August 11, 2020

Our File: 2020-4904

Region of Peel - Development Services
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON L6T 4B9

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Attention: Mr. Anthony Lalingo

Re: 16 Elm Drive West
ZBA/SPA Submission
City of Mississauga

Please find enclosed civil engineering plans and SWM Report for the above noted development application, which constitutes the third and final phase of the larger development at Elm Drive West.

A *Functional Servicing Report – Proposed High Rise Development – Elm Drive West – Revised July 2019 prepared by Schaeffers Consulting Engineers* has been approved for the entire development and remains applicable to the subject site (Phase III/Tower C). - attached here for ease of reference.

That said, it should be noted that the residential population and commercial area has been slightly revised from the previously approved FSR (stamped on July 10, 2019). The following table summarizes the population for the subject site:

Tower C - Tenure Type	Population Considered in Approved FSR (July 2019)	Current Proposed Population
Commercial (50 pp/ha GFA)	4 (637 sq.m. proposed retail)	3 (452 sq.m. proposed retail)
Residential Units (2.7 ppu)	1742 (645 units)	1685 (624 units)
TOTAL	**1746 persons**	**1688 persons**

As displayed above, the population of the subject site has decreased from the approved overall Functional Servicing Report. This ensures that the municipal sewers on Elm Drive will not be adversely affected by the revised population.

We trust the provided information is sufficient, and we look forward to receiving your approval. If you have any questions, please feel free to contact the undersigned.

Yours truly,

SCHAEFFER & ASSOCIATES LTD.

Hagop Sarkissian, P.Eng.
Partner

Diana Tabuas, EIT
Project Manager

cc: Solmar Developments – Luis Correia
SGL Planning & Design – David Riley

FUNCTIONAL SERVICING REPORT

SOLMAR DEVELOPMENTS
PROPOSED HIGH RISE DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

PROJECT 2013- 3931

REVISED: JULY 2019
DECEMBER 2017
NOVEMBER 2015
MAY 2015
NOVEMBER 2013

Revision	Description	Prepared		Approved	
		by	date	by	date
December 2017	Revised to incorporate Region's comments (Email dated November 27, 2017) & updated site unit breakdowns	I.Kabir	December 2017	H.Sarkissian	December 2017
June 2019	Revised with updated unit numbers, revised sanitary/water demand calculations, and sanitary design sheets accordingly.	H.Sarkissian	June 2019	H.Sarkissian	June 2019

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1.0 INTRODUCTION

1.1 Objective

This functional servicing report is provided in support of the proposed high rise development located at Elm Drive West, within the City of Mississauga. The subject site consists of three high-rise building which can be legally defined as Lots 1 to 4, and 20 to 25, Registered Plan 376 and Part of Lot 16, Concession 1, North of Dundas Street, City of Mississauga, Regional Municipality of Peel.

The 1.24 hectare property is located within the boundaries of Burnhamthorpe Road to the north, Confederation Parkway to the west, Hurontario Street to the east, and Central Parkway to the south, as shown in **Figure 1-1.**

This report evaluates existing and proposed water supply, sanitary, and stormwater management services within and surrounding the subject property, thereby demonstrating the viability of the proposed development.

This report has been updated in support of a Site Plan Control Application for the second phase of development while ensuring an overall servicing strategy is reflected for all three phases of development.

1.2 Existing Conditions/Site Constraints

Presently the site is vacant, and consists of 10 single-family residential lots. Available topography indicates a variance in elevation of about 7m. The peak elevation is just above 145.0m at the northwest portion of the site. The lowest point has an elevation just below 138m at the southeast portion of the site. This suggests that the site drains to the southeast.

The surrounding properties are well developed. Mid-to high-density residential buildings are located north, south, and east of the property. There is an existing school west of the site. Utility services (i.e. gas, hydro, telecom and cable) exist on Elm Drive, Hurontario Street, and Kariya Drive.

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LEGEND

SUBJECT SITE

PROPOSED HIGH-DENSITY
RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

FIGURE 1-1
LOCATION PLAN

2015-3931	NOVEMBER 2015	SCALE: N.T.S.

1.3 Proposed Development Plan and Population

The subject site has an area of 1.24 ha (see Figure 1.2) and is proposed to consist of three high-density residential buildings with some commercial use. Servicing design of each of these blocks/buildings will be separate. The Region of Peel guidelines for sanitary sewer and water supply design recommend a population density of the greater between 475 persons/hectare for high-density residential land-use, or 2.7 people per residential unit. Based on this criteria, the subject site's design population is 3,748 persons (based on the more conservative 2.7ppu), as shown in Table 1.1.

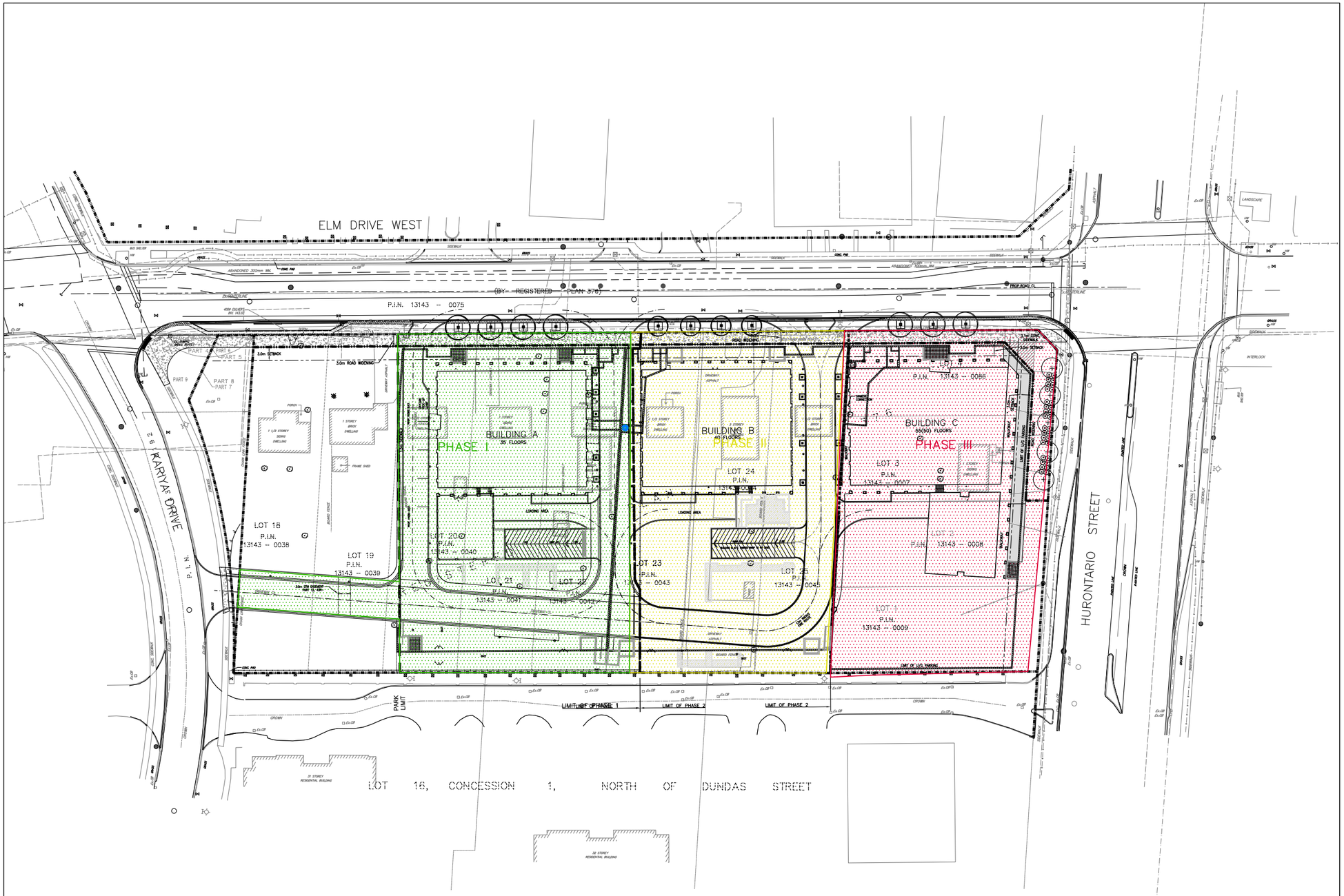
Table 1-1: Estimated Population Summary

Land Use	Criteria	Qty	Population
High-Density Residential	*475 persons/ha*	*1.29 ha*	*613*
Building A		323	792
Building B		418	1129
Building C		645	1742
Building C commercial	50 pp/ha GFA	637 sq.m	4
High-Density Residential	2.7 p.p.u.	1386 units	**3,748**

1.4 Proposed Phasing

The proposed development will be constructed in Phases. The Phasing Scheme and anticipated Timing is approximate and will depend on several conditions, which will be defined in the future stage of the project. The following table shows the timing estimate.

Building	Start of Construction	End of Construction
A	Spring 2019	Summer 2021
B	Winter 2019	Winter 2021
C	Summer 2020	Fall 2022



PROPOSED HIGH-DENSITY
RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

LEGEND

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FIGURE 1-2
PROPOSED DEVELOPMENT PLAN

2013-3931	JULY 2019	SCALE: N.T.S.

2.0 WATER SUPPLY

2.1 Existing Water Supply Services

The subject property is located within the South Peel Water Supply System Pressure Zone 3. Zone 3 is serviced by the Streetsville Reservoir and Pumping Station. Based on information received from the Region of Peel, the following watermains exist in the vicinity of the site:

- a 300mm diameter watermain along Kariya Drive;
- a 300mm diameter watermain along Elm Drive between Kariya Drive and Hurontario Street;
- a 300mm diameter watermain along Hurontario Street, north of elm Drive;

Existing water supply infrastructure can be seen schematically on Figure 2-1. It should be noted that the Region intends to strengthen the network in this area, including a 400mm watermain on Hurontario Street from Burnhamthorpe Road to Elm Drive West. This watermain is planned to be in service by 2019. **It should be noted that at the time this report was written, the Region had commenced the installation of the new 400mm dia. watermain on Elm Drive West.**

2.2 Design Criteria

The proposed water supply scheme will be designed in accordance with the Region of Peel design criteria for water systems. The following summarizes typical residential-use design criteria.

- The system shall be designed to provide sufficient flow and pressure to meet the greater of the Maximum Daily Demand Plus Fire Flow or the Maximum Hourly Demand;
- Average Daily Demand of 0.280 m^3/capita/day;
- Fire Flows in accordance with Water Supply for Public Fire Protection Survey;
- Maximum Daily Demand and Peak Hourly Demand factors shall be 2.0 and 3.0, respectively;
- Minimum watermain size of 300mm for high-density residential areas;
- Operating pressure requirements are noted as follows:

Description	Pressure
Minimum Pressure	275 kPa (40 psi)
Maximum Pressure	690 kPa (100 psi)

2.3 *Proposed Water Supply*

Based on the Region of Peel's design criteria for water supply, the total population of the development is 3,748 persons (as shown in Table 1-1). Based on a population of 3,748. the Average Daily Demand (based on 0.280 m^3/capita/day) will be 1050 m^3/day (12.2 L/s).

The Maximum Daily Demand and Peak Hour Demand are calculated as 2,100 m^3/day (24.3 L/s) and 3,152 m^3/day (36.5 L/s) respectively, based on the prescribed peaking factors. Table 2-1 summarizes the estimated potable water demand.

Table 2-1: Summary of Estimated Potable Water Demand

Land Use	Population	Average Daily Demand (L/s)[1]	Maximum Daily Demand (L/s)[2]	Peak Hour Demand (L/s)[3]
High-density Residential	3,748	12.2	24.3	36.5

1. Based on 0.280 m^3/capita/day
2. Based on a Max Day Factor of 2.0
3. Based on a Peak Hour Factor of 3.0

The proposed development consists of three high rise towers, and the construction of these towers will be performed in phases – Phase I for Building A, Phase II for Building B and Phase III for Building C.

