APPENDIX C

Watermain Modelling / Servicing

Appendix C1 – Tor Water Analysis

(Municipal Engineering Solutions, June 2024)

Appendix C2 – Mattamy – Garito Barbuto Tor FSR Figure 3: Conceptual Watermain Servicing

(David Schaeffer Engineering Ltd., February 2023)

Municipal Engineering Solutions

June 5, 2024 Project No. 17001-27

Mr. Alexander Dow
DSEL
600 Alden Road, Suite 606
Markham, ON
L3R 0E7

Subject: Garito Barbuto TOR Development – Phase 2
Water Distribution Modeling
Town of Milton, Region of Halton

Dear Mr. Dow,

We are pleased to submit our report entitled "**Garito Barbuto TOR Development Phase 2 Watermain Analysis**" outlining the results of our water distribution analysis for the proposed residential development in the Town of Milton, Region of Halton.

This is an update of our reports for Phase 1 & 2, dated April 29, 2022, November 1, 2022 and April 10, 2023. This version included revising the C-factors in Phase 2 watermains and the FUS calculations for the proposed Phase 2 units. The findings of our analysis are summarized in the following report.

We trust you find this report satisfactory. Should you have any questions or require further clarification, please call.

Yours truly,

Municipal Engineering Solutions

John C. Bourrie

Per: John C. Bourrie, P.Eng.

/LMC

File Location: D:\Projects\2022\22-008 GB Tor Milton DSEL 17001-27\3.0 Report\Revised Final June 2024\17001-27 GB TorWatermain Analysis_20240503.docx

55 Gilbank Drive, Aurora, Ontario L4G 6H9
Tel: 905.726.1016 Cell: 416.434.0186 Fax: 905.726.1225

GARITO BARBUTO TOR DEVELOPMENT - PHASE 2

WATER ANALYSIS

PREPARED BY:

MUNICIPAL ENGINEERING SOLUTIONS

FOR:

DSEL
June 2024

Project Number: 17001-27

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APPENDICES

Section 1 – INTRODUCTION

Municipal Engineering Solutions ("MES") was retained by DSEL to conduct a hydraulic water analysis for the proposed Garito Barbuto TOR development located in the Town of Milton in the Region of Halton. As part of this hydraulic assessment MES was requested to undertake the following:

1. Calculate/verify water demands for the proposed development using Region of Halton, provincial and industry design standards;
2. Add the subject watermains/development to the Region's existing water model;
3. Run the model to size the subject mains to achieve service criteria during Average Day, Peak Hour, and fire flow during Maximum Day demand; and
4. Prepare a Report summarizing the modeling results for agency review and design purposes.

1.1 Development Background

The Garito Barbuto TOR Development will consist of 572 single family homes, 133 townhomes, 232 condominium townhomes and a high density block located south of Louis St Laurent Avenue, west of 4th Line in the Town of Milton. The proposed development is shown below on **Figure 1**. This report version focuses on Phase 2, Phase 1 has been constructed.

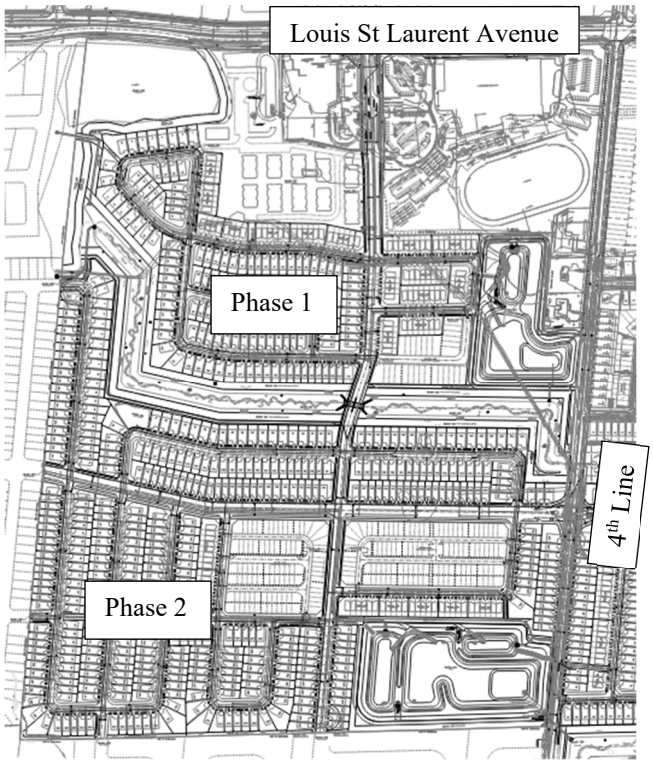

Figure 1 - Proposed Garito Barbuto TOR Development

Section 2 – WATERMAIN DESIGN CRITERIA

The design criteria utilized to estimate the water demands for the hydraulic water model follows general industry standards and is calculated using the design criteria and guidelines outlined in the Region of Halton's October 2019 Water and

Wastewater Linear Design Manual, the Ministry of the Environment, Conservation and Parks (MECP) Watermain Design Criteria, and the Fire Underwriters Survey.

The following sections summarize the specific design criteria used to conduct the hydraulic watermain assessment for this development.

2.1 Equivalent Population Densities & Water Design Factors

To calculate the equivalent population and water design factors for this development MES used Region of Halton criteria as noted in the *"Region of Halton Water and Wastewater Linear Design Manual, October 2019"*. **Table 1** summarizes the population densities and **Table 2** summarizes the average daily demand and peaking factors used for this analysis.

Table 1 – Equivalent Population Density

Type of Development	Equivalent Population (Persons/Ha)	Equivalent Population (Persons/Unit)
Single Family	55	3.772
Semi-Detached	100	3.772
Townhouse	135	2.536
Block 1	400*	1.594
Blocks 596/597	250*	

Source: Region of Halton Water and Wastewater Linear Design Manual, October 2019, 2022 Development Charges Update December 2021, *DSEL

Table 2 - Water Design Factors

Type of Development	Average Daily Demand (m^3 per capita)	Maximum Daily Demand Peaking Factor	Peak Hourly Demand Peaking Factor
Residential	0.275	2.25	4.00
Industrial	0.275	2.25	2.25
Commercial	0.275	2.25	2.25
Community Services	0.275	2.25	2.25

Source: Region of Halton Water and Wastewater Linear Design Manual, October 2019

Section 3 –FLOW DEMANDS

Utilizing the equivalent population data and the corresponding Average Day, Maximum Day, and Peak Hour data from **Table 1** the water demands for this development were calculated.

3.1 Equivalent Population Flow Demands

The calculated demands for the development are summarized in **Table 3**. For additional details on the development water demands and assigned demand nodes used in the water model see **Appendix A**.

Table 3 – Water Demand for Garito Barbuto TOR Development

Development	Average Day Demand (L/S)	Maximum Day Demand (L/S)	Peak Hour Demand (L/S)
Phase 1	6.49	14.59	25.94
Phase 2	7.16	16.11	28.64
Total	13.65	30.70	54.58

`

3.2 Fire Flow Demands

The fire demands for this development were based on typical flows calculated using the Fire Underwriters Survey ("FUS") formula outlined in the *'Water Supply For Public Fire Protection Guideline',* dated 2020. The fire flow used is shown in **Table 4**.

Table 4 - Fire Flow Requirements

Building	Fire Flow (L/S)
Singles	117-133
Street Towns	167, 183, 217
Medium Density Towns	250*, 267*

Source: Fire Underwriters Survey, 2020,
***from previous report for the condo blocks where FUS data not yet known**

As noted, the fire flows in **Table 4** above are calculated using the FUS formula using estimated values. **Table 5** below summarizes the criteria utilized to develop the fire flow requirements for each type of building as well as the assumptions made.

Table 5 – FUS Criteria/Assumptions

	Type of Development	
	Single Family Homes	Town Homes
Type of Construction	Wood Frame Construction (Essentially all Combustible)	Wood Frame Construction (Essentially all Combustible)
Occupancy Type	Limited Combustible	Limited Combustible
Fire Protection (Sprinkler/Firewalls)	Assumes No Sprinklers or Firewalls are Present.	Firewalls where noted.
Area Considered	9.1m lot - Ground Floor Area –101.2 m^2 Total Area Considered 202.4 m^2 11.0m lot - Ground Floor Area –129.5 m^2, Total Area Considered 258.9 m^2 13.1m lot - Ground Floor Area –160.3 m^2, Total Area Considered 320.5 m^2	6 Unit - Total Area Considered 1,004 m^2 7 unit - Total Area –1,156 m^2, Area Considered 817.5 m^2 8 unit - Total Area –1,330 m^2, Area Considered 661.6 m^2

Note: For Additional Information on FUS Criteria Refer to Water Supply for Public Protection Guide, Fire Underwriters Survey, 2020

3.3 External Demands

The Region of Halton InfoWater model that was provided by the Region to MES included water demands for existing and known future developments within the Region.

Section 4 – OTHER SYSTEM REQUIREMENTS

4.1 System Pressure Requirements

In addition to meeting the various flow requirements, the system must also satisfy minimum and maximum pressure requirements as outlined by the Region of Halton. The Region's pressure requirements are outlined in the Water and Wastewater Linear Design Manual and stipulate the following:

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1. The water system shall be designed to maintain as close as possible to a maximum working pressure of 690 kPa (100 psi) as a best management practice.
2. The minimum system pressure shall not be less than 140 kPa (20 psi) at any point in the water system under fire flow conditions.
3. Under normal operating conditions, the water system shall have a target minimum static pressure of 345 kPa (50 psi). Under no operating conditions shall the static pressure within a distribution main fall below 275 kPa (40 psi).
4. The normal method of reduction of pressures to comply with the Ontario Building Code (reduction of pressures to 550 kPa, 80 psi) is by pressure reducing valves to be installed on individual services.

4.2 Watermain Sizing

The Region of Halton also stipulates minimum pipe sizes and requires that all watermains are adequately sized to maintain demand flows at the required pressures without causing excessive energy loss or result in water quality decay. The watermain system must therefore be designed to accommodate the greater of the following:

- Maximum day plus fire demand
- Peak hour demand

The minimum pipe size for commercial and industrial areas shall be 300 mm diameter and for residential areas the minimum pipe size shall be 150 mm diameter. For distribution systems providing fire protection the minimum pipe size shall be 150 mm diameter in accordance with Ministry of the Environment, Conservation and Parks (MECP) and NFPA requirements.

To provide appropriate fire protection, reliable supply and pressures the water distribution system should be looped wherever possible to improve supply security and water quality.

4.3 Watermain C-Factor

In designing and modeling of the pipes the Coefficient of Roughness (C-Factor) factors from the MECP were utilized. It's our understanding that the Region's 2019 design criteria are undergoing an update to the C-Factors to the MECP values. The Coefficient of Roughness assigned to each pipe size in summarized in **Table 6** below.

Table 6 - Hazen-Williams Coefficient of Roughness (C-Factors)

Size of Pipe (Diameter in mm)	Coefficient of Roughness (C)
150 mm	100
200 mm to 250 mm	110
300 mm to 600 mm	120
Greater than 600 mm	130

Source: MECP

Section 5 – ANALYSIS & MODELING RESULTS

To conduct the hydraulic water analysis for the proposed development the water demands were estimated by MES using the design criteria previously discussed and incorporated the demands into the existing Region of Halton InfoWater model which was provided by the Region and confirmed as most recent. The following sections discusses the model setup and results.

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5.1 Model Setup

The Garito Barbuto TOR development is located within the Region's Zone M4L which is currently part of the area to be changed through the Region's zone realignment. The Garito Barbuto TOR site will be within the future Zone 250 when the zone change occurs. The development was modeled under 2021 and 2031 conditions in the Region's water model.

Phase 2 will be supplied from the constructed Phase 1 watermains with connections to the 750 mm feedermain on Louis St Laurent Avenue and a connection at 4th Line and Street B (Whitlock Avenue), via the Bayview Lexis watermain network. Phase 2 was modeled under 2031 conditions only.

New nodes were created to add the flow demands and service elevation information from the development to the Region of Halton's existing Infowater hydraulic water distribution model system and the system analysis was conducted. Friction factor for the pipes were assigned according to **Table 6**.

5.2 Watermain Sizing and System Pressures

The analysis was conducted under 2031 servicing conditions for Average Day, Maximum Day, Peak Hour, and Maximum day plus Fire demands to size the watermains and meet the pressure requirements. The pipe size and layout are shown in **Appendix B**.

The watermains were sized at 150 mm to 300 mm according to the results of average day, maximum day, maximum day plus fire, and peak hour scenarios.

The development will be supplied by connections from Louis St Laurent Avenue and 4th Line. Other supply points will become available as the surrounding developments are constructed. Some fire flows estimated in this report will be higher when those supplies become available. The pipe sizes should be discussed with the Region to confirm that the sizes match up with those proposed in the neighbouring developments. Fire flows can be met at all hydrants except on the temporary dead end of Street N. This watermain will be looped when the neighbouring site is constructed.

The site is adequately supplied from Zone 250 according to the model output. The 2031 scenarios considered that the zone switch had been completed. The top water level of Zone M4L is 236.0 which is 14 m lower than the top water level of Zone 250 so pressures could be ~20 psi (140 kPa) lower than the model results before the zone switch is completed. As the model pressures estimated to be around 70 psi, the pressures under Zone M4L would still be within the acceptable pressure range.

While the modeled pressures are below the OBC limit of 80 psi (550 kPa), under 2031 average day conditions, the pressures are estimated to be nearing the limit. As the Region does not examine minimum hour conditions, field pressures could be higher than modelled. Pressures must be confirmed in the field.

Modeled service pressures for the development are summarized in **Table 7**. All pressures lie within the required operating range under average day, maximum day, and peak hour demands.

Detailed pipe and node tables for the various scenarios modelled are attached to this report in **Appendix B**.

Table 7 - Modeled Service Pressures

Scenario	Average Day	Maximum Day	Peak Hour	Max. Day + Fire
2031	73.5 – 77.5 psi (507 to 534 kPa)	72.1 – 76.1 psi (497 to 525 kPa)	57.4 to 61.4 psi (396 to 524 kPa)	111 to 750 L/s @ 20 psi

`

Section 6 – CONCLUSIONS

The results are summarized below.

