=	70.03	23.23	41.94
TOTAL RAINFALL (mm)=	72.03	72.03	72.03
RUNOFF COEFFICIENT =	0.97	0.32	0.58

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0202)	Area (ha)= 1.22
ID= 1 DT= 2.0 min	Total Imp(%)= 70.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.85	0.37
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	90.07	40.00
Mannings n	=	0.015	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	3.35	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	8.00	
Storage Coeff. (min)=	2.14 (ii)	7.06 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.40	0.15	
			TOTALS
PEAK FLOW (cms)=	0.25	0.09	0.318 (iii)
TIME TO PEAK (hrs)=	1.50	1.57	1.50
RUNOFF VOLUME (mm)=	70.03	29.00	47.46
TOTAL RAINFALL (mm)=	72.03	72.03	72.03
RUNOFF COEFFICIENT =	0.97	0.40	0.66

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 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 (0006)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	0.70	0.159	1.50	41.94
+ ID2= 2 (0202):	1.22	0.318	1.50	47.46
ID = 3 (0006):	1.92	0.477	1.50	45.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
| ADD HYD  (  0006)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0006):     1.92   0.477     1.50    45.45
      + ID2= 2 (  0203):     0.22   0.013     1.67    17.97
        ================================================
        ID = 1 (  0006):     2.13   0.488     1.50    42.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  2000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0340      0.0630
                          0.0140     0.0080   |   0.0380      0.0820
                          0.0210     0.0190   |   0.0410      0.1050
                          0.0260     0.0310   |   0.0450      0.1360
                          0.0310     0.0460   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0006)      2.135      0.488      1.50      42.64
   OUTFLOW: ID= 1 (  2000)      2.135      0.034      2.53      42.57

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.06
                  TIME SHIFT OF PEAK FLOW         (min)= 62.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0652

------------------------------------------------------------------------------
```

Appendix F

Conceptual Stage-Storage-Discharge Relationship

NORTH STREET RESIDENTIAL DEVELOPMENT
STORMWATER MANAGEMENT
Dorchester, Ontario

Project Number: 47030-300
Date: February 21, 2023
Design By: DXS
File: Q:\47030\300\SWM\Calcualtions\47030-300 Master SWM Facility Design Sheet-Dry Pond-2022 DEcemberDS1.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)	259.70	500.00	500.00
Width (m)			
Diameter/Height (m)	0.120	0.270	0.400
Type (H/V)	V	V	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

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
259.70	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
259.95	83	0.01	0.19	0.0138	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0138
260.20	186	0.01	0.44	0.0209	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0209
260.45	309	0.01	0.69	0.0262	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0262
260.70	456	0.01	0.94	0.0306	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0306
260.95	627	0.01	1.19	0.0344	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0344
261.20	825	0.01	1.44	0.0379	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0379
261.45	1051	0.01	1.69	0.0410	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0410
261.75	1362	0.01	1.99	0.0445	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0445

NORTH STREET RESIDENTIAL DEVELOPMENT

STORMWATER MANAGEMENT

Dorchester, Ontario

Project Number: 47030-300
Date: February 21, 2023
Design By: DXS
File: Q:\47030\300\SWM\Calcualtions\47030-300 Master SWM Facility Design Sheet-Dry Pond-2022 DEcemberDS1.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*
259.70	0	295	0	0		259.70	Bottom of Pond	259.70
259.95	0.25	370	83	83				259.95
260.20	0.50	451	103	186				260.20
260.45	0.75	538	124	309				260.45
260.70	1.00	633	146	456				260.70
260.95	1.25	736	171	627				260.95
261.20	1.50	846	198	825	768	261.13	100-Year Event	261.20
261.45	1.75	961	226	1051	910	261.30	250-Year Event	261.45
261.75	2.05	1117	312	1362			Top of the Pond	261.75

Appendix G

Conceptual CDS Stormwater Treatment Unit (OGS) Information

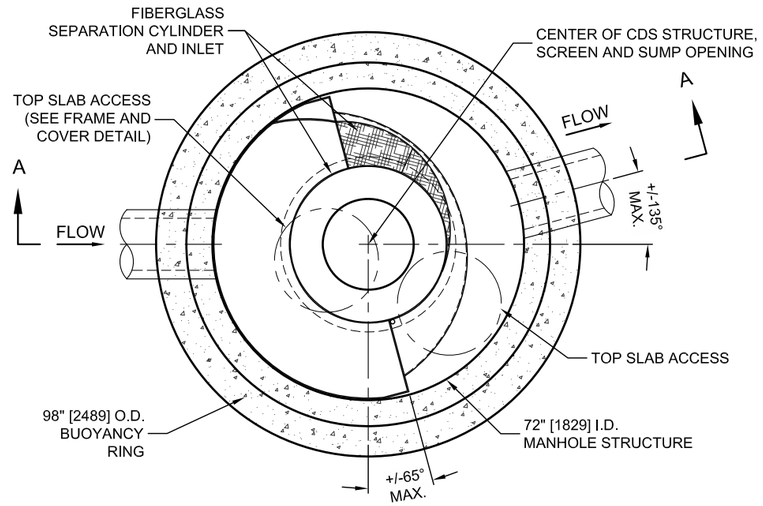
CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name:	246 North Street	**Engineer:**	**MTE Consultants Inc.**
Location:	Dorchester, ON	**Contact:**	Dragan Sredojevic, P.Eng.