Based on the Ontario Building Code, and the height of the proposed towers, two fire and one domestic service connection shall be provided per tower. In addition, Building C will have a separate service connection for the Commercial portion, as it will belong to the separate condominium corporation.

Based on the FUS (Fire Underwriters Survey) criteria, the fire demands are 66.7 l/s, 83.3 l/s and 66.7 l/s for Phases I, II and III respectively. It should be noted that the vertical opening and exterior vertical communications must be properly protected (one hour rating).

Maximum Day Demand + Fire is 72.3 l/s, 90.7 l/s and 78.0 l/s for Phases I, II and III respectively.

It is proposed to service each phase of the proposed development via connections to the watermain on Elm Drive West. It should be noted the Region will be upgrading the servicing on Elm Drive West, with a 400mm dia. watermain replacing the existing 300mm watermain. The Region has advised this capital works project is scheduled to commence in 2018, and be completed by December 2019. The first Phase will connect to the existing 300mm dia. watermain, while Phases II and III will connect to the proposed 400mm watermain. Refer to **Appendix A** for correspondence from the Region.

A servicing scheme is illustrated in **Figure 2-1.**

Hydrant testing had been conducted off the 300mm diameter watermain on Elm Drive, and the results have been presented in **Appendix B.**

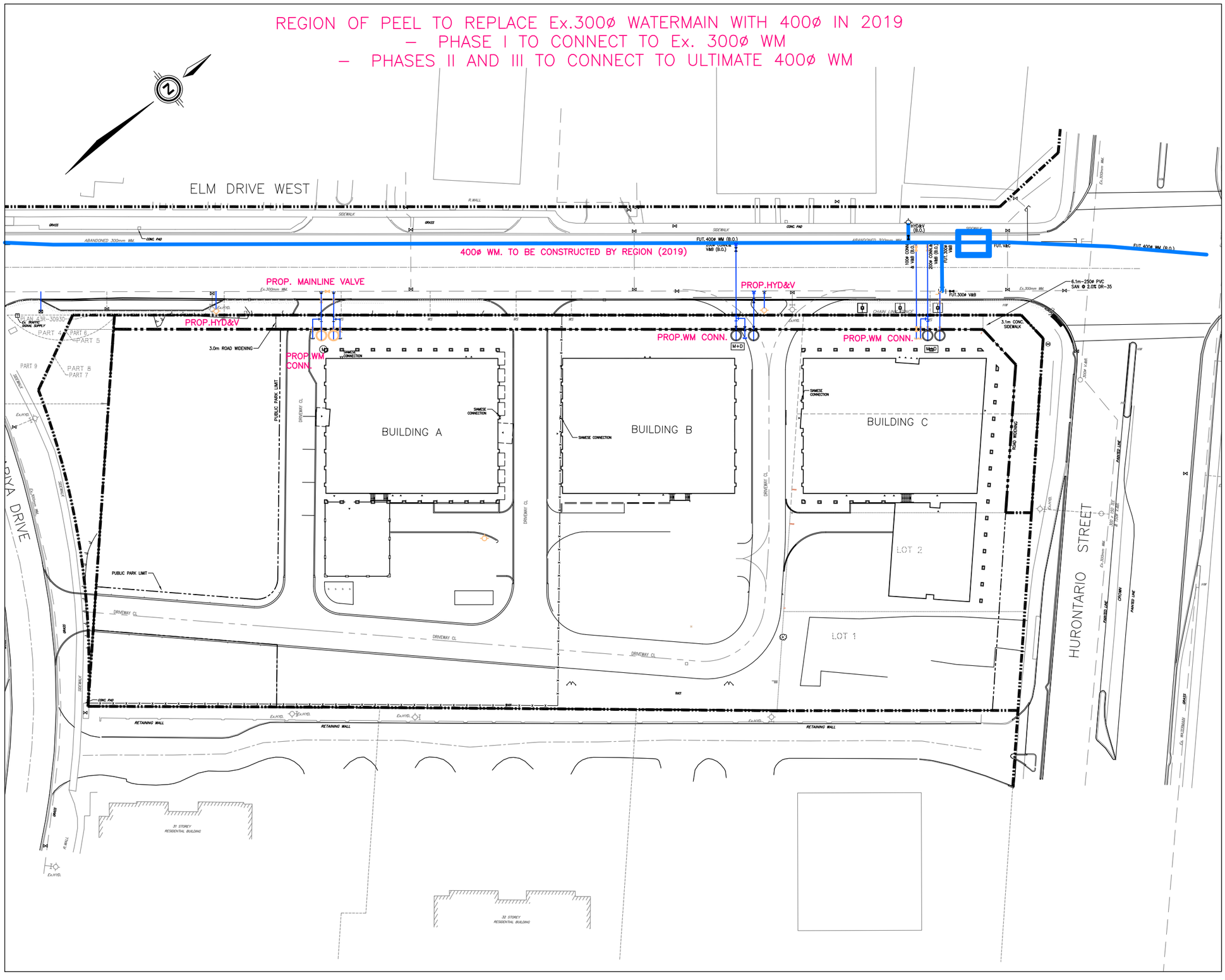
The water supply test measured a static pressure of 91 PSI (627 kpa), a pressure of 84 PSI (579 kpa) during a flow of 1487 G.P.M (94 l/s) and a pressure of 80 PSI (552 kpa) during a flow of 2367 G.P.M (149 l/s). The pressure in the existing watermain during peak hour demands can be determined by extrapolating data from the hydrant test.

Based on a peak flow rate of 12.2 l/sec for all three Buildings, which is the worst case scenario, the pressure in the municipal watermain will be approximately 621 kPa, which is above the minimum required pressure.

Extrapolating data from the hydrant test indicates that the max day plus fire scenario for all three buildings (max demand of 241.0 l/s - the worst case scenario) has an expected pressure of 505 kPa, which is greater than the minimum required residual pressure (140 kPa).

It is recommended that the Mechanical Engineer provide the design and install a Booster Pump in each tower to service the residential units at higher elevations.

REGION OF PEEL TO REPLACE Ex.300ø WATERMAIN WITH 400ø IN 2019
– PHASE I TO CONNECT TO Ex. 300ø WM
– PHASES II AND III TO CONNECT TO ULTIMATE 400ø WM



PROPOSED HIGH–DENSITY
RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

LEGEND

- EXSITING WATERMAIN
- PROPOSED WATERMAIN
- PROPOSED VALVE
- SITE BOUNDARY

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FIGURE 2–1
EXISTING AND PROPOSED
WATER SUPPLY SERVICING PLAN

2013–3931	JULY 2019	SCALE: NTS

3.0 SANITARY SERVICING

3.1 Existing Sanitary Infrastructure

Based on information received from the Region of Peel, the following sanitary sewers are present in the vicinity of the site:

- a 250mm diameter sanitary sewer along Kariya Drive;
- a 250mm diameter sanitary sewer along Elm Drive;
- a 250 mm diameter sanitary sewer along Hurontario Street, south of Elm Drive; and
- a 300mm diameter sanitary sewer crossing Hurontario Street at Elm Drive, connecting to an existing 250mm diameter sanitary sewer along Elm Drive (east of Hurontario Street).

Existing sanitary sewers are shown schematically in Figure 3-1. These sewers are intended to convey sanitary flows from the subject lands and adjacent developments to the east and ultimately to the Lakeview Wastewater Treatment Plant.

Based on the information received from the Region, the existing sanitary sewer estimated a population of 68 from the subject property, with a sewage flow of 0.9 L/s. The information received from the Region is provided in **Appendix A** for reference.

3.2 Design Criteria

The proposed sanitary servicing of the subject site will be designed in accordance with the Region of Peel's "Public Works Design, Specifications and Procedures Manual". These criteria, where applicable to the proposed development, are summarized below.

- The design flow is equal to the Average Dry Weather Flow multiplied by the Average Peak Sanitary Flow Factor, plus the Infiltration Allowance;
- The Average Dry Weather Flow is based on 302.8 L/capita/day;
- For residential areas, the peak sanitary flow factor is based on the Harmon formula ($M = 1 + 14/(4 + P^{0.5})$, where P is population in thousands;
- Except under unusual circumstances, infiltration allowance shall be determined at 0.2×10^{-3} $m^3/s/ha$ for all types of land use;
- Determination of pipe sizes and capacities to be based on Region of Peel standard drawing SD-2-5-3 or use Manning's Formula;
- Maximum velocity shall not be greater than 3.50 m/s with pipe flowing full, and minimum velocity shall not be less than 0.75 m/s at actual flow; and
- The top of the sewer pipe shall be a minimum of 2.5 meters below the centre line of the road allowance.

3.3 Proposed Sanitary Servicing

The subject development consists of three high rise towers (A, B and C). The construction of these towers will be performed in three Phases (I, II and III) and per the timing presented in Section 1.4.

Based on this, it is proposed to provide three separate sanitary service connections (for each phase) to the sewer along Elm Drive West (Figure 3.1). In addition, Building C will have a separate service connection for the commercial part, as it will belong to the separate condominium corporation.

It should be noted the Region will be upgrading the servicing on Elm Drive West, with a 375mm dia. sanitary mainline replacing the existing 250mm mainline sewer. The Region has advised this capital works project is scheduled to commence in 2018, and be completed by December 2019. The first Phase will connect to the existing 250mm dia. sewer, while Phases II and III will connect to the proposed 375mm sewer. Refer to **Appendix A** for correspondence from the Region.

A preliminary assessment of the anticipated design flow rates has been conducted in accordance with Region of Peel design criteria. With an estimated population of 3,033 persons, the expected Design Flow is 47.90 L/s. The calculations are summarized in Table 3-1.

Table 3-1: Summary of Estimated Sanitary Flows

Land Use	Area (ha)	Expected Population (1)	Average Sewage Flow (2) (L/s)	Harmon Peaking Factor	Peak Flow (L/s)	Infiltration Inflow (3) (L/s)	Estimated Flow (L/s)
Phase I	0.51	873	3.10	3.84	11.90	0.10	12.00
Phase II	0.41	1129	4.00	3.77	15.10	0.08	15.18
Phase III	0.37	1746	6.11	3.63	22.26	0.07	22.34
		3,748				Total	49.52

(1) From Table 1.1
(2) Assuming average sanitary flows per capita of 302.8 liter/cap/day (Region of Peel Design Criteria)
(3) Infiltration rate of 0.2 L/s/ha (Region of Peel Design Criteria)

The proposed population is higher than what has been allotted for in the existing design. As a result, the anticipated waste water flows are also higher.