- The service pressures in Phase 2 are expected to range between between 57.4 psi to 77.5 psi (396 kPa to 534 kPa) in 2031.
- The available fire flow meets the preliminary fire flow demands at the minimum pressure of 20 psi (140 kPa) except on the temporary dead end of Street N. This watermain will be looped when the neighbouring site is constructed. Some fire flows estimated in this report will be higher when additional supplies become available.
- The pipe sizes connecting to external developments should be discussed with the Region to confirm that the sizes match up with those proposed in the neighbouring developments.
- The development was modeled under Zone 250 conditions. The top water level of Zone M4L is 14 m lower than Zone 250 so pressures could be ~20 psi (140 kPa) lower than the model results before the zone switch is completed. It is recommended that the zone change be confirmed with the Region and/or hydrant tests conducted to confirm flows and pressures.
- According to the model output, the development will experience pressures near the OBC limit of 80 psi (550 kPa) under 2031 average day conditions. As the Region does not examine minimum hour conditions, the pressures could be higher. The need for individual pressure reducing valves must be confirmed in the field.
- The available fire flow meets or exceeds the preliminary fire flow demands utilized for this assessment at the minimum pressure of 20 psi (140 kPa) based on the proposed watermain supply and assumptions made within this report but should be confirmed when additional information becomes available. Once building designs/configurations are known, the fire flows must be confirmed using the FUS formula. Building construction and sprinkler systems may need to be designed to suit the available flow and pressure.
- This report, including all modeling assumptions used, is to be submitted to and reviewed by the water operating authority (municipality) to confirm that the modeling parameters used are acceptable to the operating authority and/or confirm if modified domestic or fire flow requirements are required or should be implemented for this particular development.

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Appendix A

Demands

Equivalent Population by Unit

(2022 Development Charges Update, December 2021 Table A-4)

Type of Development	Equivalent Population Density *(Person/Unit)*
Single Family or Semi-Detached	3.772
Townhouse*	2.536
Apartment*	1.594

*average of ppu for each size unit (towns > or < 3 bdm, apartments > or < 2 bdrm)

Equivalent Population by Area

Type of Development	Equivalent Population Density *(Person/Hectare)*	Average Day Demands *(m3/ha/day)*
Single Family	55	15.13
Semi-detached duplex and 4-plex	100	27.50
Townhouse, Maisonette (<6 stories)	135	37.13
Block 1*	400	
Block 586/587*	250	
Apartments (>6 stories)	285	78.38
Light Commercial Areas	90	24.75
Community Services	40	11.00
Light Industrial Areas	125	34.38
Hospitals (persons/bed)	4	

*DSEL

Water Design Factors

Average Daily Demand (m3/capita)	0.275
Maximum Daily Demand P.F.	2.25
Maximum Hourly Demand P.F.	
Residential	*4*
I/C/I	*2.25*

Cofficient of Roughness

Size of Pipe (mm Dia.)	Material	Coefficient of Roughness (C)
50	Copper	120
100-400	PVC/HDPE	130
Over 400	Concrete Lined	110

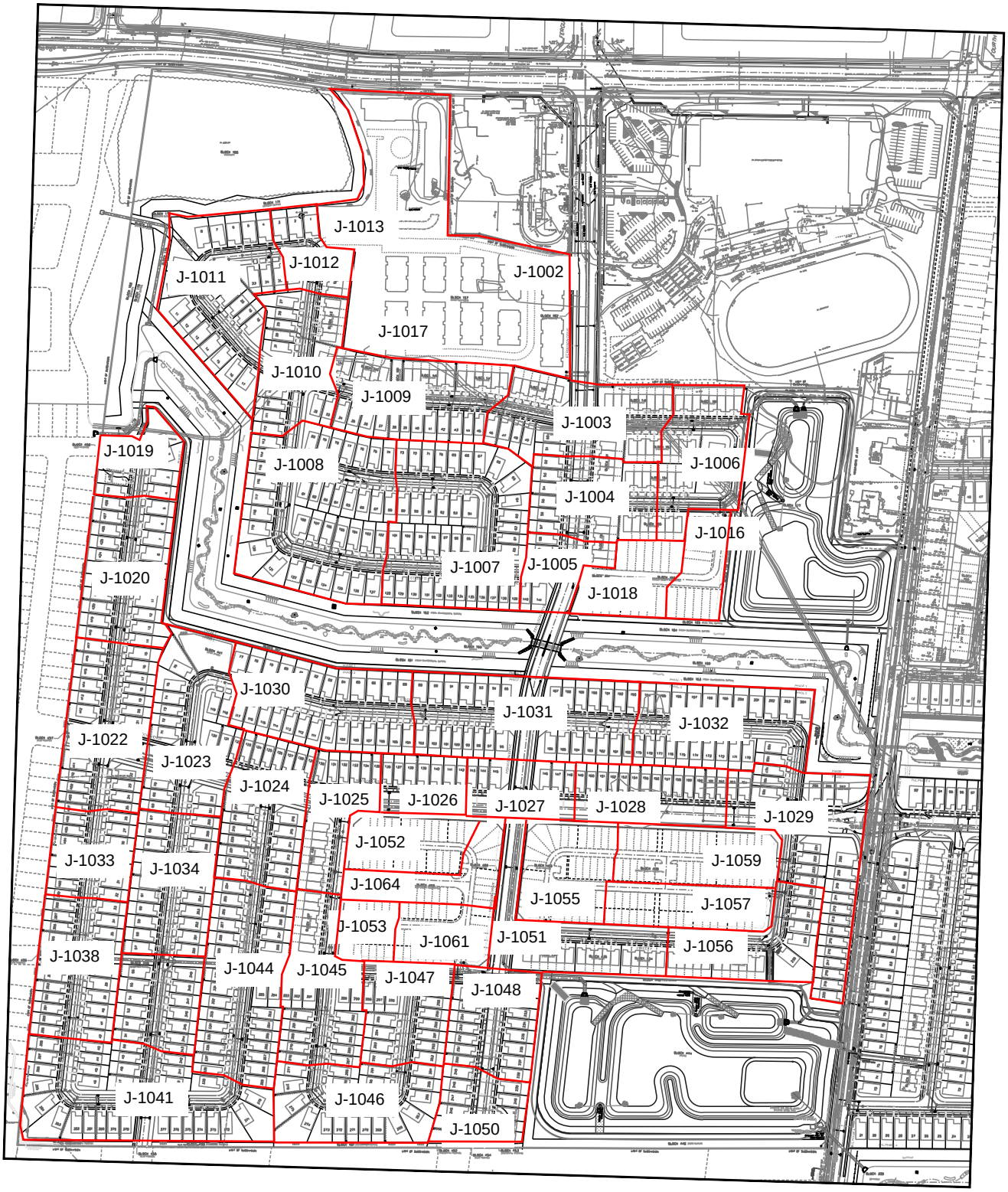
Minimum Pipe Size

Type of Development	Size of Pipe (mm Dia.)
Residential	150
Commercial/Industrial/Community	300

Working Pressures

Parameter	Pressure
Normal Condition	
Minimum Pressure	275 kPa (40 psi)
Target Pressure	350 kPa (50 psi)
Maximum (Building Code)	550 kPa (80 psi)
Maximum (Halton)	690 kPa (100 psi)
Fire Flow Conditions	
Minimum Pressure	140 kPa (20 psi)

Demand Layout



Water Demand
GB Tor, Milton On
June 4, 2024

Municipal Engineering Solutions

Node	Exist. Zone	Fut. Zone	Elevation	Type of Development							Equivalent Population		Demands			Fire Flow
				Single Family	Semi-Detached	Townhouse	MD	Commercial	Community	Industrial	Total Population	Total Population	ADD	MDD	PHD	Demands
			(m)	(units)	(units)	(units)	(ha)	(ha)	(ha)	(ha)	(Residential)	(ICI)	(L/s)	(L/s)	(L/s)	(L/s)
HYD-1000	M4L	250	197.60								0	0	0.00	0.00	0.00	267
HYD-1001	M4L	250	197.30								0	0	0.00	0.00	0.00	267
HYD-1002	M4L	250	196.32								0	0	0.00	0.00	0.00	267
HYD-1003	M4L	250	196.14								0	0	0.00	0.00	0.00	250
HYD-1004	M4L	250	196.14								0	0	0.00	0.00	0.00	250
HYD-1005	M4L	250	196.25								0	0	0.00	0.00	0.00	250
HYD-1006	M4L	250	196.30								0	0	0.00	0.00	0.00	167
HYD-1007	M4L	250	196.60								0	0	0.00	0.00	0.00	167
HYD-1008	M4L	250	196.85								0	0	0.00	0.00	0.00	167
HYD-1009	M4L	250	197.19								0	0	0.00	0.00	0.00	167
HYD-1010	M4L	250	196.94								0	0	0.00	0.00	0.00	167
HYD-1011	M4L	250	197.10								0	0	0.00	0.00	0.00	167
HYD-1012	M4L	250	196.50								0	0	0.00	0.00	0.00	250
HYD-1013	M4L	250	196.46								0	0	0.00	0.00	0.00	250
HYD-1014	M4L	250	196.14								0	0	0.00	0.00	0.00	250
HYD-1015	M4L	250	195.70								0	0	0.00	0.00	0.00	250
HYD-1016	M4L	250	195.75								0	0	0.00	0.00	0.00	250
HYD-1017	M4L	250	195.62								0	0	0.00	0.00	0.00	250
HYD-1018	M4L	250	195.82								0	0	0.00	0.00	0.00	250
HYD-1019	M4L	250	196.00								0	0	0.00	0.00	0.00	250
HYD-1020	M4L	250	195.62								0	0	0.00	0.00	0.00	133
HYD-1021	M4L	250	195.30								0	0	0.00	0.00	0.00	267
HYD-1022	M4L	250	195.05								0	0	0.00	0.00	0.00	117
HYD-1023	M4L	250	195.31								0	0	0.00	0.00	0.00	117
HYD-1024	M4L	250	194.83								0	0	0.00	0.00	0.00	267
HYD-1025	M4L	250	195.00								0	0	0.00	0.00	0.00	267
HYD-1026	M4L	250	195.40								0	0	0.00	0.00	0.00	117
HYD-1027	M4L	250	195.45								0	0	0.00	0.00	0.00	117
HYD-1028	M4L	250	195.36								0	0	0.00	0.00	0.00	117
HYD-1029	M4L	250	195.19								0	0	0.00	0.00	0.00	267
HYD-1030	M4L	250	195.38								0	0	0.00	0.00	0.00	117
HYD-1031	M4L	250	195.70								0	0	0.00	0.00	0.00	117
HYD-1032	M4L	250	196.10								0	0	0.00	0.00	0.00	117
HYD-1033	M4L	250	196.52								0	0	0.00	0.00	0.00	117
HYD-1034	M4L	250	196.31								0	0	0.00	0.00	0.00	117
HYD-1035	M4L	250	196.79								0	0	0.00	0.00	0.00	133
HYD-1036	M4L	250	196.59								0	0	0.00	0.00	0.00	117
HYD-1037	M4L	250	196.32								0	0	0.00	0.00	0.00	117
HYD-1038	M4L	250	196.28								0	0	0.00	0.00	0.00	117
HYD-1039	M4L	250	195.86								0	0	0.00	0.00	0.00	250
HYD-1040	M4L	250	195.71								0	0	0.00	0.00	0.00	250
HYD-1041	M4L	250	196.13								0	0	0.00	0.00	0.00	117
HYD-1042	M4L	250	195.90								0	0	0.00	0.00	0.00	117
HYD-1043	M4L	250	196.17								0	0	0.00	0.00	0.00	
HYD-1044	M4L	250	195.93								0	0	0.00	0.00	0.00	117
HYD-1045	M4L	250	195.36								0	0	0.00	0.00	0.00	267
HYD-1046	M4L	250	195.70								0	0	0.00	0.00	0.00	267
HYD-1047	M4L	250	195.78								0	0	0.00	0.00	0.00	250
HYD-1048	M4L	250	196.64								0	0	0.00	0.00	0.00	133
HYD-1049	M4L	250	197.01								0	0	0.00	0.00	0.00	133
HYD-1050	M4L	250	197.36								0	0	0.00	0.00	0.00	
HYD-1051	M4L	250	196.77								0	0	0.00	0.00	0.00	133
HYD-1052	M4L	250	196.58								0	0	0.00	0.00	0.00	133
HYD-1053	M4L	250	195.87								0	0	0.00	0.00	0.00	133
HYD-1054	M4L	250	195.09								0	0	0.00	0.00	0.00	133
HYD-1055	M4L	250	195.60								0	0	0.00	0.00	0.00	133
HYD-1056	M4L	250	195.66								0	0	0.00	0.00	0.00	250
HYD-1057	M4L	250	195.82								0	0	0.00	0.00	0.00	250
HYD-1058	M4L	250	195.38								0	0	0.00	0.00	0.00	250
HYD-1059	M4L	250	195.14								0	0	0.00	0.00	0.00	250
HYD-1060	M4L	250	195.00								0	0	0.00	0.00	0.00	250
HYD-1061	M4L	250	194.95								0	0	0.00	0.00	0.00	267
HYD-1062	M4L	250	194.96								0	0	0.00	0.00	0.00	267
HYD-1063	M4L	250	195.21								0	0	0.00	0.00	0.00	267
HYD-1064	M4L	250	195.04								0	0	0.00	0.00	0.00	250
HYD-1065	M4L	250	195.07								0	0	0.00	0.00	0.00	267
HYD-1066	M4L	250	195.45								0	0	0.00	0.00	0.00	133
HYD-1072	M4L	250	195.00								0	0	0.00	0.00	0.00	167
HYD-1073	M4L	250	195.01								0	0	0.00	0.00	0.00	167
HYD-1074	M4L	250	196.16								0	0	0.00	0.00	0.00	
J-1000	M4L	250	196.69								0	0	0.00	0.00	0.00	
J-1001	M4L	250	197.28								0	0	0.00	0.00	0.00	
J-1002	M4L	250	197.33				1.01				404	0	1.29	2.89	5.14	267
J-1003	M4L	250	195.95	6		20					73	0	0.23	0.53	0.93	
J-1004	M4L	250	196.15	6		14					58	0	0.19	0.42	0.74	
J-1005	M4L	250	196.27	4		3					23	0	0.07	0.16	0.29	
J-1006	M4L	250	195.41			24					61	0	0.19	0.44	0.77	
J-1007	M4L	250	196.46	39							147	0	0.47	1.05	1.87	
J-1008	M4L	250	197.29	37							140	0	0.44	1.00	1.78	
J-1009	M4L	250	196.33	12		18					91	0	0.29	0.65	1.16	
J-1010	M4L	250	196.60	11		7					59	0	0.19	0.42	0.75	
J-1011	M4L	250	196.98	22							83	0	0.26	0.59	1.06	
J-1012	M4L	250	196.85	4		5					28	0	0.09	0.20	0.35	
J-1013	M4L	250	197.16				1				400	0	1.27	2.86	5.09	267