OGS #:	OGS	**Report Date:**	8-Feb-23

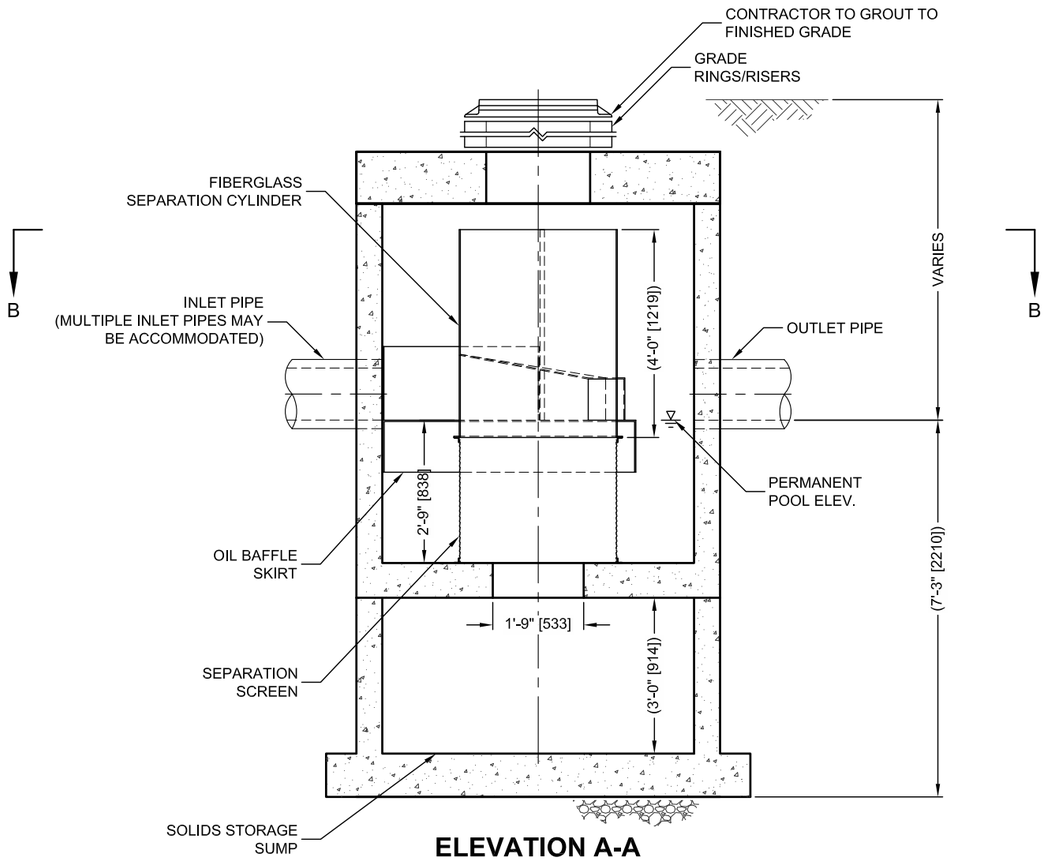
Area	2.2	ha	**Rainfall Station #**	195	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	3020		**CDS Treatment Capacity**	57	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.8%	9.8%	2.0	2.0	3.5	97.9	9.6
1.0	10.3%	20.1%	4.0	4.0	7.0	96.8	9.9
1.5	9.7%	29.7%	6.0	6.0	10.5	95.8	9.3
2.0	8.9%	38.6%	8.0	8.0	14.0	94.8	8.4
2.5	7.7%	46.2%	9.9	9.9	17.5	93.8	7.2
3.0	6.5%	52.7%	11.9	11.9	21.1	92.8	6.0
3.5	4.2%	56.9%	13.9	13.9	24.6	91.8	3.9
4.0	4.7%	61.6%	15.9	15.9	28.1	90.8	4.2
4.5	3.9%	65.4%	17.9	17.9	31.6	89.8	3.5
5.0	3.4%	68.8%	19.9	19.9	35.1	88.8	3.0
6.0	4.7%	73.6%	23.9	23.9	42.1	86.8	4.1
7.0	4.6%	78.2%	27.8	27.8	49.1	84.8	3.9
8.0	3.5%	81.7%	31.8	31.8	56.1	82.8	2.9
9.0	2.3%	84.0%	35.8	35.8	63.2	80.8	1.9
10.0	2.6%	86.6%	39.8	39.8	70.2	78.7	2.0
15.0	6.7%	93.3%	59.6	56.6	100.0	66.7	4.5
20.0	2.7%	96.0%	79.5	56.6	100.0	50.0	1.3
25.0	1.7%	97.7%	99.4	56.6	100.0	40.0	0.7
30.0	1.3%	99.0%	119.3	56.6	100.0	33.3	0.4
35.0	0.6%	99.6%	139.1	56.6	100.0	28.6	0.2
40.0	0.3%	99.8%	159.0	56.6	100.0	25.0	0.1
45.0	0.0%	99.8%	178.9	56.6	100.0	22.2	0.0
50.0	0.2%	100.0%	198.8	56.6	100.0	20.0	0.0
							87.0
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**80.5%**
						Predicted % Annual Rainfall Treated =	**96.8%**

1 - Based on 44 years of hourly rainfall data from Canadian Station 6144475, London ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications



PLAN VIEW B-B
N.T.S.

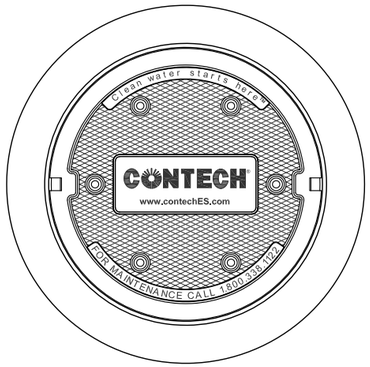


ELEVATION A-A
N.T.S.

CDS PMSU3020-6-C DESIGN NOTES

THE STANDARD CDS PMSU3020-6-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
CUSTOMIZABLE SUMP DEPTH AVAILABLE
ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH® ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS PMSU3020-6-C
INLINE CDS
STANDARD DETAIL

Appendix H

Conceptual Water Supply Information

MTE Consultants
123 St. George St., London, Ontario N6A 3A1

DATE: February 10, 2023
JOB N0.: 47030-300

Client: **246 North Inc.**
Project: **246 North Street**
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)
EX.HYD-1	263										
EX.HYD-2	264										
J-2	263										
J-3	264				18	43	0.17	0.17	0.48	0.72	0.07
J-5	264	37	111	0.45				0.45	1.24	1.86	0.18
J-6	262	27	81	0.33				0.33	0.90	1.36	0.13
J-7	263										
J-8	260	3	9	0.04				0.04	0.10	0.15	0.01
J-9	264				7	17	0.07	0.07	0.19	0.28	0.03
J-11	264	5	15	0.06				0.06	0.17	0.25	0.02
J-12	256	6	18	0.07				0.07	0.20	0.30	0.03
J-13	257										
J-14	258	2	6	0.02				0.02	0.07	0.10	0.01
J-15	260	5	15	0.06				0.06	0.17	0.25	0.02
J-16	258	6	18	0.07				0.07	0.20	0.30	0.03
J-17	259	1	3	0.01				0.01	0.03	0.05	0.00
J-18	261	2	6	0.02				0.02	0.07	0.10	0.01
J-19	262	4	12	0.05				0.05	0.13	0.20	0.02
J-20	264										
J-21	267	8	24	0.10				0.10	0.27	0.40	0.04
J-22	278	3	9	0.04				0.04	0.10	0.15	0.01
J-23	278										
J-24	277	5	15	0.06				0.06	0.17	0.25	0.02
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-27	261.55	22	66	0.27				0.27	0.74	1.10	0.11
J-28	256.46	18	54	0.22				0.22	0.60	0.90	0.09
J-31	264	7	21	0.09				0.09	0.23	0.35	0.03
J-32	263	9	27	0.11				0.11	0.30	0.45	0.04
PROP.HYD-1	263.93										
PROP.HYD-2	264										
Total		202	606	2.45	25	60	0.24	2.70	7.42	11.14	1.08

Highlighted fields note the proposed junctiones

Municipality of Thames Centre Engineering Design Standards

Average Domestic Flow =	350	l/cap/day or	**0.004050926** 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 (USGPM)	Flow @20 psi (l/s)	Static Pressure (psi)	Static Pressure (m H_20)
D405	GREEN	1265	79.80	57	302.57
D406	ORANGE	974	61.44	55.8	301.80
D407	ORANGE	933	58.85	54.1	300.03
D408	ORANGE	930	58.66	55.6	301.71
D411	GREEN	1164	73.43	58.8	301.14