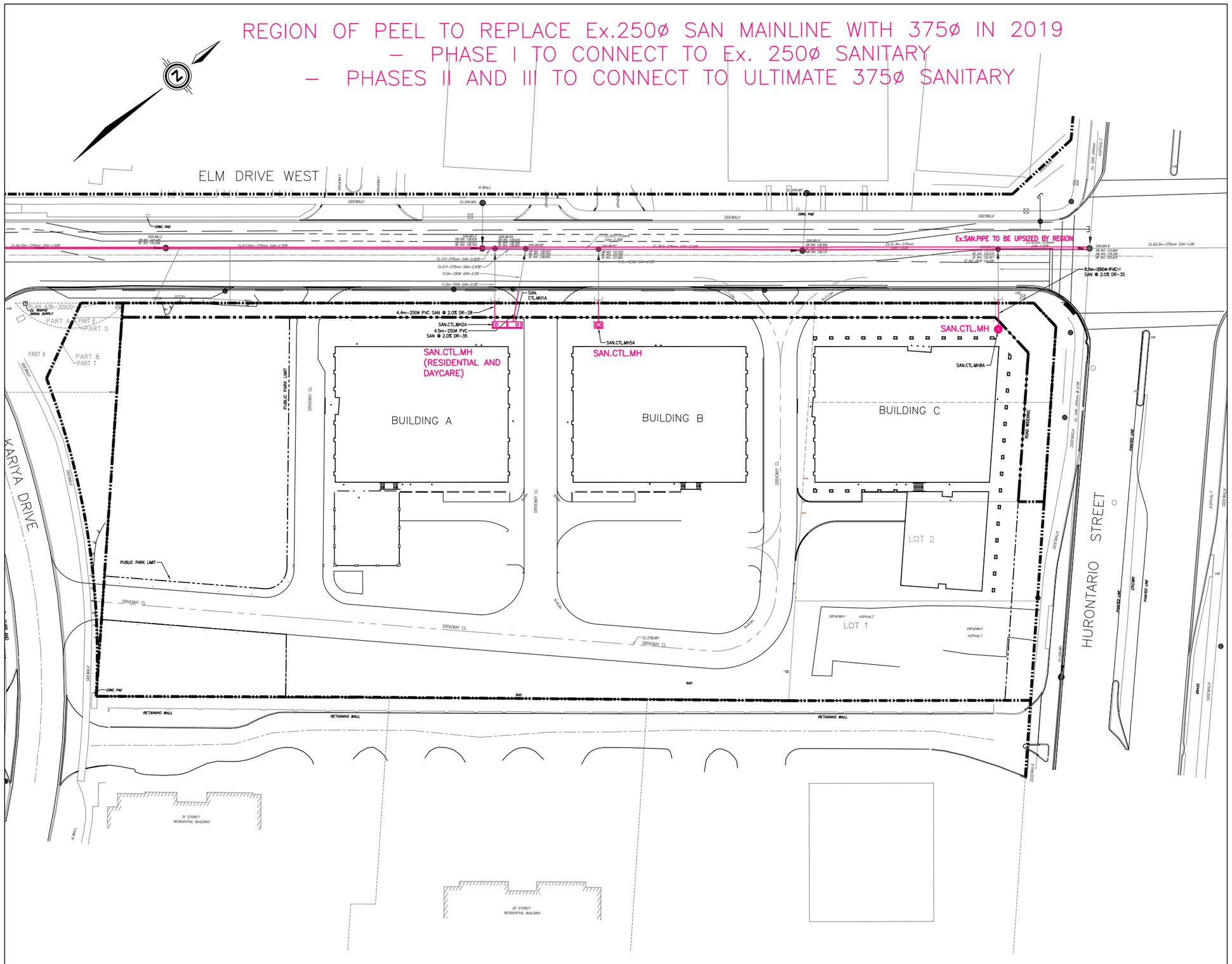
Based on the capacity analysis provided in Appendix C, which includes all three buildings, the 250mm diameter sewer at the intersection of Elm Drive West and Hurontario Street is in a surcharge condition and it is required to be upsized to 300mm pipe. As previously noted, the Region will be upgrading the sanitary on Elm Drive to a 375mm dia. sewer. **It should be noted that at the time this report was written, the Region had commenced the installation of the 375mm dia. sanitary sewer on Elm Drive West.**

Phase I of the development consists of Building A, Phase II consists of Building B, and Phase III of Building C. The analysis included in Appendix C indicates the existing sanitary sewer on Elm Drive West will be able to handle flows from Phases I and II.

As noted previously, Phase I will connect to the existing 250mm sewer, while Phases II and III will connect to the proposed 375mm sewer, which is expected to be operational in December 2019. As noted in Section 1.4, the Phase II/III buildings are not expected to be finalized until 2021/2022, as such the municipal sanitary sewer on Elm Drive should be in place prior to any occupancy at Phase II and III.

Based on the information (plan and profiles) from the Region of Peel, the existing 300mm sanitary sewer east of Hurontario street has sufficient capacity. For more details please refer to **Appendix C.**

REGION OF PEEL TO REPLACE Ex.250ø SAN MAINLINE WITH 375ø IN 2019
– PHASE I TO CONNECT TO Ex. 250ø SANITARY
– PHASES II AND III TO CONNECT TO ULTIMATE 375ø SANITARY



PROPOSED HIGH–DENSITY
RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

LEGEND

- EXSITING SANITARY SEWER
- PROPOSED SANITARY SEWER
- MAINTENANCE HOLE
- FLOW DIRECTION
- SITE BOUNDARY

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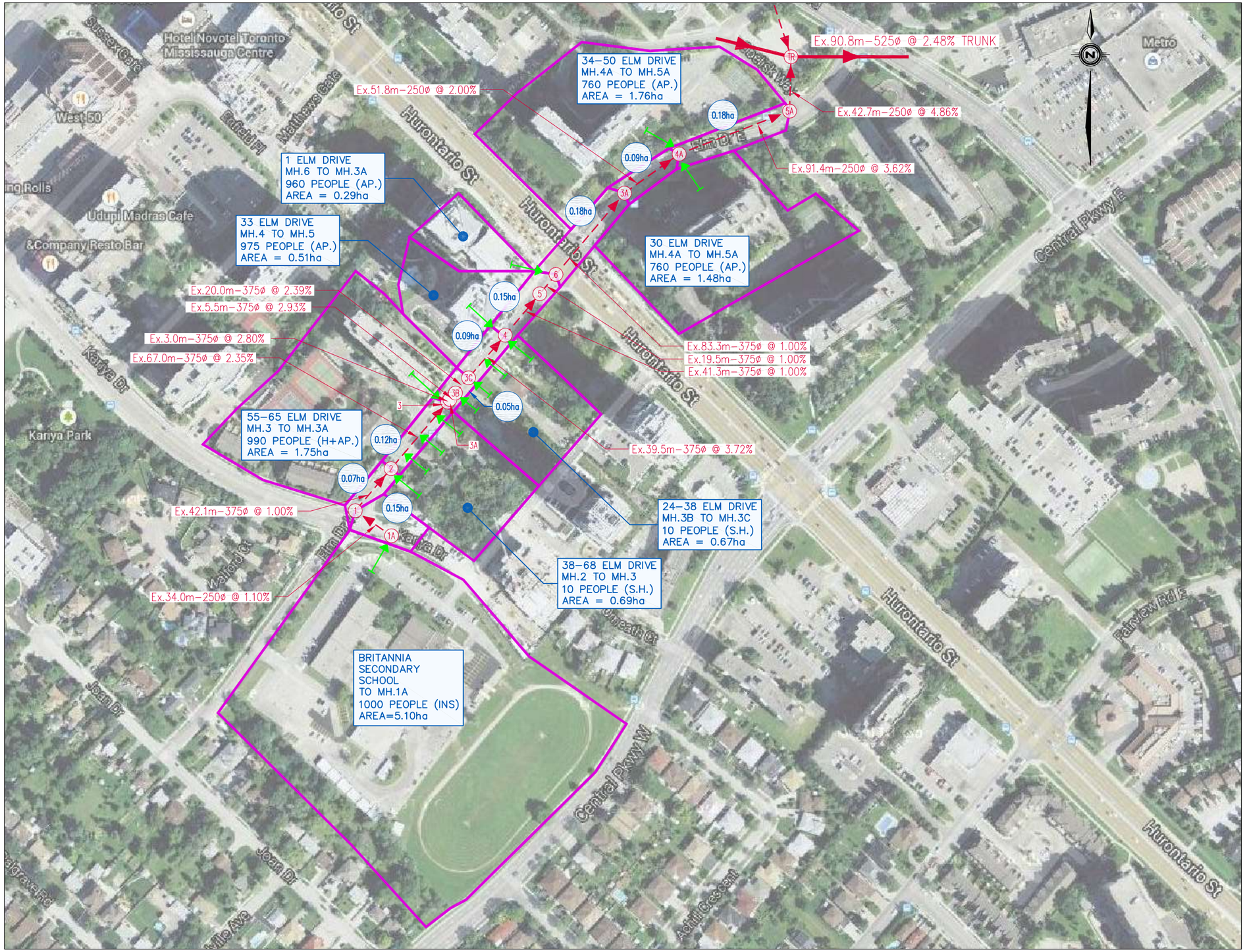
FIGURE 3–1
EXISTING AND PROPOSED
SANITARY SERVICING PLAN

2013–3931	JULY 2019	SCALE: NTS



PROPOSED HIGH–DENSITY
RESIDENTIAL DEVELOPMENT

LEGEND

- EXISTING SANITARY SEWER
- EXISTING TRIBUTARY BOUNDARY
- EXISTING SANITARY CONNECTION
- 3A MAINTENANCE HOLE

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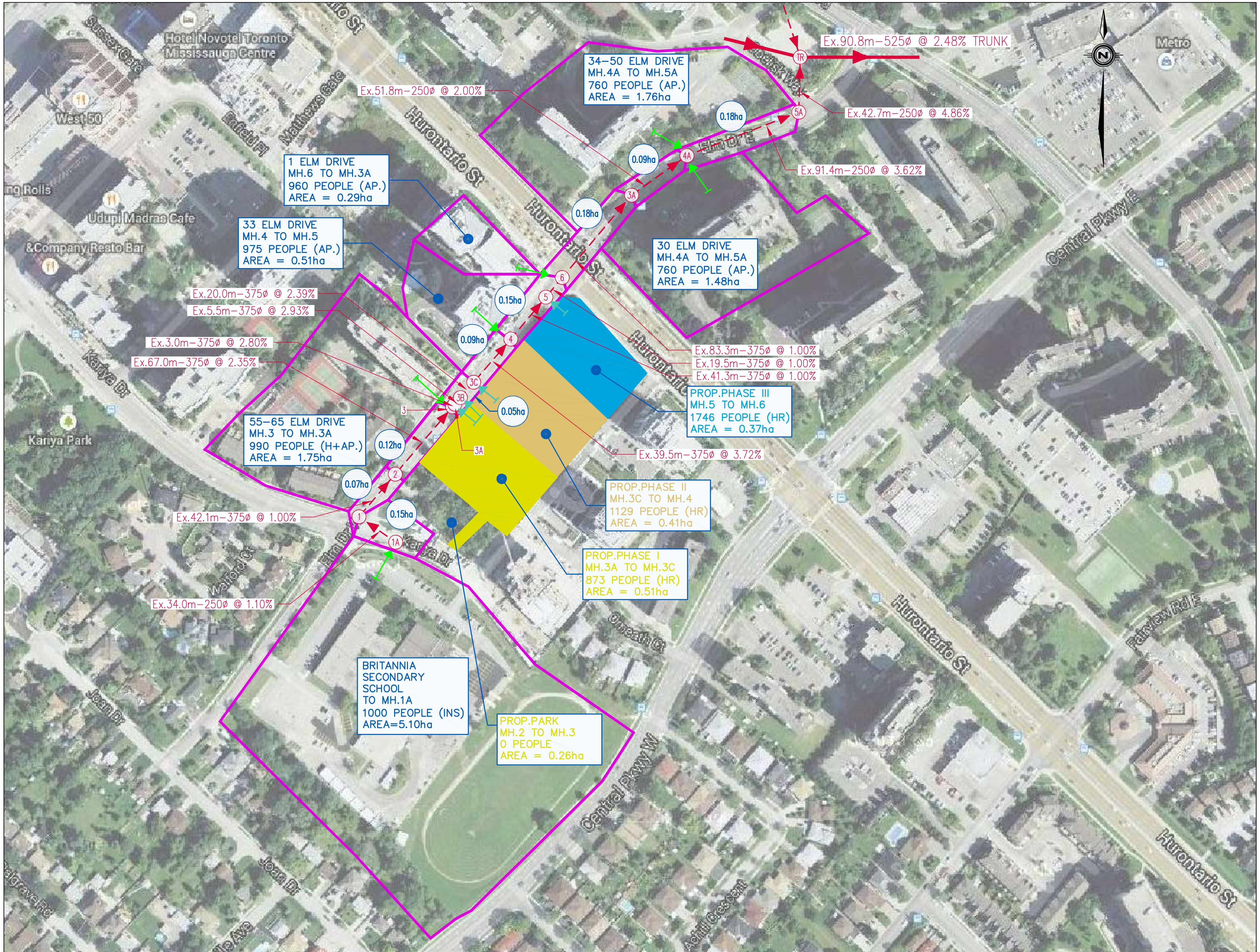
FIGURE 3–2
EXISTING SANITARY
TRIBUTARY PLAN

2013–3931	JULY 2019	SCALE: NTS

PROPOSED HIGH–DENSITY RESIDENTIAL DEVELOPMENT



LEGEND

- EXISTING SANITARY SEWER
- EXISTING TRIBUTARY BOUNDARY
- EXISTING SANITARY CONNECTION
- PROPOSED SANITARY CONNECTION
- PROPOSED PARK SANITARY CONNECTION
- (3A) MAINTENANCE HOLE
- PROPOSED PHASE I
- PROPOSED PHASE II
- PROPOSED PHASE III

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FIGURE 3–3
PROPOSED SANITARY TRIBUTARY PLAN

2013–3931	JULY 2019	SCALE: NTS

4.0 STORMWATER MANAGEMENT

4.1 Existing Infrastructure

There is an existing storm sewer along Elm Drive West, ranging in diameter from 450mm to 750mm, that conveys drainage easterly towards Hurontario Street. In previous report, it has been noted that the existing 750mm pipe along Elm Drive West have been designed as a stormwater underground storage. However, the survey of the existing pipes has been completed and based on the inverts and sizes, it has been confirmed that the storm sewer system on Elm Drive wasn't designed as a stormwater storage. Please refer to **Appendix D** for more details. There is also an existing 900mm diameter storm sewer along Hurontario Street that conveys flow from Elm Drive West in a northerly direction.