Water Demand
GB Tor, Milton On
June 4, 2024

Municipal Engineering Solutions

Node	Exist. Zone	Fut. Zone	Elevation	Type of Development							Equivalent Population		Demands			Fire Flow
				Single Family	Semi-Detached	Townhouse	MD	Commercial	Community	Industrial	Total Population	Total Population	ADD	MDD	PHD	Demands
			(m)	*(units)*	*(units)*	*(units)*	(ha)	*(ha)*	*(ha)*	*(ha)*	*(Residential)*	*(ICI)*	*(L/s)*	*(L/s)*	*(L/s)*	*(L/s)*
J-1014	M4L	250	197.43								0	0	0.00	0.00	0.00	
J-1015	M4L	250	195.72								0	0	0.00	0.00	0.00	
J-1016	M4L	250	195.52			12					30	0	0.10	0.22	0.39	250
J-1017	M4L	250	196.20				1				400	0	1.27	2.86	5.09	267
J-1018	M4L	250	196.24			16					41	0	0.13	0.29	0.52	250
J-1019	M4L	250	197.38	7							26	0	0.08	0.19	0.34	
J-1020	M4L	250	196.80	21							79	0	0.25	0.57	1.01	
J-1021	M4L	250	196.81								0	0	0.00	0.00	0.00	
J-1022	M4L	250	196.49	22							83	0	0.26	0.59	1.06	
J-1023	M4L	250	196.34	16							60	0	0.19	0.43	0.77	
J-1024	M4L	250	196.31	20							75	0	0.24	0.54	0.96	
J-1025	M4L	250	196.08	6		8					43	0	0.14	0.31	0.55	
J-1026	M4L	250	195.83	7							26	0	0.08	0.19	0.34	
J-1027	M4L	250	194.57	6							23	0	0.07	0.16	0.29	
J-1028	M4L	250	195.62	14							53	0	0.17	0.38	0.67	
J-1029	M4L	250	195.35	25							94	0	0.30	0.68	1.20	
J-1030	M4L	250	196.70	26							98	0	0.31	0.70	1.25	
J-1031	M4L	250	195.72	30							113	0	0.36	0.81	1.44	
J-1032	M4L	250	196.00	22							83	0	0.26	0.59	1.06	
J-1033	M4L	250	196.26	15							57	0	0.18	0.41	0.72	
J-1034	M4L	250	196.07	22							83	0	0.26	0.59	1.06	
J-1035	M4L	250	195.83								0	0	0.00	0.00	0.00	
J-1036	M4L	250	195.75								0	0	0.00	0.00	0.00	
J-1037	M4L	250	196.17								0	0	0.00	0.00	0.00	
J-1038	M4L	250	196.13	20							75	0	0.24	0.54	0.96	
J-1039	M4L	250	196.55								0	0	0.00	0.00	0.00	
J-1040	M4L	250	196.18								0	0	0.00	0.00	0.00	
J-1041	M4L	250	196.22	31							117	0	0.37	0.84	1.49	
J-1042	M4L	250	195.97	13							49	0	0.16	0.35	0.62	
J-1043	M4L	250	195.86								0	0	0.00	0.00	0.00	
J-1044	M4L	250	195.59	29							109	0	0.35	0.78	1.39	
J-1045	M4L	250	195.35	15		7					74	0	0.24	0.53	0.95	
J-1046	M4L	250	195.74	18							68	0	0.22	0.49	0.86	
J-1047	M4L	250	194.96	14							53	0	0.17	0.38	0.67	
J-1048	M4L	250	194.95	15							57	0	0.18	0.41	0.72	
J-1049	M4L	250	195.10								0	0	0.00	0.00	0.00	
J-1050	M4L	250	195.37	11							41	0	0.13	0.30	0.53	
J-1051	M4L	250	195.15			16					41	0	0.13	0.29	0.52	
J-1052	M4L	250	195.60			27					68	0	0.22	0.49	0.87	
J-1053	M4L	250	195.01			18					46	0	0.15	0.33	0.58	267
J-1054	M4L	250	195.22								0	0	0.00	0.00	0.00	267
J-1055	M4L	250	195.05			36					91	0	0.29	0.65	1.16	267
J-1056	M4L	250	195.00	6		11					51	0	0.16	0.36	0.64	
J-1057	M4L	250	195.36			36					91	0	0.29	0.65	1.16	267
J-1058	M4L	250	195.05								0	0	0.00	0.00	0.00	
J-1059	M4L	250	195.46			36					91	0	0.29	0.65	1.16	267
J-1060	M4L	250	194.90								0	0	0.00	0.00	0.00	
J-1061	M4L	250	195.00			29					74	0	0.23	0.53	0.94	267
J-1062	M4L	250	195.50								0	0	0.00	0.00	0.00	
J-1063	M4L	250	195.86								0	0	0.00	0.00	0.00	
J-1064	M4L	250	195.50			22					56	0	0.18	0.40	0.71	267
J-1065	M4L	250	195.88								0	0	0.00	0.00	0.00	
J-121	M4L	250	195.32								0	0	0.00	0.00	0.00	
J-122	M4L	250	195.10								0	0	0.00	0.00	0.00	
Phase 1				141	0	91	3.01	0.00	0.00	0.00	1967	0	6.26	14.08	25.04	
Ph 1 Condo Towns				0	0	28	0.00	0.00	0.00	0.00	71	0	0.23	0.51	0.90	
Phase 2				**431**	**0**	**42**	**0.00**	**0.00**	**0.00**	**0.00**	**1732**	**0**	**5.51**	**12.41**	**22.05**	
Ph 2 Condo Towns				**0**	**0**	**204**	**0.00**	**0.00**	**0.00**	**0.00**	**517**	**0**	**1.65**	**3.70**	**6.59**	
Total				**572**	**0**	**365**	**3.01**	**0.00**	**0.00**	**0.00**	**4287**	**0**	**13.65**	**30.70**	**54.58**	

Calculations are based on "Water Supply for Public Fire Protection Guide" by Fire Underwriters Survey Dated 2020

Municipal Engineering Solutions

FUS CALCULATION

Project:	GB Tor	**Building Type/Block #**	30' Singles
Project Number:	17001-27	**Firewalls/Sprinkler:**	
Project Location:	Halton Region	**Number of Units/Unit #'s**	Lot 92
Date:	28-May-24		

1.0 FUS Formula

$$RFF = 220C\sqrt{A}$$

where: RFF = required fire flow in litres per minute;
C = the Coefficient related to the type of construction; and
A = the Total Effective Floor Area (m^2) excluding basements at least 50% below grade) [a]

NBC Occupancy	Group C	
Type of Construction [b]	Wood Frame Construction	Type V
Protection (for C below 1.0)	Unprotected Openings	
Footprint area	101.2 sq. metres	
Storeys	2	
C =	1.5	
A =	202.4 Total Effective Area [a]	
F =	**5000 L/min** (rounded)	

2.0 Occupancy Adjustment

Type of Occupancy [c]	Limited Combustible
Hazard Allowance	-0.15
	-750 L/min
Adjusted Fire Flow	**4250 L/min**

3.0 Sprinkler Adjustment

		Credit	Total
NFPA 13 sprinkler standard	NO	0%	0%
Standard Water Supply	NO	0%	
Fully Supervised system	NO	0%	

Sprinkler Credit **0 L/min**

4.0 Exposure Adjustment

Construction Type of the Exposed Building Face: Type V

		Percent	Total*
North Side			
Distance to Building (m)	20.1 to 30	2%	57%
Length (ft) by height in storeys	21 to 40		
South Side			
Distance to Building (m)	10.1 to 20	11%	
Length (ft) by height in storeys	21 to 40		
East Side			
Distance to Building (m)	0 to 3	22%	
Length (ft) by height in storeys	41 to 60		
West Side			
Distance to Building (m)	0 to 3	22%	
Length (ft) by height in storeys	41 to 60		

*max 75%

Exposures Surcharge **2420 L/min**

Total Required Fire Flow (rounded)	**7000 L/min**
	117 L/sec

a) For buildings with a construction coefficient from 1.0 to 1.5, consider 100% of all floor areas. For buildings with a construction coefficient below 1.0 (vertical openings are inadequately protected), consider the two largest adjoining floors plus 50% of each of any floors immediately above them up to a maximum of eight. If the vertical openings and exterior vertical communications are properly protected, consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.

b) Wood Frame=1.5, Mass Timber= 0.8 to 1.5, Ordinary=1.0, Noncombustible=0.8, Fire-Resistive=0.6

c) Noncombustible=-25%, Limited Combustible=-15%, Combustible=0%, Free Burning=+15%, Rapid Burning=+25%

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Municipal Engineering Solutions

FUS CALCULATION

Project:	GB Tor	**Building Type/Block #**	36' Singles
Project Number:	17001-27	**Firewalls/Sprinkler:**	
Project Location:	Halton Region	**Number of Units/Unit #'s**	Lot 90
Date:	28-May-24		

1.0 FUS Formula

$$RFF = 220C\sqrt{A}$$

where: RFF = required fire flow in litres per minute;
C = the Coefficient related to the type of construction; and
A = the Total Effective Floor Area (m^2) excluding basements at least 50% below grade) [a]

NBC Occupancy	Group C	
Type of Construction [b]	Wood Frame Construction	Type V
Protection (for C below 1.0)	Unprotected Openings	
Footprint area	129.5 sq. metres	
Storeys	2	
C =	1.5	
A =	258.9 Total Effective Area [a]	
F =	**5000 L/min** (rounded)	

2.0 Occupancy Adjustment

Type of Occupancy [c]	Limited Combustible
Hazard Allowance	-0.15
	-750 L/min
Adjusted Fire Flow	**4250 L/min**

3.0 Sprinkler Adjustment

		Credit	Total
NFPA 13 sprinkler standard	NO	0%	0%
Standard Water Supply	NO	0%	
Fully Supervised system	NO	0%	

Sprinkler Credit **0 L/min**

4.0 Exposure Adjustment

Construction Type of the Exposed Building Face: Type V

		Percent	Total*
North Side			
Distance to Building (m)	20.1 to 30	2%	57%
Length (ft) by height in storeys	21 to 40		
South Side			
Distance to Building (m)	10.1 to 20	11%	
Length (ft) by height in storeys	21 to 40		
East Side			
Distance to Building (m)	0 to 3	22%	
Length (ft) by height in storeys	41 to 60		
West Side			
Distance to Building (m)	0 to 3	22%	
Length (ft) by height in storeys	41 to 60		

*max 75%

Exposures Surcharge **2420 L/min**

Total Required Fire Flow (rounded)	**7000 L/min**
	117 L/sec

a) For buildings with a construction coefficient from 1.0 to 1.5, consider 100% of all floor areas. For buildings with a construction coefficient below 1.0 (vertical openings are inadequately protected), consider the two largest adjoining floors plus 50% of each of any floors immediately above them up to a maximum of eight. If the vertical openings and exterior vertical communications are properly protected, consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.

b) Wood Frame=1.5, Mass Timber= 0.8 to 1.5, Ordinary=1.0, Noncombustible=0.8, Fire-Resistive=0.6

c) Noncombustible=-25%, Limited Combustible=-15%, Combustible=0%, Free Burning=+15%, Rapid Burning=+25%

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Municipal Engineering Solutions

FUS CALCULATION

Project:	GB Tor	**Building Type/Block #**	43' Singles
Project Number:	17001-27	**Firewalls/Sprinkler:**	
Project Location:	Halton Region	**Number of Units/Unit #'s**	Lot 127
Date:	28-May-24		

1.0 FUS Formula

$$RFF = 220C\sqrt{A}$$

where: RFF = required fire flow in litres per minute;
C = the Coefficient related to the type of construction; and
A = the Total Effective Floor Area (m^2) excluding basements at least 50% below grade) [a]

NBC Occupancy	Group C	
Type of Construction [b]	Wood Frame Construction	Type V
Protection (for C below 1.0)	Unprotected Openings	
Footprint area	160.3 sq. metres	
Storeys	2	
C =	1.5	
A =	320.5 Total Effective Area [a]	
F =	**6000 L/min** (rounded)	

2.0 Occupancy Adjustment

Type of Occupancy [c]	Limited Combustible
Hazard Allowance	-0.15
	-900 L/min
Adjusted Fire Flow	**5100 L/min**

3.0 Sprinkler Adjustment

		Credit	Total
NFPA 13 sprinkler standard	NO	0%	0%
Standard Water Supply	NO	0%	
Fully Supervised system	NO	0%	

Sprinkler Credit **0 L/min**

4.0 Exposure Adjustment

Construction Type of the Exposed Building Face: Type V

		Percent	Total*
North Side			
Distance to Building (m)	10.1 to 20	11%	
Length (ft) by height in storeys	21 to 40		
South Side			
Distance to Building (m)	over 30	0%	
Length (ft) by height in storeys	21 to 40		
East Side			55%
Distance to Building (m)	0 to 3	22%	
Length (ft) by height in storeys	41 to 60		
West Side			
Distance to Building (m)	0 to 3	22%	
Length (ft) by height in storeys	41 to 60		

*max 75%

Exposures Surcharge **2810 L/min**

Total Required Fire Flow (rounded)	**8000 L/min**
	133 L/sec

a) For buildings with a construction coefficient from 1.0 to 1.5, consider 100% of all floor areas. For buildings with a construction coefficient below 1.0 (vertical openings are inadequately protected), consider the two largest adjoining floors plus 50% of each of any floors immediately above them up to a maximum of eight. If the vertical openings and exterior vertical communications are properly protected, consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.

b) Wood Frame=1.5, Mass Timber= 0.8 to 1.5, Ordinary=1.0, Noncombustible=0.8, Fire-Resistive=0.6

c) Noncombustible=-25%, Limited Combustible=-15%, Combustible=0%, Free Burning=+15%, Rapid Burning=+25%

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Municipal Engineering Solutions

FUS CALCULATION

Project:	GB Tor Phase 2	**Building Type/Block #**	
Project Number:	17001-27	**Firewalls/Sprinkler:**	
Project Location:	Halton Region	**Number of Units/Unit #'s**	6 Units
Date:	14-May-24		

1.0 FUS Formula

$$RFF = 220C\sqrt{A}$$

where: RFF = required fire flow in litres per minute;
C = the Coefficient related to the type of construction; and
A = the Total Effective Floor Area (m^2) excluding basements at least 50% below grade) [a]