D415	BLUE	3017	190.31	58.9	301.21
D416	BLUE	2255	142.25	57.1	301.67

Municipality of Thames Centre

Water and Wastewater Master Plan Update

Dorchester Elevated Tank

New 200mm WM on North St

New 200mm WM through our site to make a looped system

Upgrade existing 150mm WM to 200mm WM

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

SHAW RD
HAMILTON RD
BRIDGE ST
MAIN 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

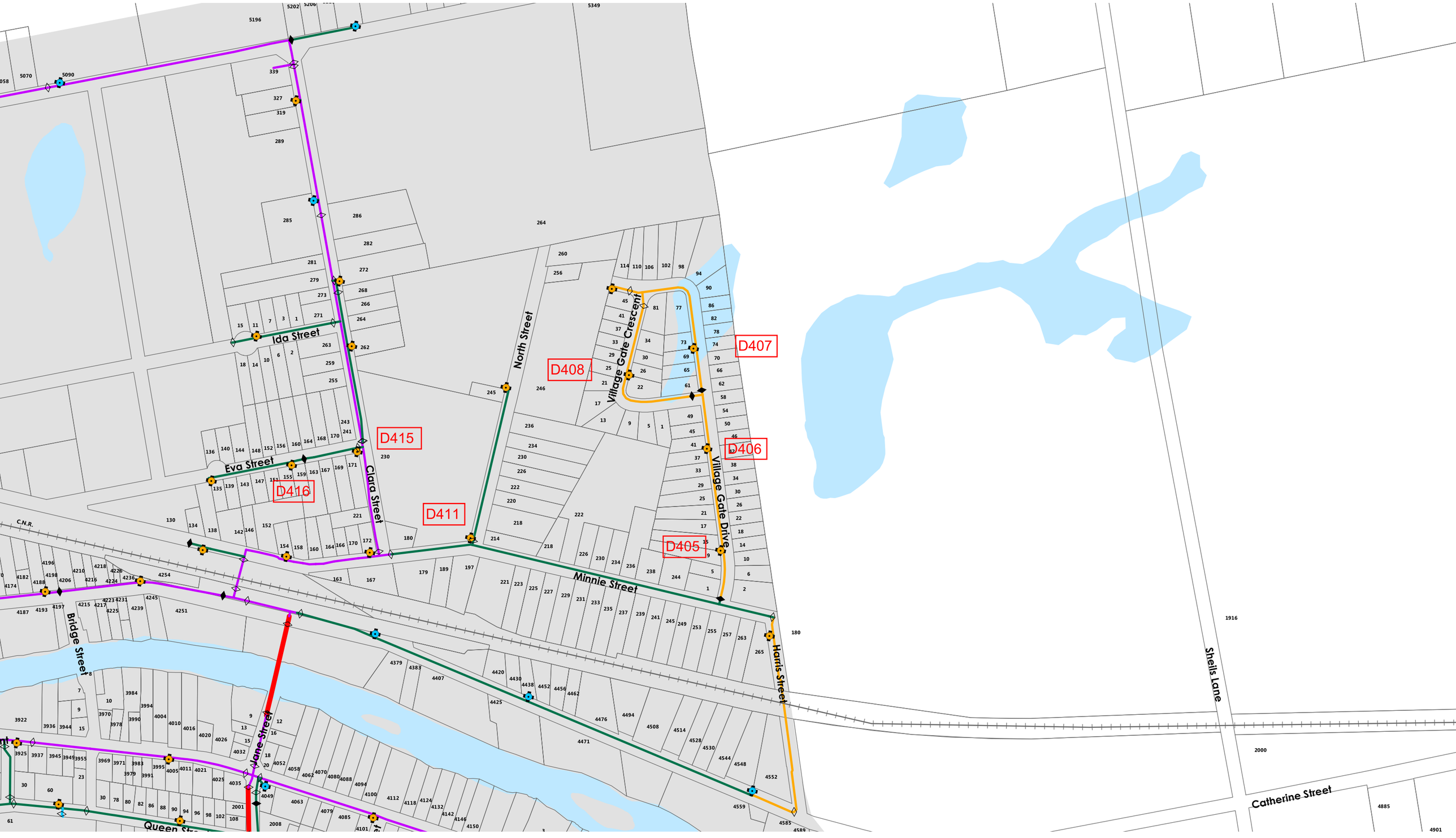
Preferred Dorchester Water Servicing Strategy

BluePlan

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

Table ES-1: Water Capital Program

Capital Program ID	Name	Description	Serviced Development Blocks	Upgrade Trigger	Upgrade Trigger (Population Growth)	Class EA Schedule	Project Type	Length (m)	Size/Capacity	Capital Program Total Component Estimated Cost (Excl. HST)
W-D-SUP-01	Maximize Dorchester WTF Supply	Maximize Well Capacity at Existing WTF	All Dorchester Developments	Existing Need	Today	A	Treatment	0 m	20 L/s	$ 1,067,000
W-D-SUP-02	New Dorchester Groundwater Supply	Includes cost of new Dorchester groundwater supply and consolidation of sources at Dorchester WTF for treatment. Includes new well houses, raw watermains, and treatment. Excludes pump capacity upgrades cost to the Dorchester WTF High Lift Pumps	All Dorchester Developments	Accumulated growth	80% Trigger of 2,800 PPJ (Persons + Jobs) = 2,200 PPJ	C	Treatment	0 m	0 L/s	$ 10,000,000
W-D-BPS-01	Dorchester HLP Upgrades	Upgrade Dorchester HLPs to supply elevated tank and distribution system from reservoirs	All Dorchester Existing + Development	Accumulated Growth or State of Good Repair (SOGR)	6,000 PPJ	A	Pumping	0 m	90 L/s	$ 1,067,000
W-D-WM-01	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (South of Byron Ave.)	450m of existing 250mm DI watermain (built in 1976) to be replaced by 300mm PVC watermain	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	450 m	300 mm	$ 931,000
W-D-WM-02	Dorchester Watermain - Spine Trunk Upgrade on Dorchester Rd. (River Bank)	190m of existing 250mm DI watermain (built in 1976 - 1987) to be replaced by 300mm PVC watermain	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	190 m	300 mm	$ 403,000
W-D-WM-03	Dorchester Watermain - Spine Trunk Upgrade on Catherine St. and Minnie Rd. (North Section)	390m of existing 250mm DI and PVC watermain (built in 1990 - 1992) to be replaced by 300mm PVC watermain following Catherine St. + Minnie St. alignment	All Dorchester Developments	Accumulated Growth	North Dorchester Development	A+	Watermain	390 m	300 mm	$ 1,345,000
W-D-WM-04	Dorchester Watermain - North St. Upgrade	360m of existing 150mm CI watermain (built in 1956) on North Street and Minnie Street to be replaced by 200mm PVC watermain.	All Dorchester Developments	Dorchester Development Block 14	With new development	A+	Watermain	360 m	200 mm	$ 628,000
W-D-WM-05	Dorchester Watermain - Northeast Loop	Total of 710m of proposed PVC watermain on North Street and Village Gate Dr. to complete loop, including 590m of 200mm proposed PVC watermain on North St. and 130m of 150mm proposed PVC watermain on Village Gate Dr.	All Dorchester Developments	Dorchester Development Blocks 9, 10, 11 and 12	With new development	A	Watermain	590 m	200 mm	$ 1,023,000
W-D-WM-06	Dorchester Watermain - Marion St. Upgrade	Total of 320m of 200mm watermain on Marion Street, including 100m of existing 150mm PVC watermain to be replaced by 200mm PVC watermain and 220m of proposed 200mm PVC watermain.	All Dorchester Developments	Dorchester Development Blocks 9, 10, 11 and 12	With new development	A+	Watermain	320 m	200 mm	$ 555,000