Presently the site is used for residential purposes and consists of ten (10) lots. Based on available topographic information, these lots generally have split drainage with the front and rear yards draining to the north and south respectively. The exception are lots 3 and 4, which drain to the northeast. For existing drainage areas please refer to Figure 4-2. Furthermore, the public area west of the site drains towards the proposed site and this flow will be captured and controlled within the proposed public park.

Figure 4-1 illustrates the existing drainage conditions. Estimated existing peak flows are as summarized in Table 4-1.

Table 4-1: Summary of Estimated Existing Peak Flows

Location	Area (ha)	Weighted Run-off Coefficient	Intensity* (mm/hr)		Flow Rate (m^3/s)	
			2-year	100-year	2-year	100-year
North Area draining to Elm Drive	0.66	0.27	59.9	140.7	0.046	0.107
South Area draining to Private lane	0.77	0.23	59.9	140.7	0.039	0.092
West City Area	0.02	0.25	59.9	140.7	0.001	0.003
South City Area	0.03	0.25	59.9	140.7	0.001	0.003
Total	1.48	-	-	-	0.086	0.202

* Based on a Tc of 15 minutes

4.2 Design Criteria

The stormwater flow calculations are based on the following the City of Mississauga design criteria:

- Storm sewers shall be designed using Rational Formula; Q = 0.0028 CIA, where Q is the flow rate in m^3/s, C is the runoff coefficient (dimensionless), I is rainfall intensity in mm/hr and A is area in ha;
- Storm sewer design should be based on City of Mississauga Rainfall Intensity Curves and a minimum time of concentration of 15 min. $I = A/ (T + B)^C$, where I is rainfall intensity in mm/hr, T is time of Concentration in hours, A = 610, B = 4.6, C = 0.78 for the 2-year storm event;
- Runoff Coefficient:
    - Paved and House Areas 0.90
    - Parks and Open Space 0.25

4.3 Proposed Stormwater Management

The proposed stormwater management scheme for the subject development will be designed in accordance with the City of Mississauga's stormwater servicing criteria. Furthermore, the proposed development consists of a public park and three high rise towers (A, B and C) which will be built in three phases (I, II and III). It is proposed to capture all flows from storms up to 100yr storm events within the boundary of the site and control runoff from for the public park and each Phases, to allowable release rates (2yr pre-development flows). This can be accomplished by using a combination of underground storage and a flow restrictor. The following describes the proposed plan for stormwater management.

Major and minor flows from the public park will be conveyed underground to the future northwest limit of the public Right-of-Way (future widening of Elm Drive West) where it will connect directly to the existing 450mm diameter storm sewer along Elm Drive West (see Figure 4-3). Flows from Phase I will be conveyed via underground system to the existing Storm Manhole S3, and from Phases II and III to the existing 750mm storm sewer. On-site controls will limit the peak flows to the allowable release rate via a flow restrictor (embedded orifice plates), and on-site storage. It is recommended that all drains and plumbing be designed watertight under surcharge conditions. The internal plumbing system should be designed by Mechanical Engineer.

Runoff exceeding the capacity of the on-site controls (i.e. in excess of the 100-year storm or in the event of a system blockage) will be conveyed overland to Elm Drive West. Further details are provided below.

4.3.1 QUANTITY CONTROL

ALLOWABLE RELEASE RATE

The allowable release rates for the park and each Phase have been determined using the existing condition under the 2-year storm event. In order to estimate the appropriate allowable release rates, a 15.0 minute time of concentration has been used. The run-off coefficient has been provided based on the existing conditions on site. The allowable release is as summarized in Table 4-2. Please refer to **Appendix D** for detailed calculations.

Table 4-2: Allowable Release Rate Summary (pre-development)

Block	Area (ha)	Runoff Coeff. 'C'	External area (ha)	Runoff Coeff. 'C'	Time of Concentration (min.)	Intensity* (mm/hr)	Peak Flow (l/s)
Public Park	0.10	0.45	0.02	0.25	15.0	59.9	8.46
Phase I	0.18	0.47	n/a	n/a	15.0	59.9	14.11
Phase II	0.17	0.47	n/a	n/a	15.0	59.9	13.66
Phase III	0.22	0.28	n/a	n/a	15.0	59.9	10.16
Total Site	**0.66**	**0.41**	**0.02**	**0.25**			**46.4**

It should be noted that every block/phase is considered as an individual development. The park is a public property and the proposed services present an interim solution. Detail design of the services for the public park will be determined in the future.

PROPOSED HIGH–DENSITY
RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

LEGEND

- EXISTING STORM SEWER
- MAINTENANCE HOLE
- FLOW DIRECTION
- AREA DRAINING TO ELM DRIVE WEST – PARK
- AREA DRAINING TO ELM DRIVE WEST – PH.1
- AREA DRAINING TO ELM DRIVE WEST – PH.2
- AREA DRAINING TO ELM DRIVE WEST – PH.3
- AREA DRAINING TO PRIVATE LANE
- EXTERNAL AREA DRAINING TO ELM DRIVE WEST (TO SITE)
- EXTERNAL AREA DRAINING TO PRIVATE LANE (TO SITE)
- PAVED AREA
- 0.69ha C=0.50 DRAINAGE AREA RUNOFF COEFFICIENT
- FLOW DIRECTION

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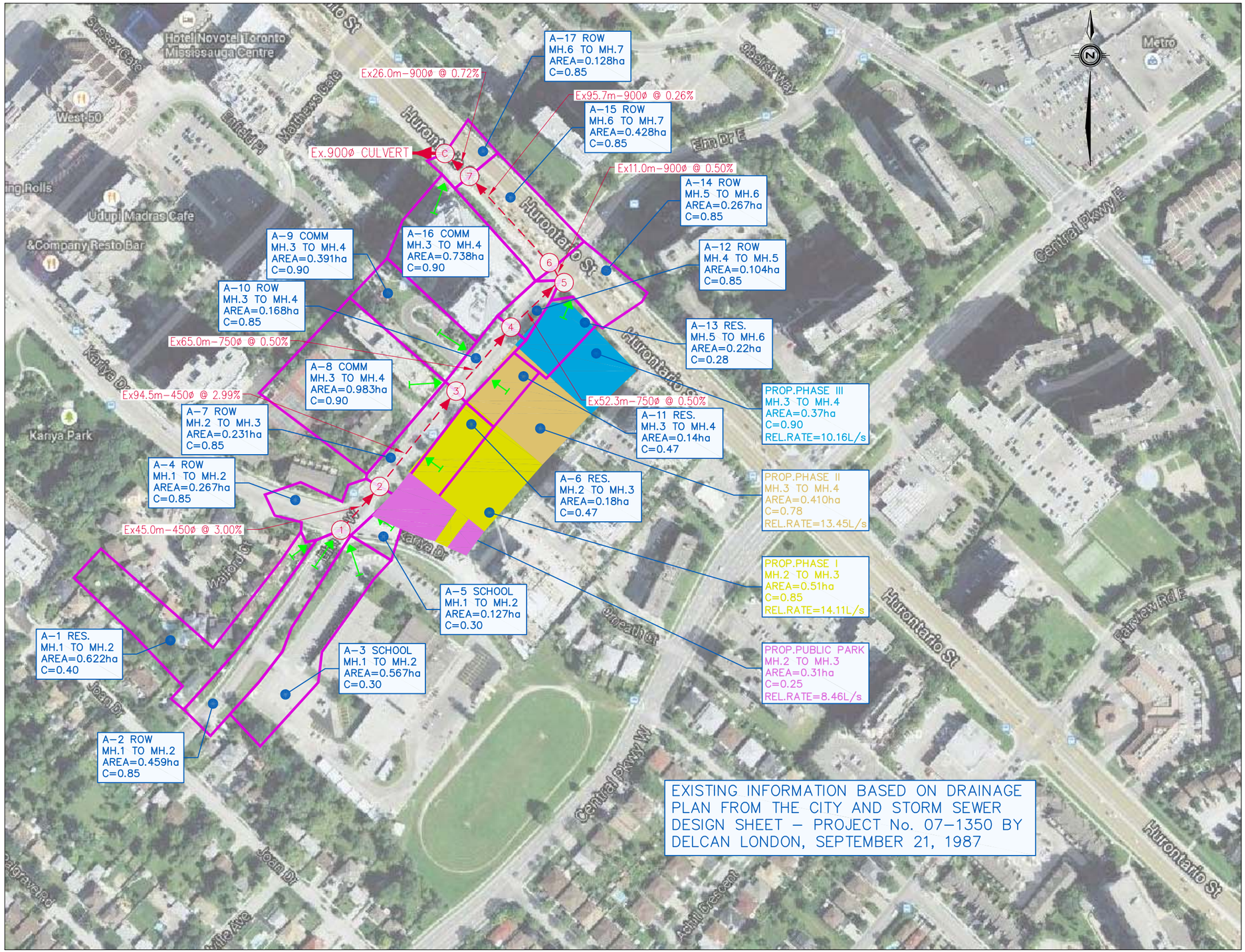
FIGURE 4–1
EXISTING DRAINAGE CONDITIONS

2013–3931	NOVEMBER 2015	SCALE: NTS



PROPOSED HIGH-DENSITY
RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

LEGEND

- EXISTING STORM SEWER
- EXISTING TRIBUTARY BOUNDARY
- DRAINAGE DIRECTION
- 3 MAINTENANCE HOLE
- PROPOSED PUBLIC PARK
- PROPOSED PHASE I
- PROPOSED PHASE II
- PROPOSED PHASE III

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

FIGURE 4-2
EXISTING AND PROPOSED
STORM TRIBUTARY PLAN

2013-3931	JULY 2019	SCALE: NTS

POST-DEVELOPMENT RUN-OFF COEFFICIENT

The existing drainage pattern on adjacent properties has not been altered and no stormwater runoff from the subject development will be directed to drain onto the adjacent properties (up to the 100-year flows). The following table presents the composition of drainage areas for the subject site.

Table 4-3: Allowable Release Rate Summary

Block	Description	Area (ha)	Runoff Coefficient
External Area	Public	0.048	0.25
Public Park	Future R.O.W.	0.009	0.90
Public Park	Landscape	0.255	0.25
Phase I	Future R.O.W.	0.017	0.90
Phase I	Roof & Impervious area	0.431	0.90
Phase I	Landscape on U/G parking	0.048	0.50
Phase I	Landscape on soil	0.008	0.25
Phase I	Permeable Pavers	0.026	0.75
Phase II	Future R.O.W.	0.015	0.90
Phase II	Roof & Impervious area	0.344	0.90
Phase II	Pervious Areas	0.066	0.25
Phase III	Future R.O.W.	0.042	0.90
Phase III	Roof & Impervious area	0.32	0.90
Phase III	Pervious Areas	0.05	0.25

Based on the existing information from the City of Mississauga – Drainage plans and storm sewer design sheets from Project 07-1350 by Delcan London, September 21, 1987, the proposed development was included in the existing storm drainage analysis.