NBC Occupancy	Group C	
Type of Construction [b]	Wood Frame Construction	Type V
Protection (for C below 1.0)	Unprotected Openings	
Footprint area	771.0 sq. metres	
Storeys	3	
C =	1.5	
A =	1004.1 Total Effective Area [a]	
F =	**10000 L/min** (rounded)	

2.0 Occupancy Adjustment

Type of Occupancy [c]	Limited Combustible
Hazard Allowance	-0.15
	-1500 L/min
Adjusted Fire Flow	**8500 L/min**

3.0 Sprinkler Adjustment

		Credit	Total
NFPA 13 sprinkler standard	NO	0%	0%
Standard Water Supply	NO	0%	
Fully Supervised system	NO	0%	

Sprinkler Credit **0 L/min**

4.0 Exposure Adjustment

Construction Type of the Exposed Building Face: Type V

North Side		Percent	Total*
Distance to Building (m)	20.1 to 30	8%	56%
Length (ft) by height in storeys	81 to 100		
South Side			
Distance to Building (m)	10.1 to 20	14%	
Length (ft) by height in storeys	81 to 100		
East Side			
Distance to Building (m)	3.1 to 10	17%	
Length (ft) by height in storeys	41 to 60		
West Side			
Distance to Building (m)	3.1 to 10	17%	
Length (ft) by height in storeys	41 to 60		

*max 75%

Exposures Surcharge **4760 L/min**

Total Required Fire Flow (rounded) **13000 L/min** / **217 L/sec**

a) For buildings with a construction coefficient from 1.0 to 1.5, consider 100% of all floor areas. For buildings with a construction coefficient below 1.0 (vertical openings are inadequately protected), consider the two largest adjoining floors plus 50% of each of any floors immediately above them up to a maximum of eight. If the vertical openings and exterior vertical communications are properly protected, consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.

b) Wood Frame=1.5, Mass Timber= 0.8 to 1.5, Ordinary=1.0, Noncombustible=0.8, Fire-Resistive=0.6

c) Noncombustible=-25%, Limited Combustible=-15%, Combustible=0%, Free Burning=+15%, Rapid Burning=+25%

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Municipal Engineering Solutions

FUS CALCULATION

Project: GB Tor Phase 2
Project Number: 17001-27
Project Location: Halton Region
Date: 14-May-24

Building Type/Block #
Firewalls/Sprinkler:
Number of Units/Unit #'s 5 of 7 Units

1.0 FUS Formula

$$RFF = 220C\sqrt{A}$$

where: RFF = required fire flow in litres per minute;
C = the Coefficient related to the type of construction; and
A = the Total Effective Floor Area (m^2) excluding basements at least 50% below grade) [a]

NBC Occupancy	Group C	
Type of Construction [b]	Wood Frame Construction	Type V
Protection (for C below 1.0)	Unprotected Openings	
Footprint area	771.0 sq. metres	
Storeys	3	
C =	1.5	
A =	817.5 Total Effective Area [a]	
F =	**9000 L/min** (rounded)	

2.0 Occupancy Adjustment

Type of Occupancy [c]	Limited Combustible
Hazard Allowance	-0.15
	-1350 L/min
Adjusted Fire Flow	**7650 L/min**

3.0 Sprinkler Adjustment

		Credit	Total
NFPA 13 sprinkler standard	NO	0%	0%
Standard Water Supply	NO	0%	
Fully Supervised system	NO	0%	

Sprinkler Credit **0 L/min**

4.0 Exposure Adjustment

Construction Type of the Exposed Building Face: Type V

North Side		Percent	Total*
Distance to Building (m)	0 to 3	22%	44%
Length (ft) by height in storeys	41 to 60		
South Side			
Distance to Building (m)	Firewall	0%	
Length (ft) by height in storeys	41 to 60		
East Side			
Distance to Building (m)	20.1 to 30	8%	
Length (ft) by height in storeys	81 to 100		
West Side			
Distance to Building (m)	10.1 to 20	14%	
Length (ft) by height in storeys	81 to 100		

*max 75%

Exposures Surcharge **3370 L/min**

Total Required Fire Flow (rounded) **11000 L/min** / **183 L/sec**

a) For buildings with a construction coefficient from 1.0 to 1.5, consider 100% of all floor areas. For buildings with a construction coefficient below 1.0 (vertical openings are inadequately protected), consider the two largest adjoining floors plus 50% of each of any floors immediately above them up to a maximum of eight. If the vertical openings and exterior vertical communications are properly protected, consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.
b) Wood Frame=1.5, Mass Timber= 0.8 to 1.5, Ordinary=1.0, Noncombustible=0.8, Fire-Resistive=0.6
c) Noncombustible=-25%, Limited Combustible=-15%, Combustible=0%, Free Burning=+15%, Rapid Burning=+25%

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Calculations are based on "Water Supply for Public Fire Protection Guide" by Fire Underwriters Survey Dated 2020

Municipal Engineering Solutions

FUS CALCULATION

Project:	GB Tor Phase 2	**Building Type/Block #**	
Project Number:	17001-27	**Firewalls/Sprinkler:**	
Project Location:	Halton Region	**Number of Units/Unit #'s**	4 of 8 Units
Date:	14-May-24		

1.0 FUS Formula

$$RFF = 220C\sqrt{A}$$

where: RFF = required fire flow in litres per minute;
C = the Coefficient related to the type of construction; and
A = the Total Effective Floor Area (m^2) excluding basements at least 50% below grade) [a]

NBC Occupancy	Group C	
Type of Construction [b]	Wood Frame Construction	Type V
Protection (for C below 1.0)	Unprotected Openings	
Footprint area	771.0 sq. metres	
Storeys	3	
C =	1.5	
A =	661.6 Total Effective Area [a]	
F =	**8000 L/min** (rounded)	

2.0 Occupancy Adjustment

Type of Occupancy [c]	Limited Combustible
Hazard Allowance	-0.15
	-1200 L/min
Adjusted Fire Flow	**6800 L/min**

3.0 Sprinkler Adjustment

		Credit	Total
NFPA 13 sprinkler standard	NO	0%	0%
Standard Water Supply	NO	0%	
Fully Supervised system	NO	0%	

Sprinkler Credit **0 L/min**

4.0 Exposure Adjustment

Construction Type of the Exposed Building Face: Type V

North Side		Percent	Total*
Distance to Building (m)	Firewall	0%	44%
Length (ft) by height in storeys	41 to 60		
South Side			
Distance to Building (m)	0 to 3	22%	
Length (ft) by height in storeys	41 to 60		
East Side			
Distance to Building (m)	20.1 to 30	8%	
Length (ft) by height in storeys	81 to 100		
West Side			
Distance to Building (m)	10.1 to 20	14%	
Length (ft) by height in storeys	81 to 100		

*max 75%

Exposures Surcharge **2990 L/min**

Total Required Fire Flow (rounded) **10000 L/min** / **167 L/sec**

a) For buildings with a construction coefficient from 1.0 to 1.5, consider 100% of all floor areas. For buildings with a construction coefficient below 1.0 (vertical openings are inadequately protected), consider the two largest adjoining floors plus 50% of each of any floors immediately above them up to a maximum of eight. If the vertical openings and exterior vertical communications are properly protected, consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.

b) Wood Frame=1.5, Mass Timber= 0.8 to 1.5, Ordinary=1.0, Noncombustible=0.8, Fire-Resistive=0.6

c) Noncombustible=-25%, Limited Combustible=-15%, Combustible=0%, Free Burning=+15%, Rapid Burning=+25%

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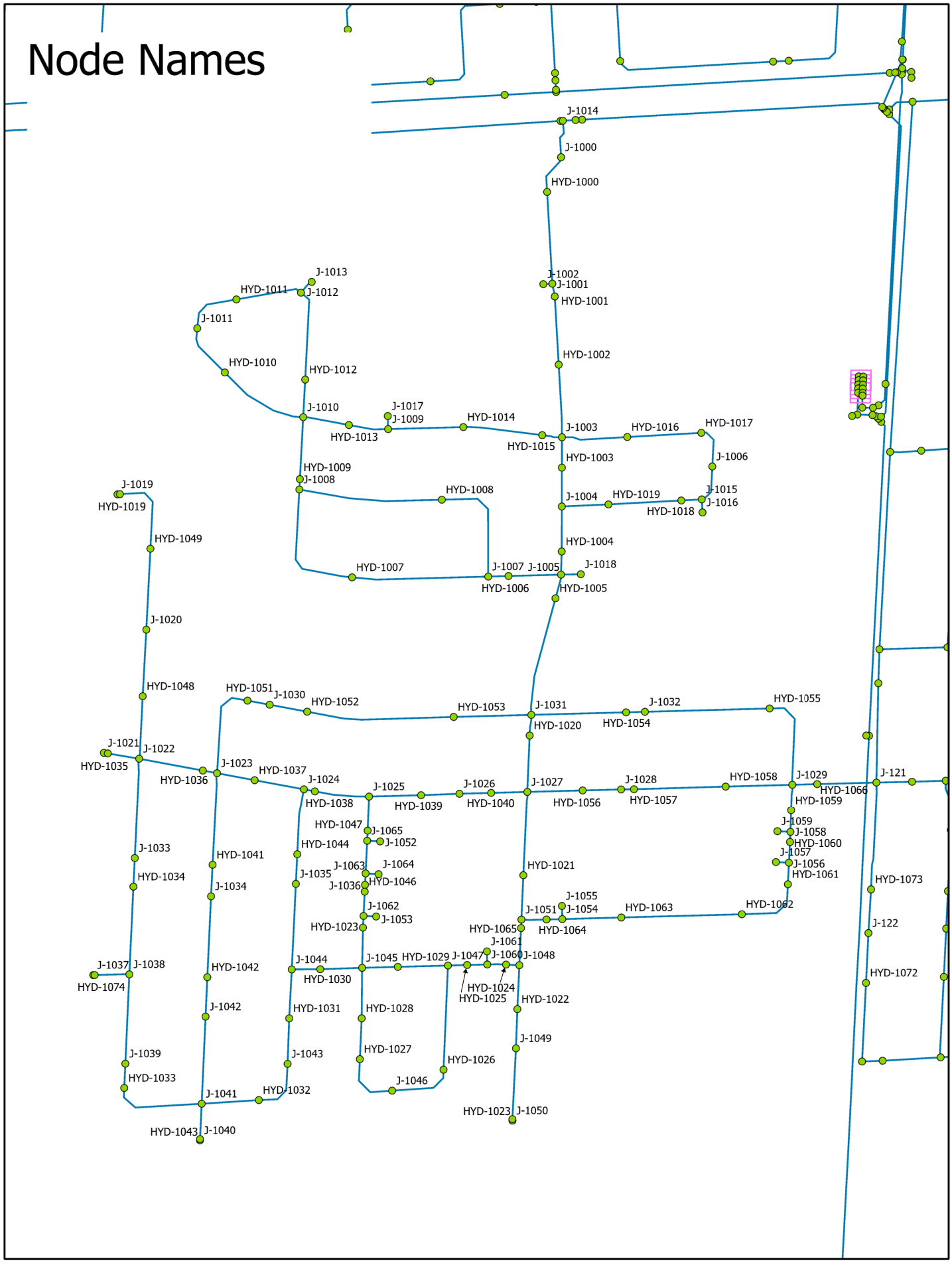
Appendix B

Model Results

Node Names


J-1014
J-1000
HYD-1000
J-1013
HYD-1011
J-1012
J-1011
HYD-1010
HYD-1012
J-1002
J-1001
HYD-1001
HYD-1002
J-1010
J-1017
J-1009
HYD-1013
HYD-1014
HYD-1015
J-1003
HYD-1016
HYD-1017
HYD-1003
J-1006
HYD-1009
J-1008
HYD-1008
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HYD-1019
J-1015
J-1016
HYD-1018
J-1019
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HYD-1049
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HYD-1021
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J-1035
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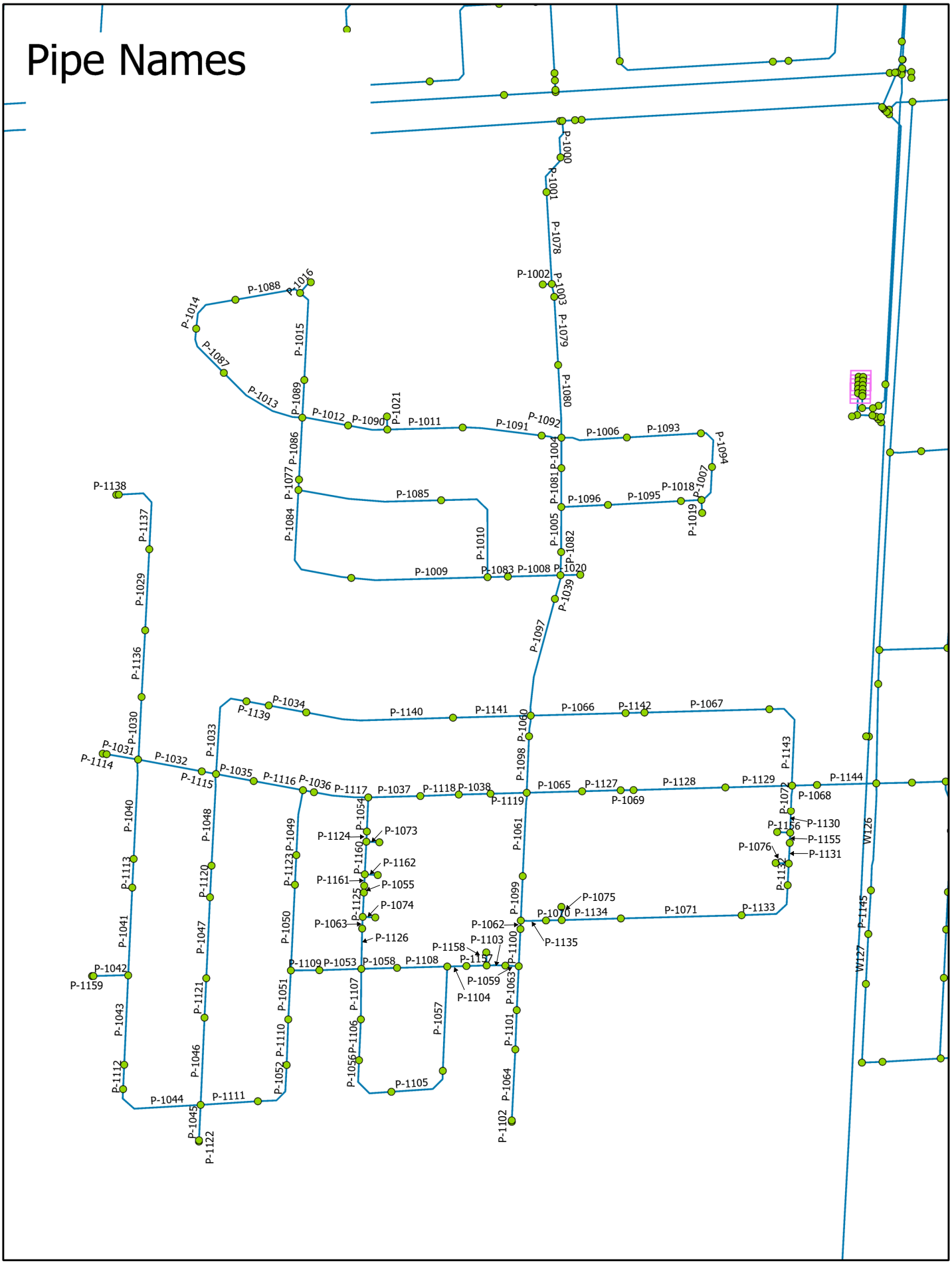
HYD-1023
J-1050
HYD-1043
J-1040