W-D-WM-07	Dorchester Watermain - West Trunk at the Development 25	Newly proposed West Trunk - 660m of proposed 300mm PVC watermain at Development 25.	Dorchester Development Block 25	Dorchester Development Block 25	Construction proposed	A	Watermain	660 m	300 mm	$ 1,067,000
W-D-WM-08-ALT1	Dorchester Watermain - West Trunk at the Development 22	Newly proposed West Trunk - 620m of proposed 300mm PVC watermain at Development 22.	Dorchester Development Blocks 16, 17, 18, and 22	Dorchester Development Block 22	With new development	A	Watermain	620 m	300 mm	$ 1,010,000
W-D-WM-09-ALT1	Dorchester Watermain - West Trunk river crossing at Development 22.	Newly proposed West Trunk - 140m of proposed 300mm PVC watermain river crossing.	Dorchester Development Blocks 16, 17, 18, and 48	Dorchester Development Block 18 or 22	With new development	B	Watermain	140 m	300 mm	$ 356,000
W-D-WM-10-ALT1	Dorchester Watermain - West Trunk at Development 22.	Newly proposed West Trunk - 270m of proposed 300mm PVC watermain at Development 22.	Dorchester Development Blocks 16, 17, 18, and 48	Dorchester Development Block 18 or 22	With new development	A	Watermain	270 m	300 mm	$ 410,000
W-D-WM-11	Dorchester Watermain - West Trunk on Christie Dr.	Newly proposed West Trunk - Total of 980m of 300mm PVC watermain along Christie Dr. including 870m of proposed 300mm PVC watermain and 110m of existing 150mm PVC watermain to be replaced by 300mm PVC watermain	Dorchester Development Blocks 16 - 18 and 48	Dorchester Development Block 18	With new development	A	Watermain	980 m	300 mm	$ 1,718,000
W-D-WM-12	Dorchester Watermain - West Trunk on Harris Rd. and Hamilton Rd.	Newly proposed West Trunk - 1080m of proposed 300mm PVC watermain along Harris Rd. and Hamilton Rd.	Dorchester Development Blocks 16, 17 and 18	Dorchester Development Block 18	With new development	A	Watermain	910 m	300 mm	$ 1,638,000
W-D-WM-13	Dorchester Watermain - West Trunk at Mill Ct. Loop	Newly proposed West Trunk - 800m of proposed 200mm PVC watermain on Mill Ct to complete loop	Dorchester Development 18	Watermain Replacement Program	-	A+	Watermain	800 m	200 mm	$ 1,394,000
W-D-WM-14	Dorchester Watermain - Catherine St. East Section Upgrade	1020m of existing 250mm DI watermain (built in 1983) to be replaced by 300mm PVC watermain on Catherine St.	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1020 m	300 mm	$ 2,089,000
W-D-WM-15	Dorchester Watermain - Catherine St. West Section Upgrade	1390m of existing 200mm PVC watermain (built in 1973 - 2013) to be replaced by 300mm PVC watermain on Catherine St.	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1390 m	300 mm	$ 2,932,000
W-D-WM-16	Dorchester Watermain - Northwest Industrial Lands Upgrade	1260m of existing 200mm DI & PVC watermain (built in 1978 - 2013) to be replaced by 300mm PVC watermain	Existing Dorchester Development	Watermain Replacement Program	-	A+	Watermain	1260 m	300 mm	$ 2,283,000
W-D-WM-17	Dorchester Watermain - Hamilton Rd. Extension	350m of proposed 200mm PVC watermain along Hamilton Rd.	Dorchester Development Block 47	Dorchester Development Block 47	With new development	A+	Watermain	350 m	200 mm	$ 610,000
W-D-WM-18	Dorchester Watermain - Benefit to Existing System	370m of proposed 200mm PVC watermain along Mill Rd.	Dorchester Development Block 19	Dorchester Development Block 19	With new development	A+	Watermain	350 m	200 mm	$ 645,000
Sub-Total Dorchester Water Capital Program Projects										**$ 33,171,000**


D407
D408
D415
D416
D411
D406
D405
Ida Street
North Street
Village Gate Crescent
Village Gate Drive
Eva Street
Clara Street
Minnie Street
Harris Street
Bridge Street
Vane Street
Queen Street
Shells Lane
Catherine Street
C.N.R.

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 # **D405**

NFPA Colour Code **GREEN**

TEST HYDRANT INFO.