Therefore, these storm sewer design sheets and tributary plans have been used to estimate the proposed development conditions for the subject area. **Figure 4-2** shows the post development conditions and revised design sheets are included in **Appendix D**. Based on these calculations, the flows from the proposed development will be less than pre-development and no issues downstream are expected for the system.

STORAGE REQUIREMENTS

In order to reduce the post-development 100-year peak flow to the allowable release rate, on-site controls are proposed (i.e. flow reducer and on-site storage). The rational method was used to estimate the total volume of storage required. summarizes the storage requirements. Storage volume calculations are provided in **Appendix D**.

Storage will be provided in an underground storage tank or aboveground swale and ditch inlet for the public park. Based on these estimates, there appears to be enough on-site storage available to reduce the peak flows to the allowable release rate.

Table 4-4: Storage Requirement Summary

Block	Area (ha)	Allowable Release Rate (l/s)	Required Storage Volume (m^3)	Provided Storage Volume (m^3)
Public Park	0.30	8.46	19.7	19.9
Phase I	0.51	14.11	196.3	210.4
Phase II	0.41	13.66	130.7	156.0
Phase III	0.37	10.16	141.7	150.0

ORIFICE CONTROL

The proposed stormwater management system is different for each of the Phases (blocks).

As mentioned before, the Public park system is an interim solution and it consists of two 75mm orifice plates – dual system. The first (upstream) orifice plate is located in the Ditch Inlet control manhole in the main park area and the second (downstream) orifice plate is located in the manhole immediately before the control manhole. The size of the outlet pipes downstream of the plates are 250mm. The invert elevation of the first orifice plate is 141.51m, and the second one 141.38m. The maximum effective head on the first plate is 1.02m, and the second 0.53m, and the discharge rate is estimated to be 8.5 l/s. This has been detailed in the SWM Report for Phase I (and the SWM Report for the park's detailed design).

The building tower A (Phase I) will be serviced via a dual orifice plate system. The upstream orifice plate is located in the stormwater storage tank (SWM Tank A), and the second orifice is located in a separate chamber, downstream of the tank and upstream of the control manhole. Both orifice plates are sized at 75mm. The discharge rate from this system is estimated to be 14.11 l/s. This has been detailed in the SWM Report for Phase I.

The building tower B (Phase II) will be serviced via a dual orifice plate system. The upstream orifice plate is located in the stormwater storage tank (SWM Tank A), and the second orifice is located in a separate chamber, downstream of the tank and upstream of the control manhole. The upstream orifice is sized at 75mm, and the downstream at 105mm. The discharge rate from this system is estimated to be 13.7 l/s. This has been detailed in the SWM Report for Phase II.

The building tower C (Phase III) will also be serviced via pump (designed by Mechanical engineer and explained below) and a 75mm embedded orifice plate system. Upstream orifice plate is located in the stormwater storage tank, at the cast-in-place control manhole. The discharge rate from this system is estimated to be 10.16 l/s. This will been detailed in the SWM Report for Phase III.

The preliminary sizing of the orifice plates has been presented in **Appendix D**. Full sizing details will be provided at the detailed design stage in the respective SWM Report.

ROOF AND AREA DRAIN CONTROL

No roof area control has been provided. All area drain should capture the 100-year storm event and the underground connection should be designed by the mechanical engineer.

PUMP SYSTEM

Due to the site limitations (for phase III) and the shallow municipal storm sewers on Elm Drive West, the pump systems have been proposed to drain the flows to the storm water tank and then allow for gravity flow to the municipal storm sewer on Elm Drive West. Pumps should be designed to have a discharge rate equal to the release rate from the subject block (10.16 for phase III).

For Phase III, all flows from the subject area drains will drain to the SWM Tank found on the parking level. This Tank will be equipped with two submersible pump systems, which will pump the water to the secondary SWM tank where the orifice plate is located. Therefore, the actual release rate is generated by the orifice and not the pump system. The effective head will be created and the flow will drain to the STM.CTL.MH. and ultimately to the existing sewer with the allowable release rate.

PROPOSED HIGH-DENSITY RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

LEGEND

- EXSITING STORM SEWER
- PROPOSED STORM SEWER
- MAINTENANCE HOLE
- FLOW DIRECTION
- SITE BOUNDARY

ENTIRE SITE

- FUTURE R.O.W. – WIDENING
- IMPERVIOUS AREA
- PAVEMENT
- ROOF (NOT CONTROLLED)
- PERVIOUS ON U/G
- PERVIOUS ON SOIL
- PERMEABLE PAVERS
- FLOW DIRECTION

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CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

FIGURE 4-3
PROPOSED STORMWATER MANAGEMENT INFRASTRUCTURE

2013-3931	JULY 2019	SCALE: NTS

4.3.2 WATER QUALITY CONTROL

Public park part of the site consists of landscape features and it doesn't require any quality control.

Phase III of the proposed development consists only of roofs and no pavements or driveways. Therefore, it is assumed that the water draining from these area will not need the quality treatment (control).Should the site plan change, the appropriate quality control device will be chosen for the development.

The water quality target for the building areas (Phases I and II) of the proposed development is to provide an "enhanced" level of water quality control, as defined by the MOE SWMP Manual. An "enhanced" level of water quality implies 80% long-term removal of suspended solids.

In this regard, the Jellyfish Filter products from Imbrium System are selected. Based on the calculation provided by Imbrium Systems (Appendix D), a Jellyfish model JF8-6-2-L0-P0 contained in a 2400mm DIA. pre-cast concrete MH and a Jellyfish model JF6-6-1-L0-P0 contained in a 1800mm DIA. pre-cast concrete MH (by Imbrium Systems Corporation) have been selected for Phases I and II respectively. They will provide a TSS removal rate of 80%.

According to the sizing report presented in Appendix D, for Phase I, the design treatment flow rate is 35.3 l/s, which meets or exceeds 90% of the average annual runoff based on 18 years of Toronto Central rainfall data. The required sediment capacity is determined to be 250 kg, which meets or exceeds the estimated average annual sediment load. Based on the Jellyfish filter datasheet, a JF8-6-2-L0-P0 unit with 8 cartridges can handle a maximum design flow rate of 35.3 l/s and has a sediment capacity of 398 kg, which is greater than the required sediment loading.

For Phase II, the design treatment flow rate is 30.9 l/s, which meets or exceeds 90% of the average annual runoff based on 18 years of Toronto Central rainfall data. The required sediment capacity is determined to be 214 kg, which meets or exceeds the estimated average annual sediment load. Based on the Jellyfish filter datasheet, a JF6-6-1-L0-P0 unit with 7 cartridges can handle a maximum design flow rate of 32.8 l/s and has a sediment capacity of 370 kg, which is greater than the required sediment loading.

The preliminary sizing has been presented in **Appendix D**. Full sizing details will be provided at the detailed design stage in the respective SWM Report.

4.3.3 SUSTAINABLE STORMWATER MANAGEMENT

The underground parking level of the proposed development occupies the majority of the subject site. Therefore, the infiltration measures like the landscape areas on top of the underground slab and permeable pavers at driveway (from Kariya Drive) have been proposed. These measures improve the total imperviousness of the site. Furthermore, the rainwater from the roofs can be retained in the underground storage and can be used for irrigation purposes.

Based on the architect's experience, high building green roofs do not have the intended function and are usually affected by the wind. Therefore, the green roofs have not been considered for this development.

Based on the irrigation requirements provided by Landscape Architect, a 6.4 cubic meters of water will be used for the landscape areas of the site in 7 days, for the landscape features at the ground level. Therefore, the storage tank has been provided within the underground parking and next to the SWM tank for Building A (Phase I). Landscape areas at the podium level will be serviced with a potable water. Please refer to **Appendix D** for details.

5.0 EROSION AND SEDIMENT CONTROL

Although the area of the subject site is less than 2ha, the sediment and erosion control measures are suggested to minimize the effects of erosion and siltation from the construction site. Control measures can include a combination of the following:

- Topsoil stockpiles;
- Rock check dams; and
- Environmental fencing.

5.1 Soils

Based on a soil map of Peel Region dated 1953, the underlying material on site consists of the Cooksville Clay Loam. The underlying soil type will be confirmed upon completion of a sub-surface soil investigation in the next stages of this development. Table 5-1, as presented below, indicates the rating of soil erodibility for various soils as shown in the "Erosion & Sediment Control Guidelines for Urban Construction" (December 2006). As demonstrated in this chart, the clay soils have an erodibility rating of "Low" to "Medium".

5.2 Erosion and Sediment Control Measures

This section will provide an overview of the methodologies and practices considered for the proposed development in order to prevent the release of sediment into the existing storm sewer system. The following describes temporary measures that can potentially be included in the sediment and erosion control plan.

Table 5-1: Soil Erodibility Summary

Soil Type	Erodibility Classification	Soil Erodibility Rating
Silt	Most	High
Silt Loam		High
Loam		High
Silty Sand		High
Sandy Loam		Medium
Silty Clay Loam		Medium
Sandy Clay Loam		Medium
Silty Clay		Medium
Sandy Clay		Low
Clay		Low
Heavy Clay		Low
Loamy Sand		Low
Sand		Low
Poorly Graded Gravel		Low
Well Graded Gravel	Least	Low

5.2.1 TOPSOIL STOCKPILES

Grading for construction requires the top layer of soil (topsoil), which contains nutrients and organic matter necessary for plant growth, to be removed. The topsoil is put into piles and conserved for later use on the site. Measures will be taken to prevent erosion of stockpiles, keeping sediment, nutrients and organic matter from entering the waterways.

To ensure the stockpile is effective, the slopes should be stabilized immediately. Seeding or mulching can be used to stabilize the stockpile. Another option is to place plastic sheeting on the stockpile to protect it from rainfall.

5.2.2 ROCK CHECK DAMS

Rock check dams (RCDs) act to slow the velocity of runoff and consequentially promote settling. Some storage capacity is created on the upstream side of the RCD. During construction activities, RCDs are anticipated to be used within stormwater drainage ditches as part of the sediment and erosion control plan.

5.2.3 ENVIRONMENTAL FENCING

Environmental fencing is a type of barrier used to physically separated construction areas from the environment. Other physical barriers include vegetative strips, plastic sheeting, and buffers. In general, environmental fencing will be placed around the limits of construction and topsoil stockpiles. Fencing should be used adjacent areas of environmental significance, such as the Levi Creek valley. It is important to inspect all physical barriers on a weekly basis and after significant rainfall events.

6.0 SUMMARY

This Functional Servicing Report provides an overview of the proposed servicing plan for the high-density residential development, located at Elm Drive West, in the City of Mississauga.

This report demonstrates that adequate stormwater and water supply servicing will be available for the proposed development. The sanitary sewer up-sizing on Elm Drive by the Region of Peel The existing sanitary sewer will have capacity for Phase I and II of the development. The Region of Peel will be upgrading the sanitary mainline on Elm Drive West, which will alleviate any capacity issues. In summary, the functional servicing analysis established the following:

Water Supply

Water supply servicing will be provided from the watermain located on Elm Drive West. Phase I will connect to the existing 300mm diameter watermain, while Phases II and III will connect to the future 400mm dia. watermain being upgraded by the Region of Peel. The watermain replacement is expected to be completed in late 2019, well before the completion of Phase II and III. **It should be noted that at the time this report was written, the Region had commenced the installation of the new 400mm dia. watermain on Elm Drive West.**

Each building will be serviced with two domestic and one fire connection, with exception of Building C, which will have an additional service connection for the commercial part. It should be noted that for the fire protection, the vertical opening and exterior vertical communications must be properly protected (one hour rating).

Sanitary

The entire proposed developments will be serviced by the sanitary sewer located along Elm Drive West. Phase I will connect to the existing 250mm dia. sewer, while Phases II and III will connect to the future 375mm dia. sewer being upgraded by the Region of Peel. The pipe replacement is expected to be completed in late 2019, well before the completion of Phase II and III. **It should be noted that at the time this report was written, the Region had commenced the installation of the 375mm dia. sanitary sewer on Elm Drive West.**

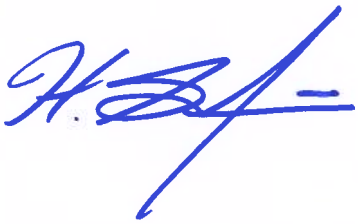
Stormwater Servicing

Peak flows from the subject property will be controlled via on-site measures, prior to discharging to the existing storm sewers along Elm Drive West. Water quality will be provided via JellyFish filtration units.