Pipe Names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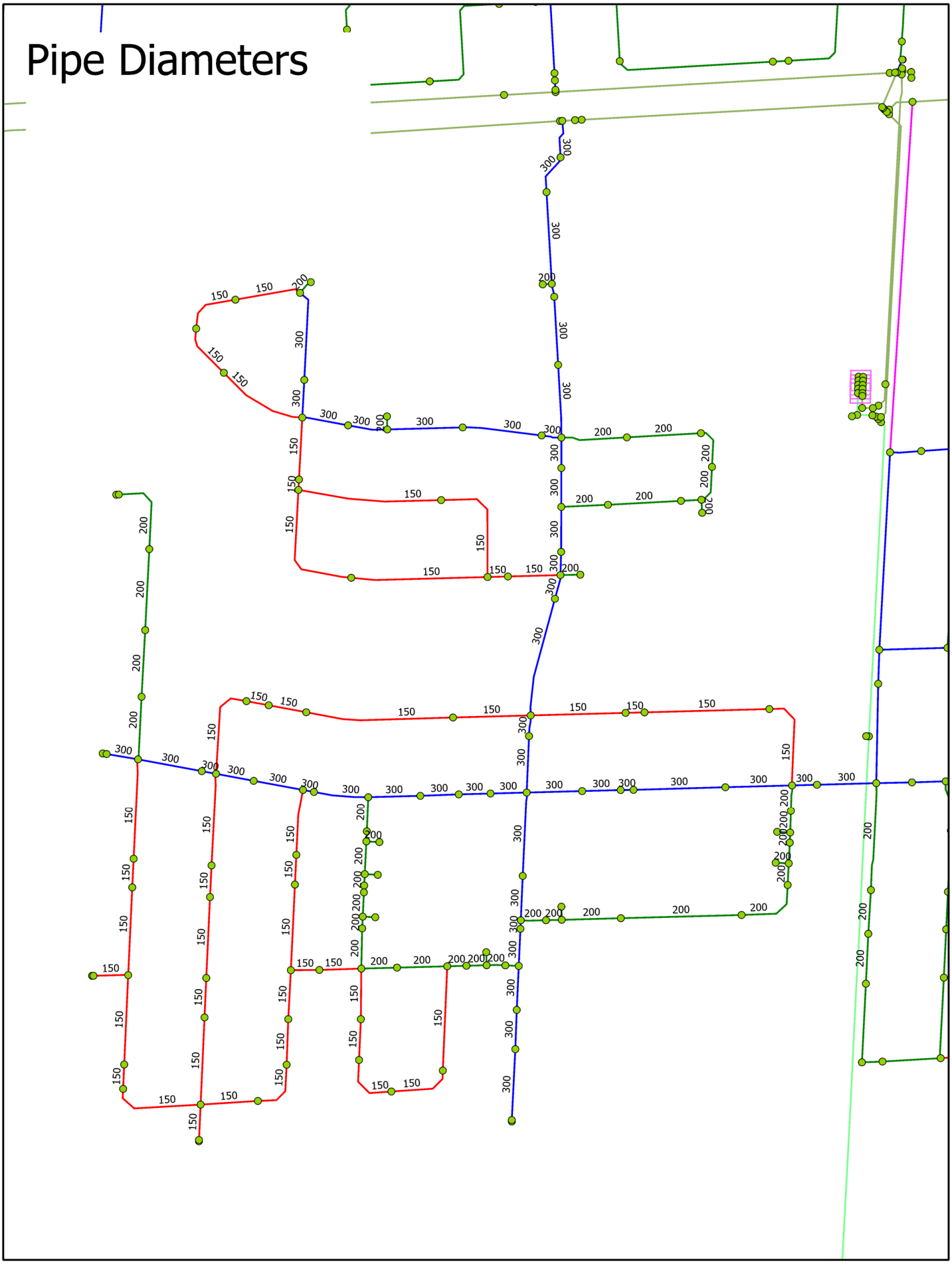
W126
W127
P-1145

Pipe Diameters



2031 Conditions
GB Tor Phase 2, Milton On
June 4, 2024

Municipal Engineering Solutions

Average Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
HYD-1020	0.00	195.62	249.09	76.01
HYD-1021	0.00	195.30	249.09	76.47
HYD-1022	0.00	195.05	249.09	76.82
HYD-1023	0.00	195.31	249.09	76.45
HYD-1024	0.00	194.83	249.09	77.13
HYD-1025	0.00	195.00	249.09	76.89
HYD-1026	0.00	195.40	249.09	76.32
HYD-1027	0.00	195.45	249.09	76.25
HYD-1028	0.00	195.36	249.09	76.38
HYD-1029	0.00	195.19	249.09	76.62
HYD-1030	0.00	195.38	249.09	76.35
HYD-1031	0.00	195.70	249.09	75.89
HYD-1032	0.00	196.10	249.09	75.32
HYD-1033	0.00	196.52	249.08	74.73
HYD-1034	0.00	196.31	249.09	75.02
HYD-1035	0.00	196.79	249.09	74.34
HYD-1036	0.00	196.59	249.09	74.63
HYD-1037	0.00	196.32	249.09	75.01
HYD-1038	0.00	196.28	249.09	75.07
HYD-1039	0.00	195.86	249.09	75.67
HYD-1040	0.00	195.71	249.09	75.88
HYD-1041	0.00	196.13	249.09	75.28
HYD-1042	0.00	195.90	249.08	75.61
HYD-1043	0.00	196.17	249.08	75.22
HYD-1044	0.00	195.93	249.09	75.57
HYD-1045	0.00	195.36	249.09	76.38
HYD-1046	0.00	195.70	249.09	75.89
HYD-1047	0.00	195.78	249.09	75.78
HYD-1048	0.00	196.64	249.09	74.56
HYD-1049	0.00	197.01	249.09	74.03
HYD-1050	0.00	197.36	249.09	73.53
HYD-1051	0.00	196.77	249.09	74.37
HYD-1052	0.00	196.58	249.09	74.64
HYD-1053	0.00	195.87	249.09	75.65
HYD-1054	0.00	195.09	249.09	76.76
HYD-1055	0.00	195.60	249.09	76.04
HYD-1056	0.00	195.66	249.09	75.95
HYD-1057	0.00	195.82	249.09	75.73
HYD-1058	0.00	195.38	249.09	76.36
HYD-1059	0.00	195.14	249.09	76.70
HYD-1060	0.00	195.00	249.09	76.90
HYD-1061	0.00	194.95	249.09	76.97
HYD-1062	0.00	194.96	249.09	76.95
HYD-1063	0.00	195.21	249.09	76.59
HYD-1064	0.00	195.04	249.09	76.83
HYD-1065	0.00	195.07	249.09	76.79
HYD-1066	0.00	195.45	249.09	76.26
HYD-1074	0.00	196.16	249.08	75.24
J-1019	0.08	197.38	249.09	73.50
J-1020	0.25	196.80	249.09	74.33
J-1021	0.00	196.81	249.09	74.32
J-1022	0.26	196.49	249.09	74.77
J-1023	0.19	196.34	249.09	74.98
J-1024	0.24	196.31	249.09	75.03
J-1025	0.14	196.08	249.09	75.35
J-1026	0.08	195.83	249.09	75.71
J-1027	0.07	194.57	249.09	77.50
J-1028	0.17	195.62	249.09	76.01
J-1029	0.30	195.35	249.09	76.40
J-1030	0.31	196.70	249.09	74.47
J-1031	0.36	195.72	249.09	75.87
J-1032	0.26	196.00	249.09	75.47
J-1033	0.18	196.26	249.09	75.10
J-1034	0.26	196.07	249.08	75.37
J-1035	0.00	195.83	249.09	75.71
J-1036	0.00	195.75	249.09	75.82
J-1037	0.00	196.17	249.08	75.22
J-1038	0.24	196.13	249.08	75.28
J-1039	0.00	196.55	249.08	74.68
J-1040	0.00	196.18	249.08	75.21
J-1041	0.37	196.22	249.08	75.15
J-1042	0.16	195.97	249.08	75.51

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(ML/d)*	*(m/s)*
P-1029	J-1020	HYD-1049	72.70	200	110	0.01	0.00
P-1030	J-1022	HYD-1048	56.15	200	110	0.03	0.01
P-1031	HYD-1035	J-1022	28.55	300	120	0.00	0.00
P-1032	J-1022	HYD-1036	58.08	300	120	-0.09	0.01
P-1033	J-1023	HYD-1051	86.44	150	100	0.00	0.00
P-1034	J-1030	HYD-1052	34.18	150	100	-0.03	0.02
P-1035	J-1023	HYD-1037	34.34	300	120	-0.14	0.02
P-1036	J-1024	HYD-1038	9.98	300	120	-0.18	0.03
P-1037	J-1025	HYD-1039	46.67	300	120	-0.25	0.04
P-1038	J-1026	HYD-1040	28.45	300	120	-0.25	0.04
P-1040	J-1022	J-1033	89.77	150	100	0.04	0.02
P-1041	J-1038	HYD-1034	78.64	150	100	-0.02	0.01
P-1042	J-1038	HYD-1074	31.18	150	100	0.00	0.00
P-1043	J-1038	J-1039	80.13	150	100	0.00	0.00
P-1044	HYD-1033	J-1041	81.79	150	100	0.00	0.00
P-1045	J-1041	HYD-1043	31.72	150	100	0.00	0.00
P-1046	J-1041	J-1042	78.18	150	100	0.00	0.00
P-1047	J-1034	HYD-1042	72.54	150	100	0.02	0.01
P-1048	J-1023	HYD-1041	82.83	150	100	0.04	0.03
P-1049	J-1024	HYD-1044	59.17	150	100	0.02	0.01
P-1050	J-1035	J-1044	76.77	150	100	0.02	0.01
P-1051	J-1044	HYD-1031	43.87	150	100	0.03	0.02
P-1052	HYD-1032	J-1043	51.67	150	100	-0.03	0.02
P-1053	J-1045	HYD-1030	37.59	150	100	0.04	0.02
P-1054	J-1025	HYD-1047	31.15	200	110	0.05	0.02
P-1055	J-1036	HYD-1046	6.12	200	110	0.02	0.01
P-1056	HYD-1027	J-1046	53.56	150	100	0.00	0.00
P-1057	J-1047	HYD-1026	93.45	150	100	0.02	0.01
P-1058	J-1045	HYD-1029	32.04	200	110	-0.06	0.02
P-1059	J-1048	HYD-1024	12.00	200	110	0.11	0.04
P-1060	J-1031	HYD-1020	18.62	300	130	0.03	0.01
P-1061	J-1027	HYD-1021	75.36	300	120	0.10	0.02
P-1062	J-1051	HYD-1065	7.60	300	120	0.13	0.02
P-1063	J-1048	HYD-1022	39.38	300	120	0.01	0.00
P-1064	J-1049	HYD-1023	63.56	300	120	0.01	0.00
P-1065	J-1027	HYD-1056	49.66	300	130	-0.33	0.05
P-1066	J-1031	HYD-1054	85.03	150	100	-0.02	0.01
P-1067	J-1032	HYD-1055	111.91	150	100	-0.04	0.03
P-1068	J-1029	HYD-1066	22.90	300	130	-0.55	0.09
P-1069	J-1028	HYD-1057	11.52	300	130	-0.34	0.06
P-1070	J-1054	HYD-1064	14.12	200	110	0.05	0.02
P-1071	HYD-1063	HYD-1062	108.20	200	110	-0.07	0.03
P-1072	J-1029	HYD-1059	23.35	200	110	0.13	0.05
P-1073	J-1052	J-1065	11.67	200	110	-0.02	0.01
P-1074	J-1053	J-1062	11.26	200	110	-0.01	0.00
P-1075	J-1055	J-1054	11.79	200	110	-0.03	0.01
P-1076	J-1057	J-1056	11.72	200	110	-0.03	0.01
P-1098	HYD-1020	J-1027	50.65	300	130	0.03	0.01
P-1099	HYD-1021	J-1051	39.81	300	120	0.10	0.02
P-1100	HYD-1065	J-1048	33.30	300	120	0.13	0.02
P-1101	HYD-1022	J-1049	35.20	300	120	0.01	0.00
P-1102	HYD-1023	J-1050	1.29	300	120	0.01	0.00
P-1103	HYD-1024	J-1060	16.81	200	110	0.11	0.04
P-1104	HYD-1025	J-1047	17.20	200	110	0.09	0.03
P-1105	J-1046	HYD-1026	57.07	150	100	-0.02	0.01
P-1106	HYD-1027	HYD-1028	36.60	150	100	0.00	0.00
P-1107	HYD-1028	J-1045	45.25	150	100	0.00	0.00
P-1108	HYD-1029	J-1047	44.99	200	110	-0.06	0.02
P-1109	J-1044	HYD-1030	25.55	150	100	-0.04	0.02
P-1110	HYD-1031	J-1043	40.87	150	100	0.03	0.02
P-1111	HYD-1032	J-1041	51.41	150	100	0.03	0.02
P-1112	HYD-1033	J-1039	21.81	150	100	0.00	0.00
P-1113	HYD-1034	J-1033	25.72	150	100	-0.02	0.01
P-1114	HYD-1035	J-1021	3.59	300	120	0.00	0.00
P-1115	HYD-1036	J-1023	12.96	300	120	-0.09	0.01
P-1116	HYD-1037	J-1024	44.92	300	120	-0.14	0.02
P-1117	HYD-1038	J-1025	49.00	300	120	-0.18	0.03
P-1118	HYD-1039	J-1026	34.45	300	120	-0.25	0.04
P-1119	HYD-1040	J-1027	32.42	300	120	-0.25	0.04
P-1120	HYD-1041	J-1034	28.34	150	100	0.04	0.03
P-1121	HYD-1042	J-1042	35.33	150	100	0.02	0.01
P-1122	HYD-1043	J-1040	1.11	150	100	0.00	0.00