HYDRANT #	D405		
N.F.P.A. COLOUR CODE	GREEN		
STATIC PRESSURE	57.0	psi	
RESIDUAL PRESSURE	19.3	psi	
PRESSURE DROP	37.7	psi	
% PRESSURE DROP	66.1	% 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	1265 USGPM

CLIENT Thames Centre
Dorchester Ontario

CUSTOMER NAME Jarrod Craven
Area Superintendent
519-494 4845

LOCATION Dorchester Distribution System
15 Village Gate Dr

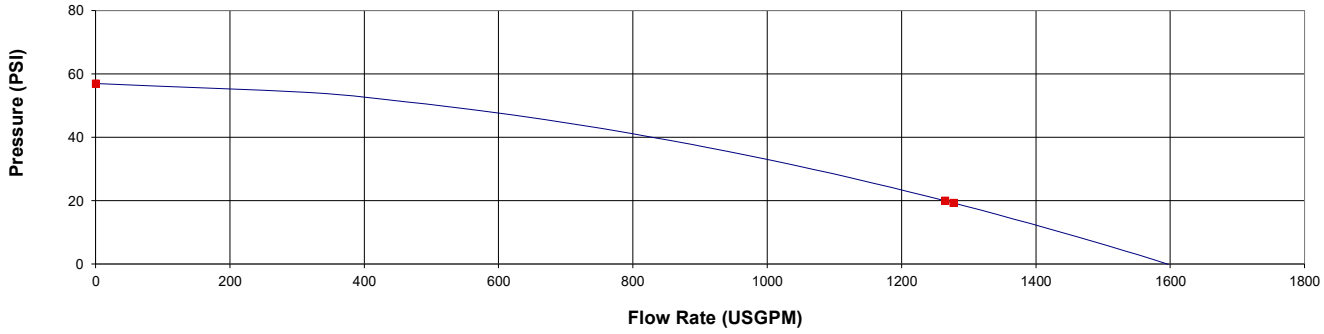
DATE 24-Aug-15

TIME 2:45pm

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	D406	1	2.5	SWIVEL BELL	0.90	15.7	553
2	D402	1	2.5	SWIVEL BELL	0.90	26.9	724
3							
4							
					Total Flow (USGPM)		1277

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.

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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 # **D406**

NFPA Colour Code **ORANGE**

TEST HYDRANT INFO.

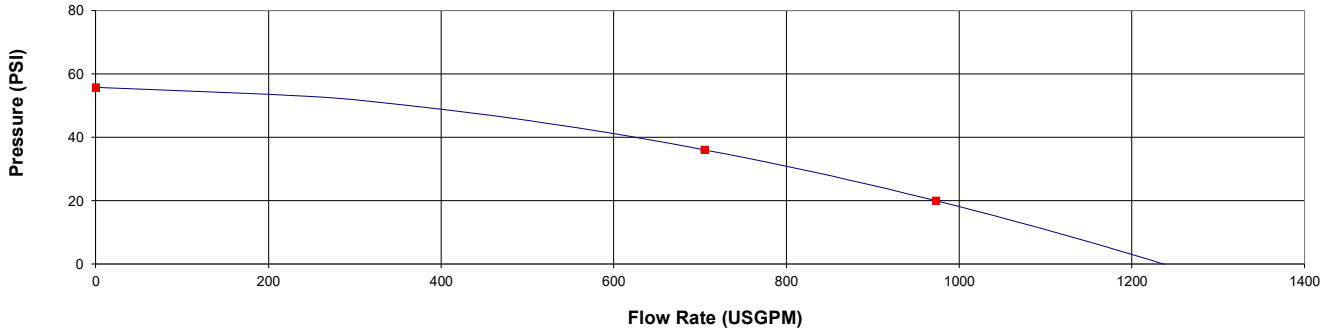
HYDRANT #	D406		
N.F.P.A. COLOUR CODE	ORANGE		
STATIC PRESSURE	55.8	psi	
RESIDUAL PRESSURE	36.1	psi	
PRESSURE DROP	19.7	psi	
% PRESSURE DROP	35.3	% psi	
NFPA 291 CONFORMANCE	MEETS NFPA 291 CONFORMANCE FOR REQUIRED PRESSURE DROP		
PRACTICAL DROP (10%)	MEETS PRACTICAL PRESSURE DROP OF 10%		
Flow At Test Hydrant at -	20	psi	974 USGPM

CLIENT	Thames Centre Dorchester Ontario
CUSTOMER NAME	Jarrod Craven Area Superintendent 519-494 4845
LOCATION	Dorchester Distribution System 37 Village Gate Dr
DATE	24-Aug-15
TIME	3:00pm

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	D409	1	2.5	SWIVEL BELL	0.90	25.5	705
2							
3							
4							
					Total Flow (USGPM)		705

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 # **D407**

NFPA Colour Code **ORANGE**

TEST HYDRANT INFO.

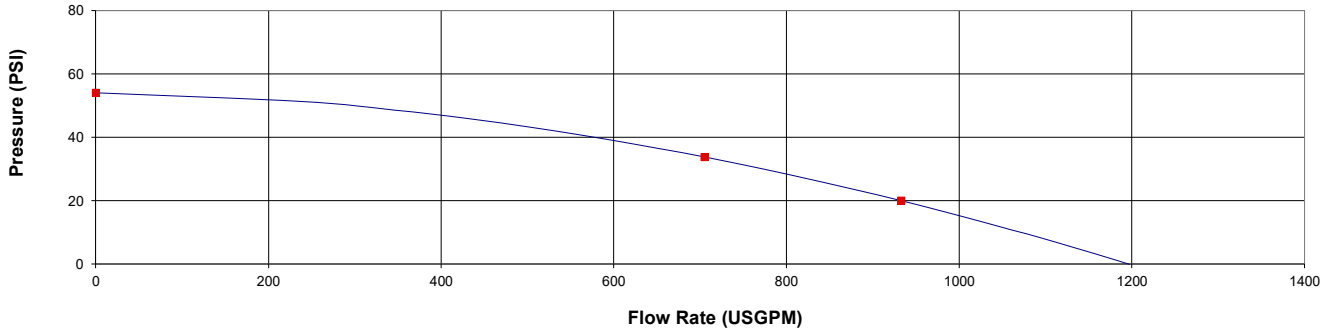
HYDRANT #	D407		
N.F.P.A. COLOUR CODE	ORANGE		
STATIC PRESSURE	54.1	psi	
RESIDUAL PRESSURE	33.8	psi	
PRESSURE DROP	20.3	psi	
% PRESSURE DROP	37.5	% psi	
NFPA 291 CONFORMANCE	MEETS NFPA 291 CONFORMANCE FOR REQUIRED PRESSURE DROP		
PRACTICAL DROP (10%)	MEETS PRACTICAL PRESSURE DROP OF 10%		
Flow At Test Hydrant at -	20	psi	933 USGPM

CLIENT	Thames Centre Dorchester Ontario
CUSTOMER NAME	Jarrod Craven Area Superintendent 519-494 4845
LOCATION	Dorchester Distribution System 74 Village Gate Dr
DATE	24-Aug-15
TIME	3:00pm

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	D409	1	2.5	SWIVEL BELL	0.90	25.5	705
2							
3							
4							
					Total Flow (USGPM)		705

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 # **D408**

NFPA Colour Code **ORANGE**

TEST HYDRANT INFO.