We trust the above information is suitable for your needs at this time. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Sincerely,

SCHAEFFER & ASSOCIATES LTD.



Hagop Sarkissian, P.Eng. PMP
Partner

APPENDIX A: BACKGROUND INFORMATION

TABLE 1

SANITARY SEWER DESIGN CALCULATIONS

AMACON DEVELOPMENT
MISSISSAUGA, ONTARIO
Z-22.310

CRA - Conestoga-Rovers & Associates

Printed: ##########

DESIGNED BY/DATE: *S. Mitchell*
CHECKED BY/DATE: *26-May-06*

MUNICIPALITY: *City of Mississauga/Regional Municipality of Peel*
PROJECT: *Amacon Site Development*

Sheet No. 1.0000

SANITARY SEWER DESIGN SHEET

0.30 cu m/c/d q.li = Average urban RESIDENTIAL flow
0.200 L/sec/ha I = Infiltration Allowance

M = 1 + 14/(4 + (Pop)^.5)
Qa = q.li × A [L/sec]
Qp = Qa × M [L/sec]
Qi = I × A [L/sec]
Qd = Qp + Qi [L/sec]

SEWER LINE LOCATION			INDIVIDUAL			CUMMULATIVE			Peaking	Average	Peak	Infiltration	Pk.Dsgn	PROPOSED SEWER DESIGN										
STREET NAME/CATCHMENT	FROM MH	TO MH	tributary Unit *Description*	Area - A *[ha]*	Pop.	Catch. *Description*	Area - A *[ha]*	Pop.	factor M	Flow Qa *[m3/sec]*	Flow Qp *[m3/sec]*	Flow Qi *[m3/sec]*	Flow Qd *[m3/sec]*	Length *[m]*	Grade *[%]*	Pipe Mat'l	Diam. *[mm]*	Cap'y Qf *[L/sec]*	Sufficient Capacity	Full veloc. *[m/sec]*	Qd/Qf *[chart]*	Vd/Vf *[chart]*	Qd veloc. *[m/sec]*	% *depth*
Britannia Secondary School		1A		5.10	1,000	1A	5.10	1000	3.80	0.004	0.013	0.0010	0.014	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Kariya Drive	1A	2A		0.00	0	1A	5.10	1000	3.80	0.004	0.013	0.0010	0.014	41.9	0.50%		250	0.0456	YES	0.9280	0.31	0.88	0.8132	0.3938
Elm Drive	2A	EX.89		0.00	0	1A	5.10	1000	3.80	0.004	0.013	0.0010	0.014	40.1	0.50%		250	0.0456	YES	0.9280	0.31	0.88	0.8132	0.3938
ELM DRIVE	EX.89	EX.88		3.11	20	1A, 2A & 3A	8.21	1020	3.79	0.004	0.014	N/A	0.014	68.2	2.60%		250	0.1039	YES	2.1162	0.13	0.68	1.4290	0.2625
ELM DRIVE	EX.88	EX.87		0.00	990	1A, 2A & 3A	8.21	2010	3.58	0.007	0.025	N/A	0.025	68.4	4.10%		250	0.1304	YES	2.6574	0.19	0.76	2.0263	0.3125
ELM DRIVE	EX.87	EX.57A		0.80	975	1A, 2A, 3A, 4A	9.01	2985	3.44	0.010	0.036	N/A	0.036	61.6	0.50%		250	0.0456	YES	0.9280	0.79	1.12	1.0373	0.6625
ELM DRIVE	EX.57A	EX.3A		0.00	960	1A, 2A, 3A, 4A	9.01	3945	3.34	0.014	0.046	N/A	0.046	83.0	1.00%		300	0.0967	YES	1.3680	0.48	0.98	1.3385	0.4813
ELM DRIVE	EX.3A	EX.4A		0.00	1,595	1A, 2A, 3A, 4A	9.01	5540	3.20	0.019	0.062	N/A	0.062	51.8	2.00%		250	0.0841	YES	1.7133	0.74	1.10	1.8878	0.6313

2-22.0

136852 PT.
PLAN C.T.A. 542-S

105971

152377

179668 &
110360 V.S.-Q.C.

BRITANNIA
SECONDARY
SCHOOL

34994 V.S.-Pl.

78210-V.S.

111822 V.S.

154859

189451

27776 V.S.

61699 V.S.

31674 V.S.
58973 V.S.

BLOCK 'A'

BLOCK 'B'

BLOCK 'C'

BLOCK 'D'

1 RESERVE

ELM DRIVE

BLOOR STREET
(CENTRAL PARKWAY WEST)

R.P. 836

ACHILLES CRESCENT

HOMEATH CT.

HURONTARIO ST.

Allowance Between Lots 15 & 16 (Road

MH 554

MH 553

MH 552(57A)

MH 89

MH 88

MH 87

MH 3A

MH2A

MH1A

SAN

D. S.)

3931

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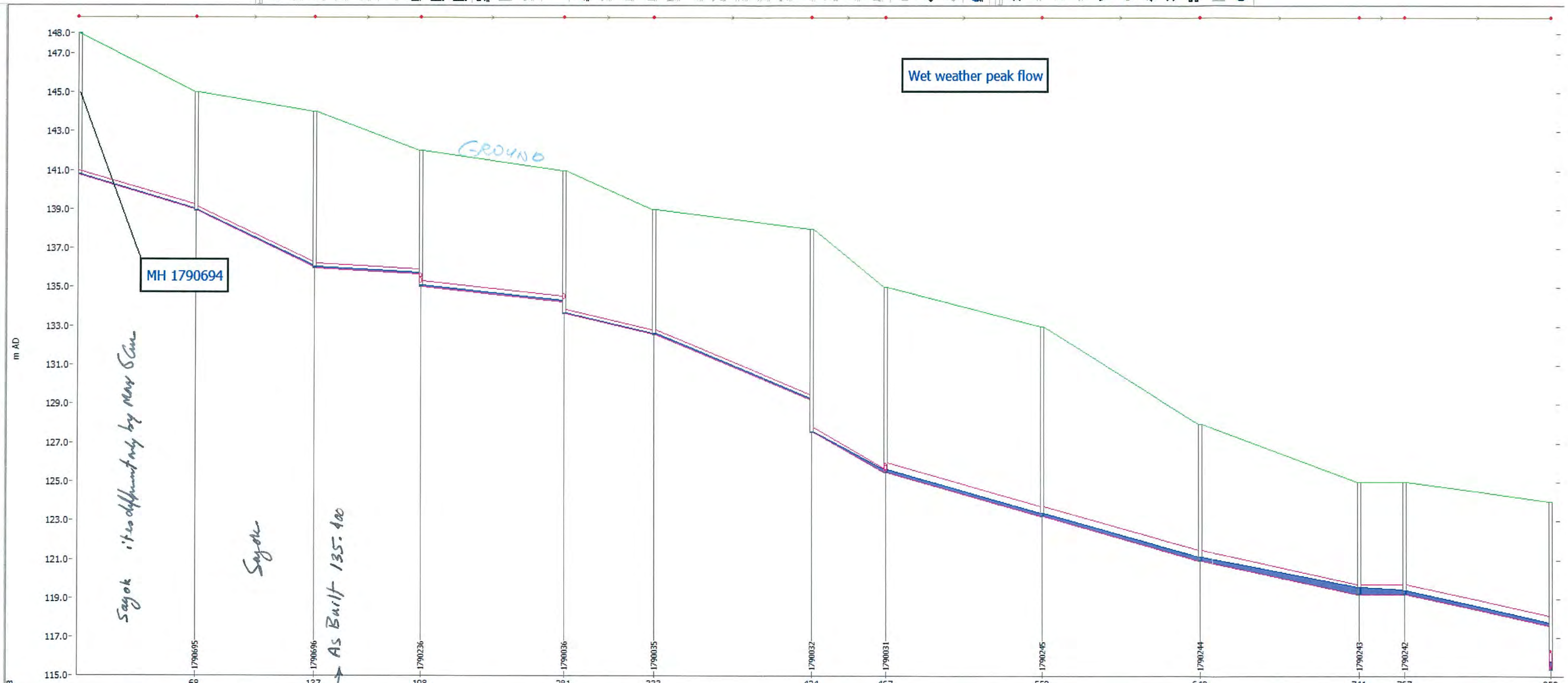


Link	1790694.1	1790695.1	1790696.1	1790236.3	1790036.1	1790035.1	1790032.1	1790031.1	1790245.1	1790244.1	1790243.1	1790242.1
length (m)	68.2	68.4	61.6	83.0	51.8	91.4	42.7	90.8	90.8	92.7	25.9	85.3
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	250	250	250	300	250	250	250	525	525	525	525	525
us inv (m AD)	140.750	138.890	135.959	135.025	133.624	132.558	127.537	125.462	123.215	120.957	119.216	119.216
ds inv (m AD)	139.001	136.078	135.676	134.235	132.588	129.250	125.462	123.215	120.957	119.216	119.216	117.604
grad (m/m)	0.02565	0.04111	0.00459	0.00952	0.02000	0.03619	0.04859	0.02475	0.02487	0.01878	0.00000	0.01890
pfc (m3/s)	0.095	0.121	0.040	0.094	0.084	0.113	0.131	0.677	0.678	0.589	0.000	0.591
US Flow (m3/s)	0.00357	0.00677	0.00916	0.01379	0.01515	0.01631	0.01714	0.16108	0.16292	0.16498	0.16605	0.16797

Handwritten beside 1790696.1: -G ① -W ②; beside 1790236.3: W-3, -E ②; beside 1790036.1: → E MH 3

Node	1790694	1790695	1790696	1790236	1790036	1790035	1790032	1790031	1790245	1790244	1790243	1790242	1790241
ground (m AD)	148.000	145.000	144.000	142.000	141.000	139.000	138.000	135.000	133.000	128.000	125.000	125.000	124.000

Ready - Press F1 for Help | Zoom (m): 441.00 [1:3814] | READ | NUM

300φ @ 0.95%.
300φ @ 0.8%.

Hagop Sarkissian

From: McInnes, Caleigh [mailto:Caleigh.McInnes@peelregion.ca]
Sent: February-18-16 9:24 AM
To: Melissa Bruno <melissa.bruno@mississauga.ca>; Elizabeth Dollimore <Elizabeth.Dollimore@mississauga.ca>; Michael Hynes <Michael.Hynes@mississauga.ca>
Cc: David Riley (driley@sglplanning.ca) <driley@sglplanning.ca>; Koryun Shahbikian <kshahbikian@schaeffers.com>; Vandenburg, Ryan <Ryan.Vandenburg@peelregion.ca>
Subject: RE: Elm...

One minor change, my apologies. See below. Thanks.

Caleigh McInnes, M.Pl.
Junior Planner, Development Services
Public Works
Region of Peel

Telephone: 905.791.7800, Ext. 4645
Email: caleigh.mcinnes@peelregion.ca

From: McInnes, Caleigh
Sent: February 17, 2016 5:35 PM
To: 'Melissa Bruno'; Elizabeth Dollimore; Michael Hynes
Cc: David Riley (driley@sglplanning.ca); Koryun Shahbikian; Vandenburg, Ryan
Subject: RE: Elm...

Hi Melissa:

Could you please have the following added to the Development Agreement for the Region?

"Phase 1 will be permitted to connect to the existing 250mm sanitary sewer on Elm Drive. The existing 300mm diameter watermain on Elm Drive and Hurontario is already at capacity. There is a new Pressure Zone 2 400mm diameter watermain on Hurontario which is under construction and will be promoted to Pressure Zone 3 in the future. The owner is permitted to connect Phase 1 to the existing 300mm diameter watermain on Elm Drive prior to the 400mm diameter watermain on Hurontario being completed , commissioned , operational to Region of Peel standards and promoted to Pressure Zone 3. Proposed Phase 2 and Phase 3 will require connection to the future proposed 400mm diameter watermain on Elm Drive and future proposed 375mm diameter sanitary sewer on Elm Drive once they are completed, commissioned and operational to Region of Peel standards."