Municipal Engineering Solutions

Average Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
J-1043	0.00	195.86	249.09	75.66
J-1044	0.35	195.59	249.09	76.05
J-1045	0.24	195.35	249.09	76.39
J-1046	0.22	195.74	249.09	75.84
J-1047	0.17	194.96	249.09	76.95
J-1048	0.18	194.95	249.09	76.96
J-1049	0.00	195.10	249.09	76.75
J-1050	0.13	195.37	249.09	76.37
J-1051	0.13	195.15	249.09	76.68
J-1052	0.22	195.60	249.09	76.04
J-1053	0.15	195.01	249.09	76.88
J-1054	0.00	195.22	249.09	76.58
J-1055	0.29	195.05	249.09	76.82
J-1056	0.16	195.00	249.09	76.89
J-1057	0.29	195.36	249.09	76.38
J-1058	0.00	195.05	249.09	76.82
J-1059	0.29	195.46	249.09	76.24
J-1060	0.00	194.90	249.09	77.03
J-1061	0.23	195.00	249.09	76.89
J-1062	0.00	195.50	249.09	76.18
J-1063	0.00	195.86	249.09	75.67
J-1064	0.18	195.50	249.09	76.18
J-1065	0.00	195.88	249.09	75.64
J-121	0.00	195.32	249.10	76.45
MIN		**194.57**		**73.50**
MAX		**197.38**		**77.50**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(ML/d)*	*(m/s)*
P-1123	HYD-1044	J-1035	26.61	150	100	0.02	0.01
P-1124	HYD-1047	J-1065	9.07	200	110	0.05	0.02
P-1125	HYD-1046	J-1062	21.78	200	110	0.02	0.01
P-1126	HYD-1045	J-1045	36.06	200	110	0.00	0.00
P-1127	HYD-1056	J-1028	34.55	300	130	-0.33	0.05
P-1128	HYD-1057	HYD-1058	82.33	300	130	-0.34	0.06
P-1129	HYD-1058	J-1029	59.79	300	130	-0.34	0.06
P-1130	HYD-1059	J-1058	19.47	200	110	0.13	0.05
P-1131	HYD-1060	J-1056	18.60	200	110	0.11	0.04
P-1132	HYD-1061	J-1056	19.35	200	110	-0.07	0.03
P-1133	HYD-1062	HYD-1061	60.94	200	110	-0.07	0.03
P-1134	HYD-1063	J-1054	52.98	200	110	0.07	0.03
P-1135	J-1051	HYD-1064	22.57	200	110	-0.05	0.02
P-1136	HYD-1048	J-1020	59.81	200	110	0.03	0.01
P-1137	HYD-1050	HYD-1049	75.07	200	110	-0.01	0.00
P-1138	HYD-1050	J-1019	2.23	200	110	0.01	0.00
P-1139	HYD-1051	J-1030	20.29	150	100	0.00	0.00
P-1140	HYD-1052	HYD-1053	132.12	150	100	-0.03	0.02
P-1141	HYD-1053	J-1031	69.66	150	100	-0.03	0.02
P-1142	HYD-1054	J-1032	16.93	150	100	-0.02	0.01
P-1143	HYD-1055	J-1029	85.85	150	100	-0.04	0.03
P-1144	HYD-1066	J-121	53.01	300	130	-0.55	0.09
P-1155	J-1058	HYD-1060	9.10	200	110	0.11	0.04
P-1156	J-1058	J-1059	11.70	200	110	0.03	0.01
P-1157	J-1060	HYD-1025	18.10	200	110	0.09	0.03
P-1158	J-1060	J-1061	11.70	200	110	0.02	0.01
P-1159	HYD-1074	J-1037	1.20	150	100	0.00	0.00
P-1160	J-1065	J-1063	29.32	200	110	0.03	0.01
P-1161	J-1063	J-1036	10.22	200	110	0.02	0.01
P-1162	J-1063	J-1064	11.67	200	110	0.02	0.01
P-1163	J-1062	HYD-1045	10.48	200	110	0.00	0.00

Maximum Day

Node Table

ID	Demand	Elevatio	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
HYD-1020	0.00	195.62	248.11	74.62
HYD-1021	0.00	195.30	248.11	75.07
HYD-1022	0.00	195.05	248.11	75.43
HYD-1023	0.00	195.31	248.11	75.06
HYD-1024	0.00	194.83	248.11	75.74
HYD-1025	0.00	195.00	248.11	75.49
HYD-1026	0.00	195.40	248.10	74.92
HYD-1027	0.00	195.45	248.10	74.85
HYD-1028	0.00	195.36	248.10	74.98
HYD-1029	0.00	195.19	248.10	75.22
HYD-1030	0.00	195.38	248.10	74.95
HYD-1031	0.00	195.70	248.10	74.49
HYD-1032	0.00	196.10	248.09	73.91
HYD-1033	0.00	196.52	248.09	73.32
HYD-1034	0.00	196.31	248.09	73.62
HYD-1035	0.00	196.79	248.10	72.94
HYD-1036	0.00	196.59	248.10	73.23
HYD-1037	0.00	196.32	248.10	73.61
HYD-1038	0.00	196.28	248.10	73.67
HYD-1039	0.00	195.86	248.11	74.27
HYD-1040	0.00	195.71	248.11	74.49
HYD-1041	0.00	196.13	248.10	73.87
HYD-1042	0.00	195.90	248.09	74.20
HYD-1043	0.00	196.17	248.09	73.81
HYD-1044	0.00	195.93	248.10	74.17
HYD-1045	0.00	195.36	248.10	74.98
HYD-1046	0.00	195.70	248.10	74.50
HYD-1047	0.00	195.78	248.10	74.38
HYD-1048	0.00	196.64	248.10	73.16
HYD-1049	0.00	197.01	248.10	72.63
HYD-1050	0.00	197.36	248.10	72.13
HYD-1051	0.00	196.77	248.10	72.97
HYD-1052	0.00	196.58	248.10	73.24
HYD-1053	0.00	195.87	248.11	74.26
HYD-1054	0.00	195.09	248.11	75.38
HYD-1055	0.00	195.60	248.12	74.67
HYD-1056	0.00	195.66	248.11	74.57
HYD-1057	0.00	195.82	248.12	74.35
HYD-1058	0.00	195.38	248.13	74.98
HYD-1059	0.00	195.14	248.13	75.33
HYD-1060	0.00	195.00	248.12	75.52
HYD-1061	0.00	194.95	248.12	75.59
HYD-1062	0.00	194.96	248.12	75.57
HYD-1063	0.00	195.21	248.11	75.21
HYD-1064	0.00	195.04	248.11	75.44
HYD-1065	0.00	195.07	248.11	75.40
HYD-1066	0.00	195.45	248.14	74.90
HYD-1074	0.00	196.16	248.09	73.83
J-1019	0.19	197.38	248.10	72.10
J-1020	0.57	196.80	248.10	72.93
J-1021	0.00	196.81	248.10	72.91
J-1022	0.59	196.49	248.10	73.37
J-1023	0.43	196.34	248.10	73.58
J-1024	0.54	196.31	248.10	73.63
J-1025	0.31	196.08	248.10	73.96
J-1026	0.19	195.83	248.11	74.32
J-1027	0.16	194.57	248.11	76.11
J-1028	0.38	195.62	248.12	74.63
J-1029	0.68	195.35	248.13	75.03
J-1030	0.70	196.70	248.10	73.07
J-1031	0.81	195.72	248.11	74.48
J-1032	0.59	196.00	248.11	74.08
J-1033	0.41	196.26	248.10	73.69
J-1034	0.59	196.07	248.09	73.96
J-1035	0.00	195.83	248.10	74.31
J-1036	0.00	195.75	248.10	74.42
J-1037	0.00	196.17	248.09	73.81
J-1038	0.54	196.13	248.09	73.87
J-1039	0.00	196.55	248.09	73.27
J-1040	0.00	196.18	248.09	73.80
J-1041	0.84	196.22	248.09	73.74
J-1042	0.35	195.97	248.09	74.10

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(ML/d)*	*(m/s)*
P-1029	J-1020	HYD-1049	72.70	200	110	0.02	0.01
P-1030	J-1022	HYD-1048	56.15	200	110	0.07	0.02
P-1031	HYD-1035	J-1022	28.55	300	120	0.00	0.00
P-1032	J-1022	HYD-1036	58.08	300	120	-0.20	0.03
P-1033	J-1023	HYD-1051	86.44	150	100	-0.01	0.01
P-1034	J-1030	HYD-1052	34.18	150	100	-0.07	0.05
P-1035	J-1023	HYD-1037	34.34	300	120	-0.32	0.05
P-1036	J-1024	HYD-1038	9.98	300	120	-0.41	0.07
P-1037	J-1025	HYD-1039	46.67	300	120	-0.55	0.09
P-1038	J-1026	HYD-1040	28.45	300	120	-0.57	0.09
P-1040	J-1022	J-1033	89.77	150	100	0.09	0.06
P-1041	J-1038	HYD-1034	78.64	150	100	-0.05	0.03
P-1042	J-1038	HYD-1074	31.18	150	100	0.00	0.00
P-1043	J-1038	J-1039	80.13	150	100	0.00	0.00
P-1044	HYD-1033	J-1041	81.79	150	100	0.00	0.00
P-1045	J-1041	HYD-1043	31.72	150	100	0.00	0.00
P-1046	J-1041	J-1042	78.18	150	100	-0.01	0.00
P-1047	J-1034	HYD-1042	72.54	150	100	0.04	0.02
P-1048	J-1023	HYD-1041	82.83	150	100	0.09	0.06
P-1049	J-1024	HYD-1044	59.17	150	100	0.05	0.03
P-1050	J-1035	J-1044	76.77	150	100	0.05	0.03
P-1051	J-1044	HYD-1031	43.87	150	100	0.06	0.04
P-1052	HYD-1032	J-1043	51.67	150	100	-0.06	0.04
P-1053	J-1045	HYD-1030	37.59	150	100	0.08	0.05
P-1054	J-1025	HYD-1047	31.15	200	110	0.11	0.04
P-1055	J-1036	HYD-1046	6.12	200	110	0.04	0.01
P-1056	HYD-1027	J-1046	53.56	150	100	0.00	0.00
P-1057	J-1047	HYD-1026	93.45	150	100	0.04	0.02
P-1058	J-1045	HYD-1029	32.04	200	110	-0.13	0.05
P-1059	J-1048	HYD-1024	12.00	200	110	0.24	0.09
P-1060	J-1031	HYD-1020	18.62	300	130	-0.03	0.01
P-1061	J-1027	HYD-1021	75.36	300	120	0.21	0.03
P-1062	J-1051	HYD-1065	7.60	300	120	0.30	0.05
P-1063	J-1048	HYD-1022	39.38	300	120	0.03	0.00
P-1064	J-1049	HYD-1023	63.56	300	120	0.03	0.00
P-1065	J-1027	HYD-1056	49.66	300	130	-0.82	0.13
P-1066	J-1031	HYD-1054	85.03	150	100	-0.06	0.04
P-1067	J-1032	HYD-1055	111.91	150	100	-0.11	0.07
P-1068	J-1029	HYD-1066	22.90	300	130	-1.34	0.22
P-1069	J-1028	HYD-1057	11.52	300	130	-0.86	0.14
P-1070	J-1054	HYD-1064	14.12	200	110	0.12	0.05
P-1071	HYD-1063	HYD-1062	108.20	200	110	-0.18	0.07
P-1072	J-1029	HYD-1059	23.35	200	110	0.32	0.12
P-1073	J-1052	J-1065	11.67	200	110	-0.04	0.02
P-1074	J-1053	J-1062	11.26	200	110	-0.03	0.01
P-1075	J-1055	J-1054	11.79	200	110	-0.06	0.02
P-1076	J-1057	J-1056	11.72	200	110	-0.06	0.02
P-1098	HYD-1020	J-1027	50.65	300	130	-0.03	0.01
P-1099	HYD-1021	J-1051	39.81	300	120	0.21	0.03
P-1100	HYD-1065	J-1048	33.30	300	120	0.30	0.05
P-1101	HYD-1022	J-1049	35.20	300	120	0.03	0.00
P-1102	HYD-1023	J-1050	1.29	300	120	0.03	0.00
P-1103	HYD-1024	J-1060	16.81	200	110	0.24	0.09
P-1104	HYD-1025	J-1047	17.20	200	110	0.20	0.07
P-1105	J-1046	HYD-1026	57.07	150	100	-0.04	0.02
P-1106	HYD-1027	HYD-1028	36.60	150	100	0.00	0.00
P-1107	HYD-1028	J-1045	45.25	150	100	0.00	0.00
P-1108	HYD-1029	J-1047	44.99	200	110	-0.13	0.05
P-1109	J-1044	HYD-1030	25.55	150	100	-0.08	0.05
P-1110	HYD-1031	J-1043	40.87	150	100	0.06	0.04
P-1111	HYD-1032	J-1041	51.41	150	100	0.06	0.04
P-1112	HYD-1033	J-1039	21.81	150	100	0.00	0.00
P-1113	HYD-1034	J-1033	25.72	150	100	-0.05	0.03
P-1114	HYD-1035	J-1021	3.59	300	120	0.00	0.00
P-1115	HYD-1036	J-1023	12.96	300	120	-0.20	0.03
P-1116	HYD-1037	J-1024	44.92	300	120	-0.32	0.05
P-1117	HYD-1038	J-1025	49.00	300	120	-0.41	0.07
P-1118	HYD-1039	J-1026	34.45	300	120	-0.55	0.09
P-1119	HYD-1040	J-1027	32.42	300	120	-0.57	0.09
P-1120	HYD-1041	J-1034	28.34	150	100	0.09	0.06
P-1121	HYD-1042	J-1042	35.33	150	100	0.04	0.02
P-1122	HYD-1043	J-1040	1.11	150	100	0.00	0.00