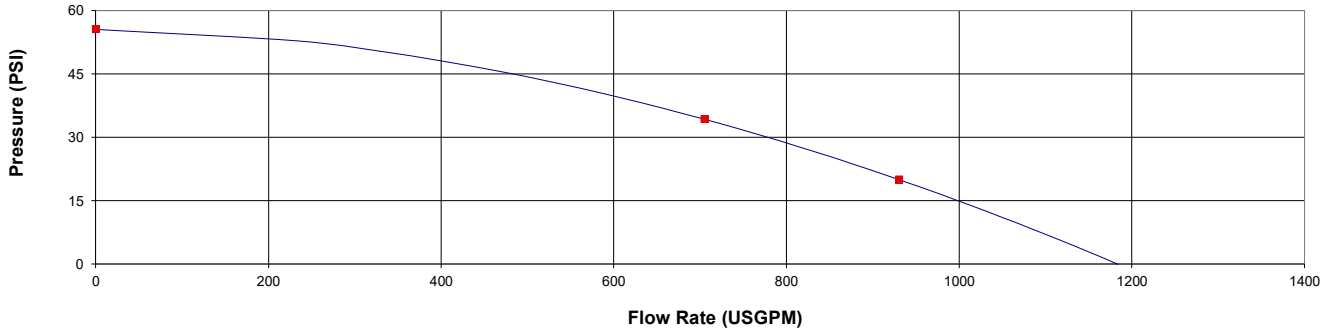
HYDRANT #	D408		
N.F.P.A. COLOUR CODE	ORANGE		
STATIC PRESSURE	55.6	psi	
RESIDUAL PRESSURE	34.3	psi	
PRESSURE DROP	21.3	psi	
% PRESSURE DROP	38.3	% psi	
NFPA 291 CONFORMANCE	MEETS NFPA 291 CONFORMANCE FOR REQUIRED PRESSURE DROP		
PRACTICAL DROP (10%)	MEETS PRACTICAL PRESSURE DROP OF 10%		
Flow At Test Hydrant at -	20	psi	930 USGPM

CLIENT	Thames Centre Dorchester Ontario
CUSTOMER NAME	Jarrod Craven Area Superintendent 519-494 4845
LOCATION	Dorchester Distribution System 26 Village Gate Cres
DATE	24-Aug-15
TIME	3:00pm

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	D409	1	2.5	SWIVEL BELL	0.90	25.5	705
2							
3							
4							
					Total Flow (USGPM)		705

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 # **D411**

NFPA Colour Code **GREEN**

TEST HYDRANT INFO.

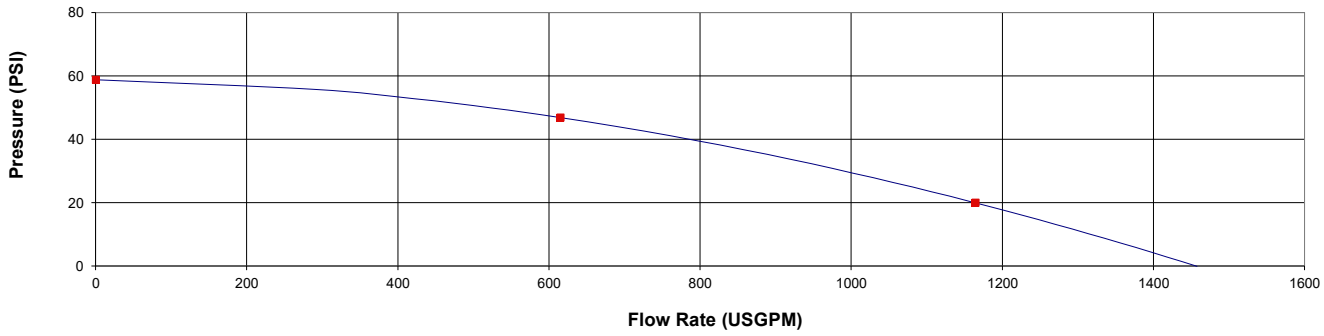
HYDRANT #	D411		
N.F.P.A. COLOUR CODE	GREEN		
STATIC PRESSURE	58.8	psi	
RESIDUAL PRESSURE	46.9	psi	
PRESSURE DROP	11.9	psi	
% PRESSURE DROP	20.2	% psi	
NFPA 291 CONFORMANCE	DOES NOT MEET NFPA 291 CONFORMANCE FOR REQUIRED PRESSURE DROP		
PRACTICAL DROP (10%)	MEETS PRACTICAL PRESSURE DROP OF 10%		
Flow At Test Hydrant at -	20	psi	1164 USGPM

CLIENT	Thames Centre Dorchester Ontario
CUSTOMER NAME	Jarrod Craven Area Superintendent 519-494 4845
LOCATION	Dorchester Distribution System Minnie at North
DATE	24-Aug-15
TIME	3:00pm

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	D410	1	2.5	SWIVEL BELL	0.90	19.4	615
2							
3							
4							
					Total Flow (USGPM)		615

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

More flow discharge is required to reduce the residual pressure to meet the NFPA 291 standard

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

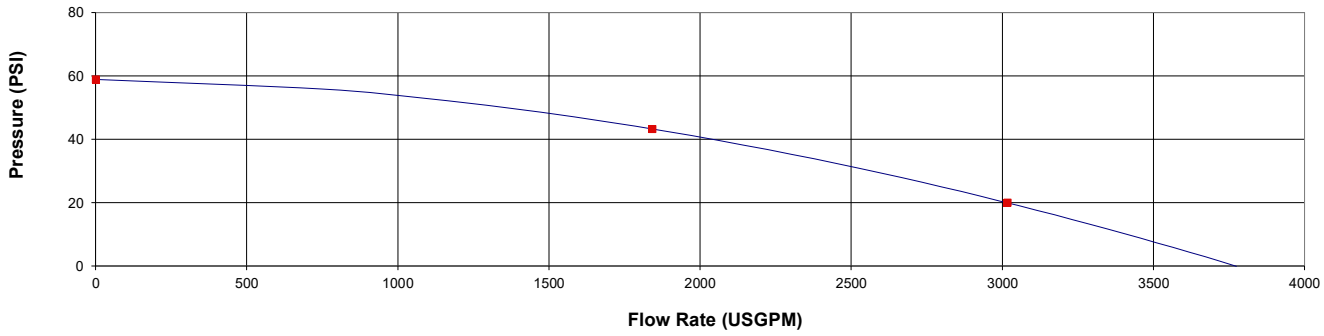
DATE 25-Aug-15

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.