Thank you.

Caleigh McInnes, M.Pl.
Junior Planner, Development Services
Public Works
Region of Peel

Telephone: 905.791.7800, Ext. 4645
Email: caleigh.mcinnes@peelregion.ca

Hagop Sarkissian

From: Jefferson, Heather <heather.jefferson@peelregion.ca>
Sent: November 21, 2017 2:11 PM
To: Hagop Sarkissian
Cc: Martino, Alex; 'Maurizio Rogato'; Sniatenchuk, Bernadette
Subject: RE: Elm Drive West - City of Mississauga

Good afternoon Hagop,

We are planning to have a Contractor in place by summer 2018 and expect to complete our works on Elm Drive by December 2019. We will be having our peer review of the 90% design drawings by February 2018, so, when available, please provide our Development Group with your required sewer and watermain connection details required for your Phase 2 development so that we can incorporate the details in our project design.

Regarding your activities, will your main access for construction be off Elm Drive or Hurontario St? There will be a fair bit of activities occurring on Elm Drive starting in 2018 so there will need to be some coordination and management of traffic.

Regards

Heather Jefferson
Project Manager
Water Division, Capital Works
Public Works
Region of Peel
☎ 905.791.7800 x**7881** 🖷 905.791.1442 ❩ 416.420.4715
✉ Heather.Jefferson@peelregion.ca

From: Hagop Sarkissian [mailto:hsarkissian@schaeffers.com]
Sent: November 21, 2017 1:42 PM
To: Jefferson, Heather
Cc: Martino, Alex; 'Maurizio Rogato'
Subject: Elm Drive West - City of Mississauga
Importance: High

Good afternoon Heather,

Further to my voicemail yesterday, we're looking to move forward with the development of the Solmar Development Site Plans (SP 13 219, as well as the upcoming SPA for the second tower) at the southwest corner of Elm & Hurontario – refer to attached.

The client is aiming to commence construction of the first tower early next year (which I believe did not have any servicing issues), and the second building will follow shortly thereafter. As such, we are hoping to get some good news regarding the timing of the municipal improvement projects to ensure sufficient servicing is available.

Kindly review, and let us know what the timing is for the construction & commissioning of the 400mm dia. watermain and 375mm dia. sanitary sewer on Elm Drive.

Regards,

Hagop Sarkissian, P.Eng., PMP
Schaeffer & Associates Ltd.
Off.: 905-738-6100 ext. 249
Mobile: 416-209-6828
hsarkissian@schaeffers.com

Veljko Pirkovic

From: Frandsen, Iwona <Iwona.Frandsen@peelregion.ca>
Sent: September-08-15 12:58 PM
To: koryun shahbikian; veljko pirkovic
Cc: Maurizio Rogato; Masley, Aleksander; McInnes, Caleigh; Vandenburg, Ryan
Subject: RE: Solmar OZ 13-022 Elm Drive - Region Comments 2/2

Hi Koryun,

Based on the FSR and projected sanitary flow from three buildings, only one section of the sewer needs upsizing; However there are potential for other developments in the drainage area which would require upsizing other sections as well.

We do not expect Solmar development to contribute towards upsizing these sections. Having construction phases of this development will help us to determine the time of the required upgrades.

Thanks,

Iwona Frandsen
Technical Analyst, Development Engineering
Development Services, Public Works, Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, On L6T 4B9
e-mail: iwona.frandsen@peelregion.ca
Phone: 905-791-7800, ext.7920
Fax: 905-791-1442

From: koryun shahbikian [mailto:kshahbikian@schaeffers.com]
Sent: September 3, 2015 12:56 PM
To: Frandsen, Iwona; veljko pirkovic
Cc: Maurizio Rogato
Subject: RE: Solmar OZ 13-022 Elm Drive - Region Comments 2/2

Hi Iwona,
Thanks for your email.
We will revise the FSR to define the phasing and provide some approximate time line of development and we will send it to you for your review. Just we need to consult with our client first.
However, I appreciate if you can get and send us the sanitary flow that your modeller is using and basing his/her comment upon that flow.
Regional Modeller commented that more than one pipe will have insufficient capacity to support all three buildings, where as Veljko's calculation shows only one sewer needs to be updated.
Since the basis of calculation is not changed, the ultimate flow (after construction of third building) in the revised FSR and original FSR will remain the same. Thus, We need to know the sanitary flow that modeller has used as basis of his/her comment, so we can advise our client for the future potential costs specially since we are going through phasing.
Thanks,

Koryun Shahbikian, M.Eng., P.Eng., PMP
Associate

Schaeffer & Associates Limited
6 Ronrose Drive
Concord, Ontario L4K 4R3
Tel: 905 738 6100 Ext. 203
Fax: 905 738 6875

From: Frandsen, Iwona [mailto:Iwona.Frandsen@peelregion.ca]
Sent: September-03-15 12:05 PM
To: veljko pirkovic <vpirkovic@schaeffers.com>
Cc: koryun shahbikian <kshahbikian@schaeffers.com>
Subject: RE: Solmar OZ 13-022 Elm Drive - Region Comments 2/2

Veljko

The feedback I am getting is; submit revised FSR include all the sent info.

Ensure the phasing is identified (with relative timelines) (digital copy is fine). I know it's challenging to define timelines but we must have them.

Thanks,

Iwona Frandsen
Technical Analyst, Development Engineering
Development Services, Public Works, Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, On L6T 4B9
e-mail: iwona.frandsen@peelregion.ca
Phone: 905-791-7800, ext.**7920**
Fax: 905-791-1442

From: veljko pirkovic [mailto:vpirkovic@schaeffers.com]
Sent: September 3, 2015 9:22 AM
To: Frandsen, Iwona
Cc: koryun shahbikian
Subject: RE: Solmar OZ 13-022 Elm Drive - Region Comments 2/2

HI Iwona,

Thanks for your help.

The information we have from the client/planner is:

- Phasing Scheme is as shown – Phase 1 is Building 1, Phase 2 is Building 2 and Phase 3 is Building 3.
  If the sales are going well, one Phase can include two Buildings (I don't think we can estimate that at this moment).

- Anticipated Timing is – approximately 18 months per building – therefore 2016-2020(1).

This is a rough estimate. I hope it is sufficient.
If you need anything else, please let us know.

Regards,

SCHAEFFERS
CONSULTING ENGINEERS
VELJKO PIRKOVIC, EIT
DESIGNER
6 Ronrose Drive, Concord, Ontario, L4K 4R3
tel: 905.738.6100 cell: 647.994.4803
email: vpirkovic@schaeffers.com

From: Frandsen, Iwona [mailto:Iwona.Frandsen@peelregion.ca]
Sent: September-02-15 10:46 AM
To: veljko pirkovic <vpirkovic@schaeffers.com>
Cc: koryun shahbikian <kshahbikian@schaeffers.com>
Subject: RE: Solmar OZ 13-022 Elm Drive - Region Comments 2/2

Hi Veljko,

Got the info, forwarded it on.

Can you tell me the phasing scheme and anticipated timing?

Thanks,

Iwona Frandsen
Technical Analyst, Development Engineering
Development Services, Public Works, Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, On L6T 4B9
e-mail: iwona.frandsen@peelregion.ca
Phone: 905-791-7800, ext.7920
Fax: 905-791-1442

From: veljko pirkovic [mailto:vpirkovic@schaeffers.com]
Sent: September 2, 2015 8:42 AM
To: Frandsen, Iwona
Subject: FW: Solmar OZ 13-022 Elm Drive - Region Comments 2/2

Hi Iwona,

As per our conversation yesterday, I'm sending you the files of our Sanitary and Water Supply studies for the Elm Drive West development.
Due to a size, I'm sending two separate emails.

I know you were asking for a revised report, but I'm sending you this first, with the explanation included in the body of the email. If you notice any issues with the
background information or the principles we have used, please let us know, and then we can revise it and send the final version of the report.

Sanitary – Attached please find the Sanitary.Zip file.

I put the documents we received from the Region in the 'Background info' folder. We used the Amacon Design sheets (DS-1) and Tributary Plan (TA-1) to create our
Pre and Post development Design Sheets and Tributary Area (Figure 3-2). For the Post-development Design sheets we used the Building 1, 2 and 3 Sanitary Demand files.
This information is also available in Connection Demand Tables.

The problem was that we used several sources to collect Pipe information from (slopes and inverts) and there were some discrepancies. For example, the file
'Infoworks – Region' shows W invert of 135.676 and the Elm Drive Plan and Profile drawings invert of 135.400. That changes the slope of the pipe and
can affect the capacity as well. We assumed that the pipe is approximately 1%, but we put the note that 'it should be confirmed on site'. That pipe is the critical one and we are proposing its upsizing.
Based on the file named Z21, it seems that the Area Z has 1520 people at 3.24ha (8.0acres). We assumed that this number of people is contributing to MH4A.

Based on all of these, we didn't notice any capacity issues except the pipe we are proposing to upsize.

Water - Attached please find the Water.Zip file.

Water supply demands are shown for all Buildings (1,2 and 3) in 'Building WS' files, and the FUS stands for Fire Underwriters Survey – we used their criteria for the fire calculations.
You can find the Hydrant Test Report and results and again the Connection Demand Tables from the Region that we filled out.
The water supply test measured a static pressure of 91 PSI (627 kpa), a pressure of 84 PSI (579 kpa) during a flow of 1487 G.P.M (94 l/s)
and a pressure of 80 PSI (552 kpa) during a flow of 2367 G.P.M (149 l/s). The pressure in the existing watermain during peak hour demands can be determined by extrapolating data from the hydrant test.
Based on a peak flow rate of 11.82 l/sec for all three Buildings, the pressure in the municipal watermain will be approximately 621 kPa, which is above the minimum required pressure.
Extrapolating data from the hydrant test indicates that the max day plus fire scenario for all three buildings (max demand of 390.29 l/s) has an expected pressure of 429 kPa, which is
greater than the minimum required residual pressure (140 kPa).

I hope this explains the methods that we used. The Phasing of the proposed developments can be easily implemented in these calculations.
If you need anything else, please let us know.

Thank you for your time.

Regards,

APPENDIX B: WATER SUPPLY CALCULATIONS

Water Supply Calculation

Project No. 3931

Proposed Development - Building A, City of Mississauga

Fire Flow: **4000** l/min **66.7** l/s

Water Supply Demand: **280** l/capita/day

Land Use	Type	Units	Pop. Density (persons/unit) †	Population	Average Day Demand (l/s) ‡
Residential	Units	323	2.7	873	**2.8**
Total				873	**2.8**

Land Use	Average Day Demand (l/s) ‡	Peak Hour Demand Peaking Factor †	Peak Hour Demand (l/s)	Max Day Demand Peaking Factor †	Max Day Demand (l/s)	Max Day Demand + Fire (l/s)
Residential	**2.8**	3.0	**8.4**	2.0	**5.6**	**72.3**

† As per Region of Peel Design Guidelines

‡ Based on 280 L/D per person based on Region of Peel Design Guidelines

Water Supply Calculation

Project No. 3931

Proposed Development - Building B, City of Mississauga

Fire Flow: **5000** l/min **83.3** l/s

Water Supply Demand: **280** l/capita/day

Land Use	Type	Units	Pop. Density (persons/unit) †	Population	Average Day Demand (l/s) ‡
Residential	Units	418	2.7	1129	**3.7**
Total				1129	**3.7**

Land Use	Average Day Demand (l/s) ‡	Peak Hour Demand Peaking Factor †	Peak Hour Demand (l/s)	Max Day Demand Peaking Factor †	Max Day Demand (l/s)	Max Day Demand + Fire (l/s)
Residential	**3.7**	3.0	**11.1**	2.0	**7.4**	**90.7**

† As per Region of Peel Design Guidelines

‡ Based on 280 L/D per person based on Region of Peel Design Guidelines

Water Supply Calculation

Project No. 3931

Proposed Development - Building C, City of Mississauga

Fire Flow:	**4000**	l/min	**66.667** l/s
Water Supply Demand:	**280**	l/capita/day	
Water Supply Demand for ICI:	**300**	l/capita/day	

Land Use	Type	Units or Area	Pop. Density (persons/unit) †	Population	Average Day Demand (l/s) ‡
Residential	Units	645	2.7	1742	**5.65**
Commercial	Retail	637.26	50	4	**0.01**
	Total			1746	**5.66**

Land Use	Average Day Demand (l/s) ‡	Peak Hour Demand Peaking Factor †	Peak Hour Demand (l/s)	Max Day Demand Peaking Factor †	Max Day Demand (l/s)	Max Day Demand + Fire (l/s)
Residential	**5.645**	3.0	**16.936**	2.0	**11.291**	
Commercial	**0.014**	3.0	**0.042**	1.4	**0.019**	**77.98**

† As per Region of Peel Design Guidelines

‡ Based on 280 L/D per person based on Region of Peel Design Guidelines

Fire Flow Elm Drive - Building A

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	**0.6**	

B = Ground Floor Area

Area:	1051.5	square metres

C = Height (storeys)

Height:	35	Storeys
	(2+8*0.5)	

D = Fire Flow (000's)

GFA	2,340	square metres
Construction Type	0.6	
Fire Flow	6,385	L/min.