Municipal Engineering Solutions

Maximum Day

Node Table

ID	Demand	Elevatio	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
J-1043	0.00	195.86	248.10	74.26
J-1044	0.78	195.59	248.10	74.65
J-1045	0.53	195.35	248.10	74.99
J-1046	0.49	195.74	248.10	74.44
J-1047	0.38	194.96	248.10	75.55
J-1048	0.41	194.95	248.11	75.57
J-1049	0.00	195.10	248.11	75.36
J-1050	0.30	195.37	248.11	74.97
J-1051	0.29	195.15	248.11	75.29
J-1052	0.49	195.60	248.10	74.64
J-1053	0.33	195.01	248.10	75.48
J-1054	0.00	195.22	248.11	75.19
J-1055	0.65	195.05	248.11	75.43
J-1056	0.36	195.00	248.12	75.52
J-1057	0.65	195.36	248.12	75.01
J-1058	0.00	195.05	248.13	75.45
J-1059	0.65	195.46	248.13	74.87
J-1060	0.00	194.90	248.11	75.64
J-1061	0.53	195.00	248.11	75.50
J-1062	0.00	195.50	248.10	74.78
J-1063	0.00	195.86	248.10	74.27
J-1064	0.40	195.50	248.10	74.78
J-1065	0.00	195.88	248.10	74.24
J-121	0.00	195.32	248.15	75.10
MIN		**194.57**		**72.10**
MAX		**197.38**		**76.11**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(ML/d)*	*(m/s)*
P-1123	HYD-1044	J-1035	26.61	150	100	0.05	0.03
P-1124	HYD-1047	J-1065	9.07	200	110	0.11	0.04
P-1125	HYD-1046	J-1062	21.78	200	110	0.04	0.01
P-1126	HYD-1045	J-1045	36.06	200	110	0.01	0.00
P-1127	HYD-1056	J-1028	34.55	300	130	-0.82	0.13
P-1128	HYD-1057	HYD-1058	82.33	300	130	-0.86	0.14
P-1129	HYD-1058	J-1029	59.79	300	130	-0.86	0.14
P-1130	HYD-1059	J-1058	19.47	200	110	0.32	0.12
P-1131	HYD-1060	J-1056	18.60	200	110	0.27	0.10
P-1132	HYD-1061	J-1056	19.35	200	110	-0.18	0.07
P-1133	HYD-1062	HYD-1061	60.94	200	110	-0.18	0.07
P-1134	HYD-1063	J-1054	52.98	200	110	0.18	0.07
P-1135	J-1051	HYD-1064	22.57	200	110	-0.12	0.05
P-1136	HYD-1048	J-1020	59.81	200	110	0.07	0.02
P-1137	HYD-1050	HYD-1049	75.07	200	110	-0.02	0.01
P-1138	HYD-1050	J-1019	2.23	200	110	0.02	0.01
P-1139	HYD-1051	J-1030	20.29	150	100	-0.01	0.01
P-1140	HYD-1052	HYD-1053	132.12	150	100	-0.07	0.05
P-1141	HYD-1053	J-1031	69.66	150	100	-0.07	0.05
P-1142	HYD-1054	J-1032	16.93	150	100	-0.06	0.04
P-1143	HYD-1055	J-1029	85.85	150	100	-0.11	0.07
P-1144	HYD-1066	J-121	53.01	300	130	-1.34	0.22
P-1155	J-1058	HYD-1060	9.10	200	110	0.27	0.10
P-1156	J-1058	J-1059	11.70	200	110	0.06	0.02
P-1157	J-1060	HYD-1025	18.10	200	110	0.20	0.07
P-1158	J-1060	J-1061	11.70	200	110	0.05	0.02
P-1159	HYD-1074	J-1037	1.20	150	100	0.00	0.00
P-1160	J-1065	J-1063	29.32	200	110	0.07	0.03
P-1161	J-1063	J-1036	10.22	200	110	0.04	0.01
P-1162	J-1063	J-1064	11.67	200	110	0.03	0.01
P-1163	J-1062	HYD-1045	10.48	200	110	0.01	0.00

Municipal Engineering Solutions

Peak Hour

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
HYD-1020	0.00	195.62	237.78	59.94
HYD-1021	0.00	195.30	237.78	60.39
HYD-1022	0.00	195.05	237.78	60.74
HYD-1023	0.00	195.31	237.78	60.37
HYD-1024	0.00	194.83	237.78	61.05
HYD-1025	0.00	195.00	237.77	60.80
HYD-1026	0.00	195.40	237.76	60.22
HYD-1027	0.00	195.45	237.76	60.15
HYD-1028	0.00	195.36	237.76	60.27
HYD-1029	0.00	195.19	237.76	60.52
HYD-1030	0.00	195.38	237.75	60.24
HYD-1031	0.00	195.70	237.75	59.77
HYD-1032	0.00	196.10	237.74	59.19
HYD-1033	0.00	196.52	237.73	58.59
HYD-1034	0.00	196.31	237.74	58.89
HYD-1035	0.00	196.79	237.75	58.23
HYD-1036	0.00	196.59	237.75	58.52
HYD-1037	0.00	196.32	237.76	58.91
HYD-1038	0.00	196.28	237.76	58.97
HYD-1039	0.00	195.86	237.77	59.58
HYD-1040	0.00	195.71	237.78	59.80
HYD-1041	0.00	196.13	237.74	59.15
HYD-1042	0.00	195.90	237.73	59.47
HYD-1043	0.00	196.17	237.73	59.08
HYD-1044	0.00	195.93	237.76	59.46
HYD-1045	0.00	195.36	237.76	60.27
HYD-1046	0.00	195.70	237.76	59.79
HYD-1047	0.00	195.78	237.76	59.68
HYD-1048	0.00	196.64	237.75	58.44
HYD-1049	0.00	197.01	237.75	57.92
HYD-1050	0.00	197.36	237.75	57.42
HYD-1051	0.00	196.77	237.75	58.26
HYD-1052	0.00	196.58	237.76	58.54
HYD-1053	0.00	195.87	237.77	59.57
HYD-1054	0.00	195.09	237.79	60.70
HYD-1055	0.00	195.60	237.82	60.02
HYD-1056	0.00	195.66	237.79	59.90
HYD-1057	0.00	195.82	237.80	59.68
HYD-1058	0.00	195.38	237.82	60.34
HYD-1059	0.00	195.14	237.83	60.69
HYD-1060	0.00	195.00	237.82	60.87
HYD-1061	0.00	194.95	237.81	60.93
HYD-1062	0.00	194.96	237.80	60.91
HYD-1063	0.00	195.21	237.79	60.53
HYD-1064	0.00	195.04	237.78	60.76
HYD-1065	0.00	195.07	237.78	60.72
HYD-1066	0.00	195.45	237.85	60.28
HYD-1074	0.00	196.16	237.73	59.10
J-1019	0.34	197.38	237.75	57.39
J-1020	1.01	196.80	237.75	58.22
J-1021	0.00	196.81	237.75	58.20
J-1022	1.06	196.49	237.75	58.66
J-1023	0.77	196.34	237.75	58.87
J-1024	0.96	196.31	237.76	58.92
J-1025	0.55	196.08	237.76	59.26
J-1026	0.34	195.83	237.77	59.63
J-1027	0.29	194.57	237.78	61.43
J-1028	0.67	195.62	237.80	59.96
J-1029	1.20	195.35	237.84	60.40
J-1030	1.25	196.70	237.75	58.36
J-1031	1.44	195.72	237.78	59.80
J-1032	1.06	196.00	237.79	59.41
J-1033	0.72	196.26	237.74	58.96
J-1034	1.06	196.07	237.73	59.23
J-1035	0.00	195.83	237.75	59.60
J-1036	0.00	195.75	237.76	59.72
J-1037	0.00	196.17	237.73	59.08
J-1038	0.96	196.13	237.73	59.14
J-1039	0.00	196.55	237.73	58.54
J-1040	0.00	196.18	237.73	59.07
J-1041	1.49	196.22	237.73	59.01
J-1042	0.62	195.97	237.73	59.37

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(ML/d)*	*(m/s)*
P-1029	J-1020	HYD-1049	72.70	200	110	0.03	0.01
P-1030	J-1022	HYD-1048	56.15	200	110	0.12	0.04
P-1031	HYD-1035	J-1022	28.55	300	120	0.00	0.00
P-1032	J-1022	HYD-1036	58.08	300	120	-0.36	0.06
P-1033	J-1023	HYD-1051	86.44	150	100	-0.02	0.01
P-1034	J-1030	HYD-1052	34.18	150	100	-0.12	0.08
P-1035	J-1023	HYD-1037	34.34	300	120	-0.57	0.09
P-1036	J-1024	HYD-1038	9.98	300	120	-0.73	0.12
P-1037	J-1025	HYD-1039	46.67	300	120	-0.98	0.16
P-1038	J-1026	HYD-1040	28.45	300	120	-1.01	0.17
P-1040	J-1022	J-1033	89.77	150	100	0.15	0.10
P-1041	J-1038	HYD-1034	78.64	150	100	-0.09	0.06
P-1042	J-1038	HYD-1074	31.18	150	100	0.00	0.00
P-1043	J-1038	J-1039	80.13	150	100	0.01	0.00
P-1044	HYD-1033	J-1041	81.79	150	100	0.01	0.00
P-1045	J-1041	HYD-1043	31.72	150	100	0.00	0.00
P-1046	J-1041	J-1042	78.18	150	100	-0.01	0.01
P-1047	J-1034	HYD-1042	72.54	150	100	0.06	0.04
P-1048	J-1023	HYD-1041	82.83	150	100	0.16	0.10
P-1049	J-1024	HYD-1044	59.17	150	100	0.08	0.05
P-1050	J-1035	J-1044	76.77	150	100	0.08	0.05
P-1051	J-1044	HYD-1031	43.87	150	100	0.11	0.07
P-1052	HYD-1032	J-1043	51.67	150	100	-0.11	0.07
P-1053	J-1045	HYD-1030	37.59	150	100	0.15	0.10
P-1054	J-1025	HYD-1047	31.15	200	110	0.20	0.07
P-1055	J-1036	HYD-1046	6.12	200	110	0.06	0.02
P-1056	HYD-1027	J-1046	53.56	150	100	0.01	0.00
P-1057	J-1047	HYD-1026	93.45	150	100	0.07	0.04
P-1058	J-1045	HYD-1029	32.04	200	110	-0.22	0.08
P-1059	J-1048	HYD-1024	12.00	200	110	0.43	0.16
P-1060	J-1031	HYD-1020	18.62	300	130	0.00	0.00
P-1061	J-1027	HYD-1021	75.36	300	120	0.38	0.06
P-1062	J-1051	HYD-1065	7.60	300	120	0.54	0.09
P-1063	J-1048	HYD-1022	39.38	300	120	0.05	0.01
P-1064	J-1049	HYD-1023	63.56	300	120	0.05	0.01
P-1065	J-1027	HYD-1056	49.66	300	130	-1.41	0.23
P-1066	J-1031	HYD-1054	85.03	150	100	-0.09	0.06
P-1067	J-1032	HYD-1055	111.91	150	100	-0.19	0.12
P-1068	J-1029	HYD-1066	22.90	300	130	-2.32	0.38
P-1069	J-1028	HYD-1057	11.52	300	130	-1.47	0.24
P-1070	J-1054	HYD-1064	14.12	200	110	0.21	0.08
P-1071	HYD-1063	HYD-1062	108.20	200	110	-0.31	0.11
P-1072	J-1029	HYD-1059	23.35	200	110	0.56	0.21
P-1073	J-1052	J-1065	11.67	200	110	-0.08	0.03
P-1074	J-1053	J-1062	11.26	200	110	-0.05	0.02
P-1075	J-1055	J-1054	11.79	200	110	-0.10	0.04
P-1076	J-1057	J-1056	11.72	200	110	-0.10	0.04
P-1098	HYD-1020	J-1027	50.65	300	130	0.00	0.00
P-1099	HYD-1021	J-1051	39.81	300	120	0.38	0.06
P-1100	HYD-1065	J-1048	33.30	300	120	0.54	0.09
P-1101	HYD-1022	J-1049	35.20	300	120	0.05	0.01
P-1102	HYD-1023	J-1050	1.29	300	120	0.05	0.01
P-1103	HYD-1024	J-1060	16.81	200	110	0.43	0.16
P-1104	HYD-1025	J-1047	17.20	200	110	0.35	0.13
P-1105	J-1046	HYD-1026	57.07	150	100	-0.07	0.04
P-1106	HYD-1027	HYD-1028	36.60	150	100	-0.01	0.00
P-1107	HYD-1028	J-1045	45.25	150	100	-0.01	0.00
P-1108	HYD-1029	J-1047	44.99	200	110	-0.22	0.08
P-1109	J-1044	HYD-1030	25.55	150	100	-0.15	0.10
P-1110	HYD-1031	J-1043	40.87	150	100	0.11	0.07
P-1111	HYD-1032	J-1041	51.41	150	100	0.11	0.07
P-1112	HYD-1033	J-1039	21.81	150	100	-0.01	0.00
P-1113	HYD-1034	J-1033	25.72	150	100	-0.09	0.06
P-1114	HYD-1035	J-1021	3.59	300	120	0.00	0.00
P-1115	HYD-1036	J-1023	12.96	300	120	-0.36	0.06
P-1116	HYD-1037	J-1024	44.92	300	120	-0.57	0.09
P-1117	HYD-1038	J-1025	49.00	300	120	-0.73	0.12
P-1118	HYD-1039	J-1026	34.45	300	120	-0.98	0.16
P-1119	HYD-1040	J-1027	32.42	300	120	-1.01	0.17
P-1120	HYD-1041	J-1034	28.34	150	100	0.16	0.10
P-1121	HYD-1042	J-1042	35.33	150	100	0.06	0.04
P-1122	HYD-1043	J-1040	1.11	150	100	0.00	0.00