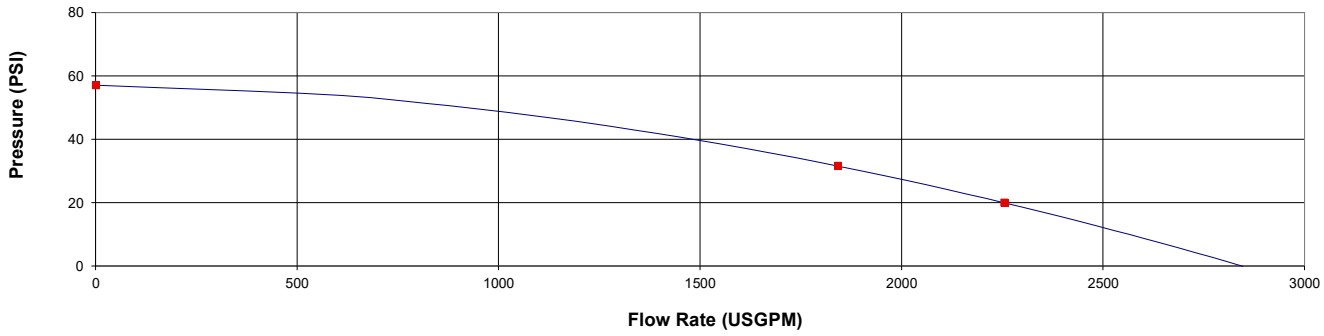
HYDRANT #	D416		
N.F.P.A. COLOUR CODE	BLUE		
STATIC PRESSURE	57.1	psi	
RESIDUAL PRESSURE	31.6	psi	
PRESSURE DROP	25.5	psi	
% PRESSURE DROP	44.7	% psi	
NFPA 291 CONFORMANCE	MEETS NFPA 291 CONFORMANCE FOR REQUIRED PRESSURE DROP		
PRACTICAL DROP (10%)	MEETS PRACTICAL PRESSURE DROP OF 10%		
Flow At Test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

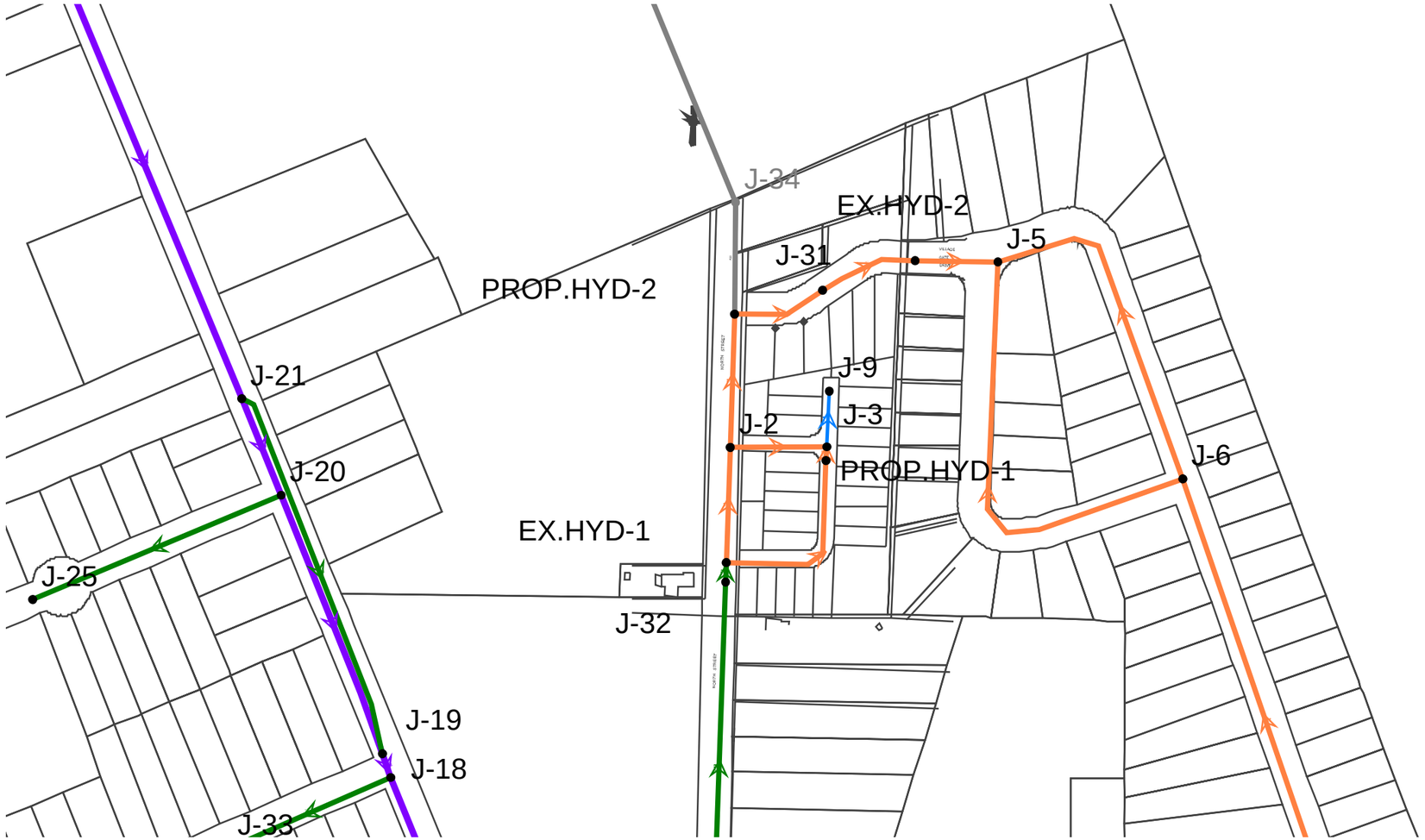
	HYDRANT #	# PORTS FLOWED	OUTLET DIAMETER (INCHES)	FLOW METER OR DIFFUSER	NOZZLE COEFFICIENT (~0.9)	PITOT READING (psi)	DISCHARGE FLOW (USGPM)
1	D417	2	2.5	SWIVEL BELL	0.90	15.6	1103
2	D419	1	2.5	SWIVEL BELL	0.90	28.0	739
3							
4							
					Total Flow (USGPM)		1842

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

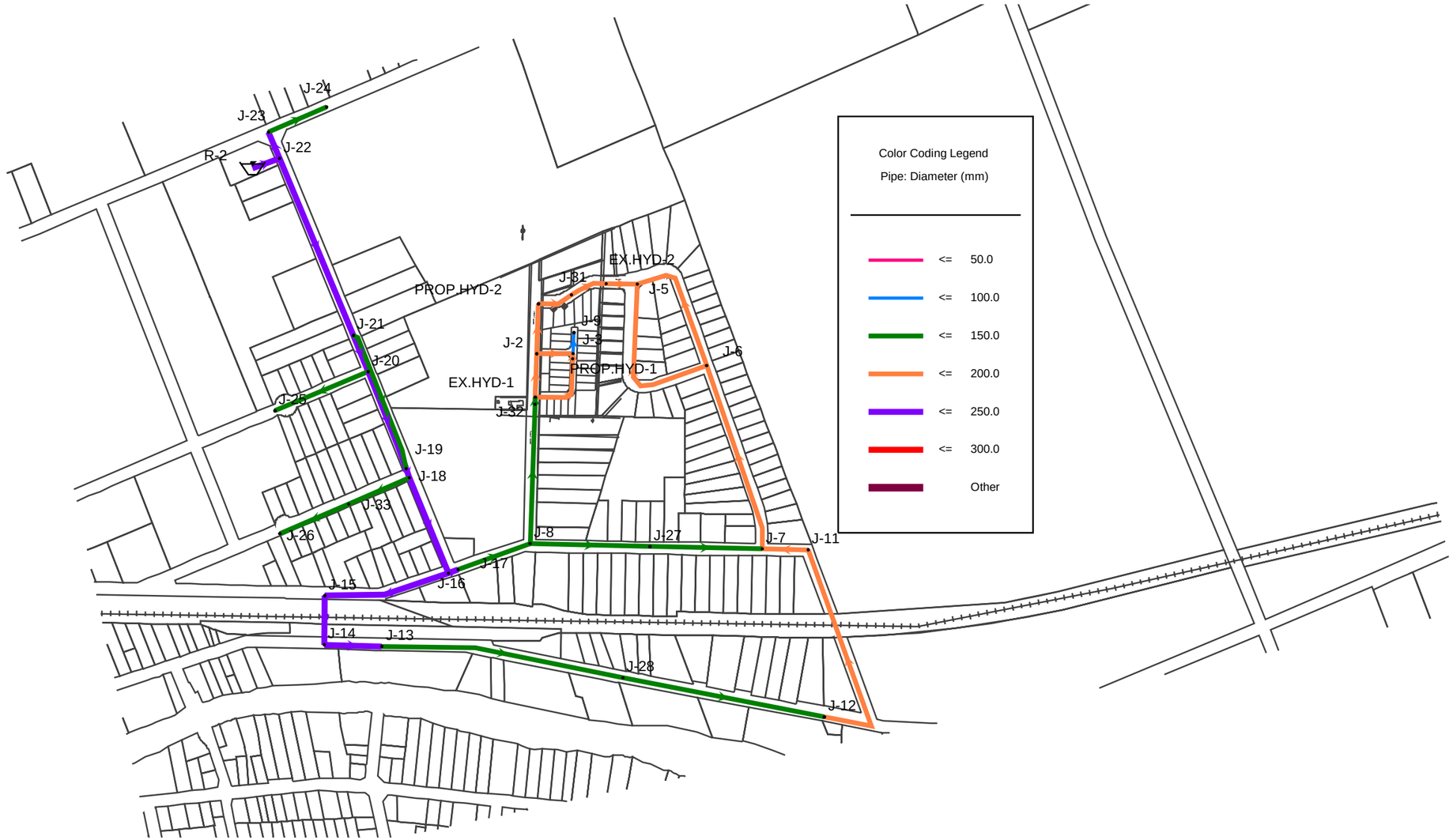


Color Coding Legend

Pipe: Diameter (mm)

<=	50.0	
<=	100.0	
<=	150.0	
<=	200.0	
<=	250.0	
<=	300.0	
	Other	

Scenario: Average Day



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-2	263.00	0.00	300.00	362	(N/A)
J-3	264.00	0.17	300.00	352	(N/A)
J-9	264.00	0.07	300.00	352	(N/A)
J-31	264.00	0.09	300.00	352	(N/A)
PROP.HYD-1	263.93	0.00	300.00	353	(N/A)
PROP.HYD-2	264.00	0.00	300.00	352	(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-5	81	PROP.HYD-2	J-2	200.0	110.0	-0.29	0.01	(N/A)
P-6	59	J-2	J-3	200.0	110.0	0.02	0.00	(N/A)
P-7(1)	8	J-3	PROP.HYD-1	200.0	110.0	-0.22	0.01	(N/A)
P-7(2)	117	PROP.HYD-1	EX.HYD-1	200.0	110.0	-0.22	0.01	(N/A)
P-4(2)(1)	61	EX.HYD-2	J-31	200.0	110.0	-0.20	0.01	(N/A)
P-4(2)(2)	58	J-31	PROP.HYD-2	200.0	110.0	-0.29	0.01	(N/A)
P-10	34	J-3	J-9	100.0	100.0	0.07	0.01	(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-2	263.00	0.00	299.58	358	(N/A)