Municipal Engineering Solutions

Peak Hour

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
J-1043	0.00	195.86	237.74	59.54
J-1044	1.39	195.59	237.75	59.93
J-1045	0.95	195.35	237.76	60.29
J-1046	0.86	195.74	237.76	59.73
J-1047	0.67	194.96	237.77	60.85
J-1048	0.72	194.95	237.78	60.88
J-1049	0.00	195.10	237.78	60.67
J-1050	0.53	195.37	237.78	60.29
J-1051	0.52	195.15	237.78	60.60
J-1052	0.87	195.60	237.76	59.93
J-1053	0.58	195.01	237.76	60.77
J-1054	0.00	195.22	237.78	60.51
J-1055	1.16	195.05	237.78	60.75
J-1056	0.64	195.00	237.81	60.86
J-1057	1.16	195.36	237.81	60.35
J-1058	0.00	195.05	237.82	60.80
J-1059	1.16	195.46	237.82	60.22
J-1060	0.00	194.90	237.77	60.94
J-1061	0.94	195.00	237.77	60.80
J-1062	0.00	195.50	237.76	60.08
J-1063	0.00	195.86	237.76	59.56
J-1064	0.71	195.50	237.76	60.08
J-1065	0.00	195.88	237.76	59.54
J-121	0.00	195.32	237.88	60.50
MIN		**194.57**		**57.39**
MAX		**197.38**		**61.43**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(ML/d)*	*(m/s)*
P-1123	HYD-1044	J-1035	26.61	150	100	0.08	0.05
P-1124	HYD-1047	J-1065	9.07	200	110	0.20	0.07
P-1125	HYD-1046	J-1062	21.78	200	110	0.06	0.02
P-1126	HYD-1045	J-1045	36.06	200	110	0.01	0.01
P-1127	HYD-1056	J-1028	34.55	300	130	-1.41	0.23
P-1128	HYD-1057	HYD-1058	82.33	300	130	-1.47	0.24
P-1129	HYD-1058	J-1029	59.79	300	130	-1.47	0.24
P-1130	HYD-1059	J-1058	19.47	200	110	0.56	0.21
P-1131	HYD-1060	J-1056	18.60	200	110	0.46	0.17
P-1132	HYD-1061	J-1056	19.35	200	110	-0.31	0.11
P-1133	HYD-1062	HYD-1061	60.94	200	110	-0.31	0.11
P-1134	HYD-1063	J-1054	52.98	200	110	0.31	0.11
P-1135	J-1051	HYD-1064	22.57	200	110	-0.21	0.08
P-1136	HYD-1048	J-1020	59.81	200	110	0.12	0.04
P-1137	HYD-1050	HYD-1049	75.07	200	110	-0.03	0.01
P-1138	HYD-1050	J-1019	2.23	200	110	0.03	0.01
P-1139	HYD-1051	J-1030	20.29	150	100	-0.02	0.01
P-1140	HYD-1052	HYD-1053	132.12	150	100	-0.12	0.08
P-1141	HYD-1053	J-1031	69.66	150	100	-0.12	0.08
P-1142	HYD-1054	J-1032	16.93	150	100	-0.09	0.06
P-1143	HYD-1055	J-1029	85.85	150	100	-0.19	0.12
P-1144	HYD-1066	J-121	53.01	300	130	-2.32	0.38
P-1155	J-1058	HYD-1060	9.10	200	110	0.46	0.17
P-1156	J-1058	J-1059	11.70	200	110	0.10	0.04
P-1157	J-1060	HYD-1025	18.10	200	110	0.35	0.13
P-1158	J-1060	J-1061	11.70	200	110	0.08	0.03
P-1159	HYD-1074	J-1037	1.20	150	100	0.00	0.00
P-1160	J-1065	J-1063	29.32	200	110	0.13	0.05
P-1161	J-1063	J-1036	10.22	200	110	0.06	0.02
P-1162	J-1063	J-1064	11.67	200	110	0.06	0.02
P-1163	J-1062	HYD-1045	10.48	200	110	0.01	0.01

2031 Conditions
GB Tor Phase 2, Milton On
June 4, 2024

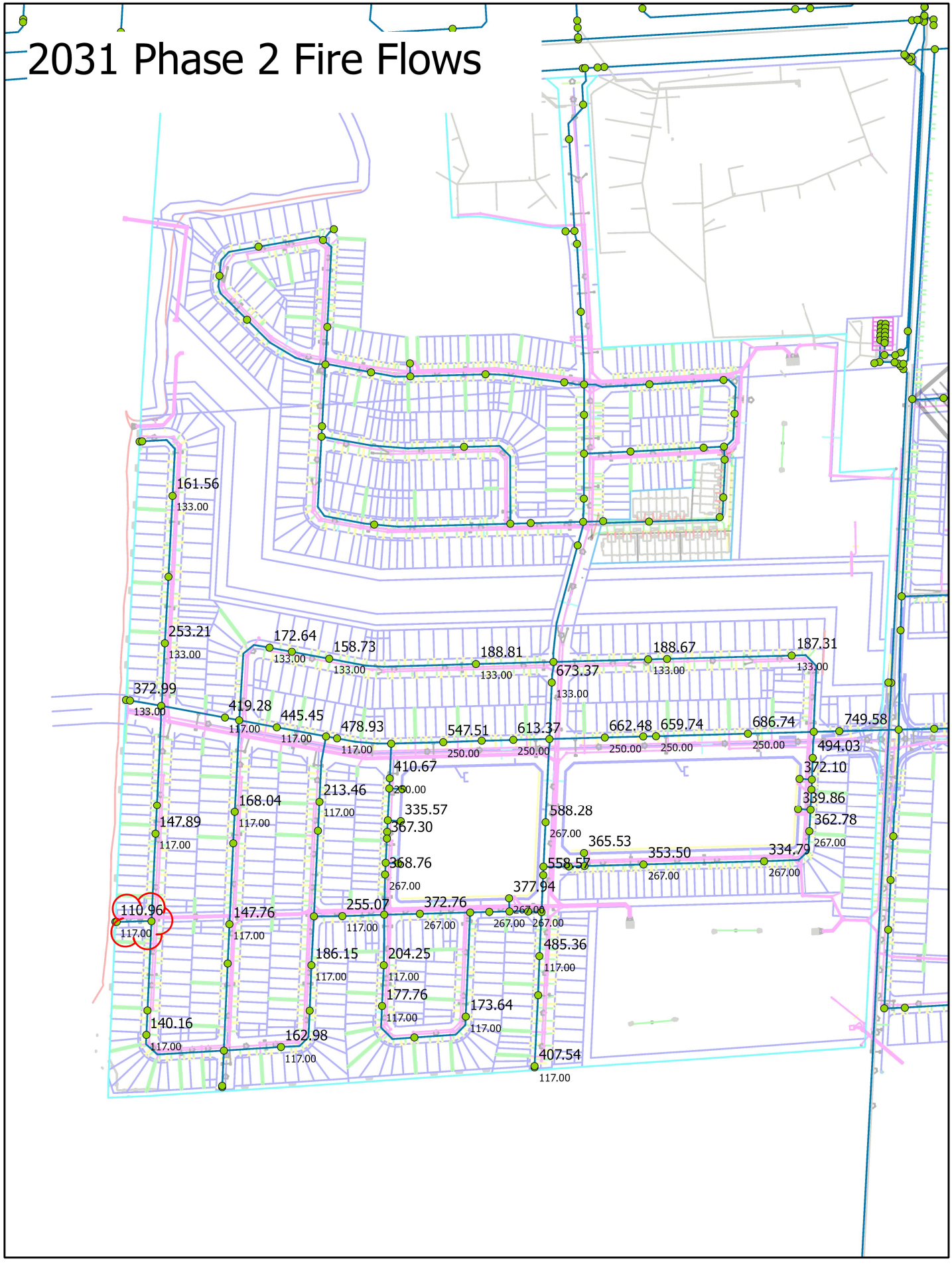
Municipal Engineering Solutions

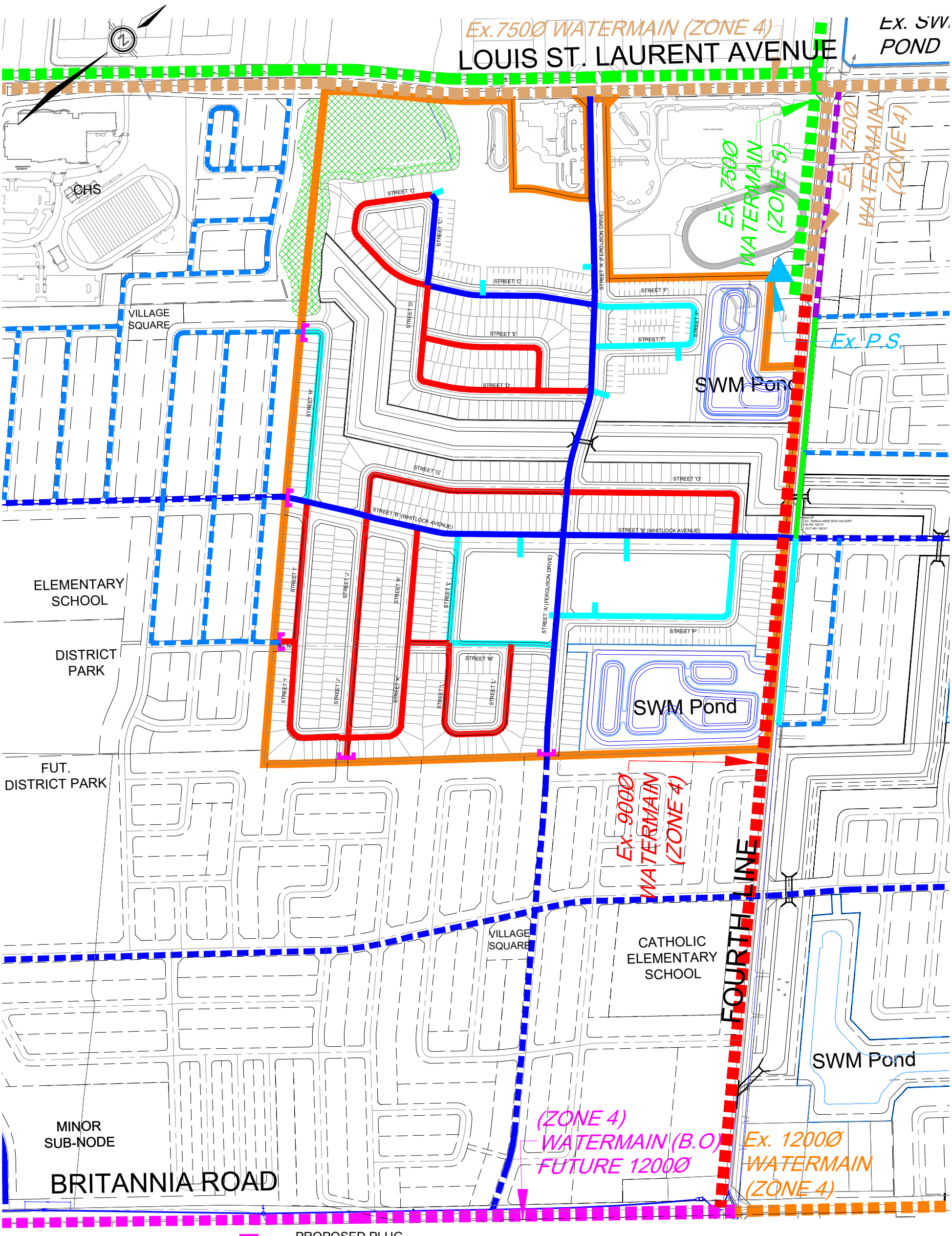
Fire Flow Table

ID	Total Demand *(L/s)*	Available Flow *(L/s)*	Fire Flow Met?
HYD-1020	133.00	673.37	TRUE
HYD-1021	267.00	588.28	TRUE
HYD-1022	117.00	485.36	TRUE
HYD-1023	117.00	407.54	TRUE
HYD-1024	267.00	478.06	TRUE
HYD-1025	267.00	409.28	TRUE
HYD-1026	117.00	173.64	TRUE
HYD-1027	117.00	177.76	TRUE
HYD-1028	117.00	204.25	TRUE
HYD-1029	267.00	372.76	TRUE
HYD-1030	117.00	255.07	TRUE
HYD-1031	117.00	186.15	TRUE
HYD-1032	117.00	162.98	TRUE
HYD-1033	117.00	140.16	TRUE
HYD-1034	117.00	147.89	TRUE
HYD-1035	133.00	372.99	TRUE
HYD-1036	117.00	419.28	TRUE
HYD-1037	117.00	445.45	TRUE
HYD-1038	117.00	478.93	TRUE
HYD-1039	250.00	547.51	TRUE
HYD-1040	250.00	613.37	TRUE
HYD-1041	117.00	168.04	TRUE
HYD-1042	117.00	147.76	TRUE
HYD-1044	117.00	213.46	TRUE
HYD-1045	267.00	368.76	TRUE
HYD-1046	267.00	367.30	TRUE
HYD-1047	250.00	410.67	TRUE
HYD-1048	133.00	253.21	TRUE
HYD-1049	133.00	161.56	TRUE
HYD-1051	133.00	172.64	TRUE
HYD-1052	133.00	158.73	TRUE
HYD-1053	133.00	188.81	TRUE
HYD-1054	133.00	188.67	TRUE
HYD-1055	133.00	187.31	TRUE
HYD-1056	250.00	662.48	TRUE
HYD-1057	250.00	659.74	TRUE
HYD-1058	250.00	686.74	TRUE
HYD-1059	250.00	494.03	TRUE
HYD-1060	250.00	409.83	TRUE
HYD-1061	267.00	362.78	TRUE
HYD-1062	267.00	334.79	TRUE
HYD-1063	267.00	353.50	TRUE
HYD-1064	250.00	451.32	TRUE
HYD-1065	267.00	558.57	TRUE
HYD-1066	167.00	749.58	TRUE
HYD-1074	117.00	110.96	FALSE
J-1052	250.49	352.73	TRUE
J-1053	267.33	333.20	TRUE
J-1055	267.65	365.53	TRUE
J-1057	267.65	339.86	TRUE
J-1059	267.65	372.10	TRUE
J-1061	267.53	377.94	TRUE
J-1064	267.40	335.57	TRUE

MIN	**110.96**
MAX	**749.58**

2031 Phase 2 Fire Flows





LEGEND

- SITE BOUNDARY
- PROPOSED 300Ø WATERMAIN
- PROPOSED 200Ø LOCAL WATERMAIN
- PROPOSED 150Ø LOCAL WATERMAIN
- PROPOSED PLUG
- FUTURE 1200Ø WATERMAIN (BY OTHERS)
- EXISTING 400Ø WATERMAIN (BY OTHERS)
- PROPOSED 300Ø WATERMAIN (BY OTHERS)
- FUTURE 300Ø WATERMAIN (BY OTHERS)
- FUTURE LOCAL WATERMAIN (BY OTHERS)
- EXISTING 1200Ø WATERMAIN (ZONE 4)
- EXISTING 900Ø WATERMAIN (ZONE 4)
- EXISTING 750Ø WATERMAIN (ZONE 4)
- EXISTING 750Ø WATERMAIN (ZONE 5)

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TOWN OF MILTON

CONCEPTUAL WATERMAIN SERVICING

SCALE:	1:5000	PROJECT No.:	15-786
DATE:	FEBRUARY 2023	FIGURE:	3