J-3	264.00	0.70	299.58	348	(N/A)
J-9	264.00	0.29	299.58	348	(N/A)
J-31	264.00	0.37	299.58	348	(N/A)
PROP.HYD-1	263.93	0.00	299.58	349	(N/A)
PROP.HYD-2	264.00	0.00	299.58	348	(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-5	81	PROP.HYD-2	J-2	200.0	110.0	-1.20	0.04	(N/A)
P-6	59	J-2	J-3	200.0	110.0	0.07	0.00	(N/A)
P-7(1)	8	J-3	PROP.HYD-1	200.0	110.0	-0.92	0.03	(N/A)
P-7(2)	117	PROP.HYD-1	EX.HYD-1	200.0	110.0	-0.92	0.03	(N/A)
P-4(2)(1)	61	EX.HYD-2	J-31	200.0	110.0	-0.83	0.03	(N/A)
P-4(2)(2)	58	J-31	PROP.HYD-2	200.0	110.0	-1.20	0.04	(N/A)
P-10	34	J-3	J-9	100.0	100.0	0.29	0.04	(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-2	263.00	0.00	299.82	360	(N/A)
J-3	264.00	0.47	299.82	351	(N/A)
J-9	264.00	0.19	299.82	351	(N/A)
J-31	264.00	0.25	299.82	351	(N/A)
PROP.HYD-1	263.93	0.00	299.82	351	(N/A)
PROP.HYD-2	264.00	0.00	299.82	351	(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-5	81	PROP.HYD-2	J-2	200.0	110.0	-0.80	0.03	(N/A)
P-6	59	J-2	J-3	200.0	110.0	0.04	0.00	(N/A)
P-7(1)	8	J-3	PROP.HYD-1	200.0	110.0	-0.62	0.02	(N/A)
P-7(2)	117	PROP.HYD-1	EX.HYD-1	200.0	110.0	-0.62	0.02	(N/A)
P-4(2)(1)	61	EX.HYD-2	J-31	200.0	110.0	-0.55	0.02	(N/A)
P-4(2)(2)	58	J-31	PROP.HYD-2	200.0	110.0	-0.80	0.03	(N/A)
P-10	34	J-3	J-9	100.0	100.0	0.19	0.02	(N/A)

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 (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated Zone Lower Limit) (kPa)	Demand (L/s)	Velocity of Maximum Pipe (m/s)	Pipe w/ Maximum Velocity
EX.HYD-1	False	76.00	55.40	55.40	140	157	148	0.00	2.40	P-20
EX.HYD-2	False	76.00	56.22	56.22	140	144	147	0.00	2.40	P-20
PROP.HYD-1	False	90.00	55.45	55.45	140	143	143	0.00	2.40	P-20
PROP.HYD-2	False	76.00	55.78	55.78	140	145	149	0.00	2.40	P-20