-> Fire Flow	**6,000**	**L/min.**

E = Occupancy Factor

Fire Hazard of Contents	**Charge**
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**5,100**	**L/min.**

F = Sprinkler Factor

Sprinkler System	**Charge**
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	-40%	incl 10% Standard Connection Size

G = Exposure Factor

Separation	**Charge**
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
30.1 to 45 m	5%
Exposed Sides	4

Exposure Factor	25%	(no more than 75%)

H - Net Fire Flow Required

	Charge
F + G Factors	-15%

	4335	L/min.
Fire Flow:	4000	L/min.
	67	L/s

Fire Flow Elm Drive - Building B

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	**0.6**	

B = Ground Floor Area

Area:	1051.48	square metres

C = Height (storeys)

Height:	40	Storeys
	(2+8*0.5)	

D = Fire Flow (000's)

GFA	2,340	square metres
Construction Type	0.6	
Fire Flow	6,385	L/min.

-> Fire Flow	**6,000**	**L/min.**

E = Occupancy Factor

Fire Hazard of Contents	**Charge**
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**5,100**	**L/min.**

F = Sprinkler Factor

Sprinkler System	**Charge**
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	-40%	incl 10% Standard Connection Size

G = Exposure Factor

Separation	**Charge**
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
30.1 to 45 m	5%
Exposed Sides	4

Exposure Factor	30%	(no more than 75%)

H - Net Fire Flow Required

	Charge
F + G Factors	-10%

	4590	L/min.
Fire Flow:	5000	L/min.
	83	L/s

Fire Flow Elm Drive - Building C

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	**0.6**	

B = Ground Floor Area

Area:	1330.79	square metres

C = Height (storeys)

Height:	55	Storeys
	(2+8*0.5)	

D = Fire Flow (000's)

GFA	1,917	square metres
Construction Type	0.6	
Fire Flow	5,780	L/min.

-> Fire Flow	**6,000**	**L/min.**

E = Occupancy Factor

Fire Hazard of Contents	**Charge**
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**5,100**	**L/min.**

F = Sprinkler Factor

Sprinkler System	**Charge**
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	-40%	incl 10% Standard Connection Size

G = Exposure Factor

Separation	**Charge**	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	
30.1 to 45 m	5%	one side
Exposed Sides	4	

Exposure Factor	25%	(no more than 75%)

H - Net Fire Flow Required

	Charge
F + G Factors	-15%

	4335	L/min.
Fire Flow:	4000	L/min.
	67	L/s

AQUAZITION

200 Connie Crescent Unit # 5
Concord, Ontario L4K 1M1

Tel: 416-883-9777
Fax: 905-303-6977

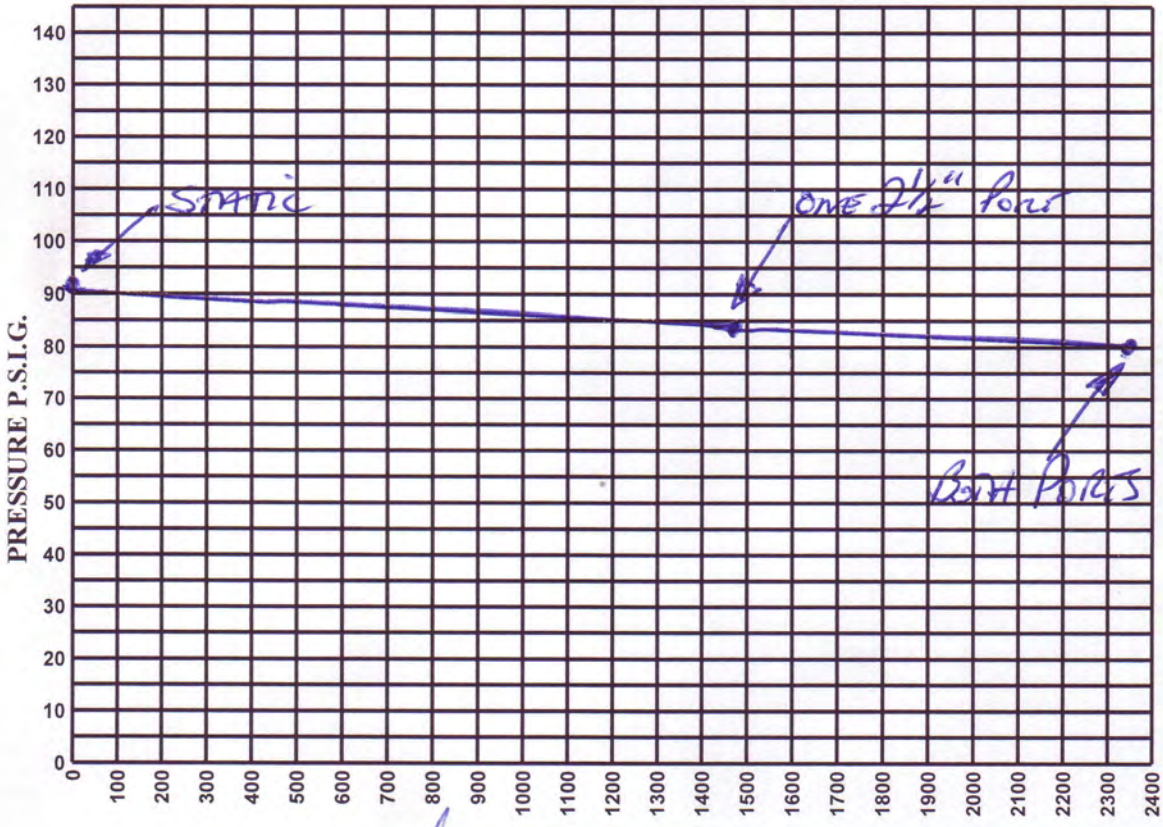
FLOW TEST REPORT DATE: THURS MAY 7 2015

LOCATION OF RESIDUAL HYDRANT 45 ELM DRIVE WEST

LOCATION OF FLOW HYDRANT 31 ELM DRIVE WEST, MISSISSAUGA

TIME OF TEST 12:10 PM WATERMAIN SIZE 12" STATIC PRESSURE 91 PSI

NUMBER OF OUTLETS	PITOT PRESSURE	FLOW (US G.P.M.)	RESIDUAL PRESSURE
ONE 2½" PORT	80	1497	87
BOTH 2½" PORTS	50	2367	80

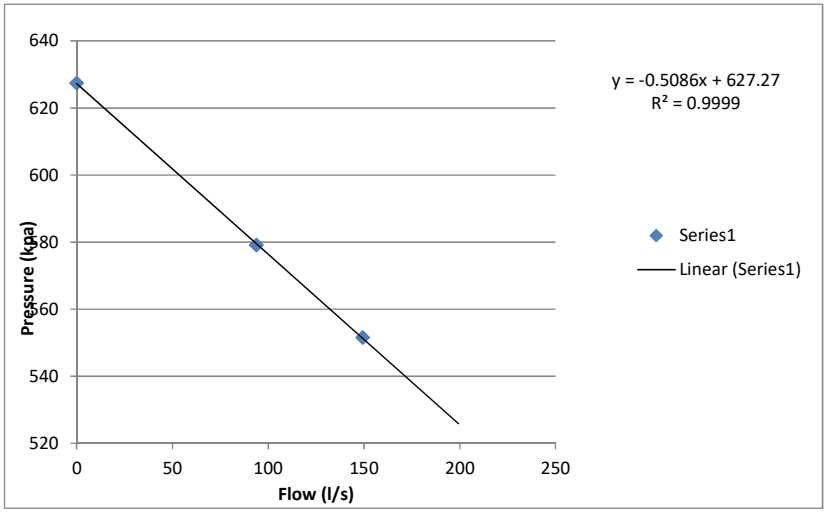


AQUAZITION SIGNATURE _____ AUTHORIZED BY SIGNATURE SOLMAR HOMES

AQUAZITION EMPLOYEE B. CARLUCCI (PRINT NAME) AUTHORIZED BY NAME _____ (PRINT NAME)

Elm Drive, City of Mississauga
Job Number: 3931
Test 1
Flow Test Results: May 07, 2015
Location: Flow 31 Elm Drive West
Residual 45 Elm Drive West

Test Results			
Flow US. Gpm	Residual Pressure psi	Flow l/s	Residual Presure kpa
0	91	0	627
1487	84	94	579
2367	80	149	552



Max day demand + fire flow

Building A

72.30	**l/s**	
590	**kpa**	
2.80	**l/s**	average day
626	**kpa**	

Building B

90.70	**l/s**	
581	**kpa**	
3.70	**l/s**	average day
625	**kpa**	

Building C

77.98	**l/s**	
588	**kpa**	
5.66	**l/s**	average day
624	**kpa**	

All Buildings - A,B, C

240.98	**l/s**	
505	**kpa**	
12.16	**l/s**	average day
621	**kpa**	

1 USG = 3.785 litres
1 IG = 4.546 litres
1 psi = 6.9 kpa

APPENDIX C: SANITARY CALCULATIONS

SUBDIVISION Elm Drive West
(CITY OF MISSISSAUGA)

CONSULTANT Schaeffer & Associates Ltd.

DRAINAGE AREA PLAN NO.

REGISTERED PROFESSIONAL ENGINEER
H. O. TOZCU
Jul.4/19
PROVINCE OF ONTARIO

REGIONAL MUNICIPALITY OF PEEL

SANITARY SEWER DESIGN SHEET

PRE-DEVELOPMENT CONDITIONS

PROJECT No. 2013-3931
DESIGNED BY H.S.
DATE 4-Jul-19

LOCATION	From MH	Up Stream Inv.	To MH	Down Stream Inv.	AREA (ha)	DENSITY persons per ha	POP	CUM. AREA (ha)	CUM. POP.	SEWAGE FLOW (L/sec)	INFILTRATION FLOW (L/sec)	FOUNDATION DRAINS (L/sec)	TOTAL FLOW (L/sec)	Length (m)	Pipe Dia NOM (mm)	Pipe Dia ACT (mm)	Grade (%)	Capacity (L/sec)	Full Velocity (m/s)
KARIYA DRIVE			1A		5.10		1000	5.10	1000										
KARIYA DRIVE	1A		1		0.15		0	5.25	1000	13.32	1.05	0.000	14.37	34.0	250	254.0	1.10	65.07	1.28
ELM DRIVE W.	1		2		0.07		0	5.32	1000	13.32	1.06	0.000	14.38	42.1	375	381.0	1.00	182.91	1.60
								5.32	**1000**										
38-68 ELM DRIVE W.			2		0.69		10	0.69	10										
ELM DRIVE W.	2		3		0.12		0	6.13	1010	13.44	1.23	0.000	14.67	67.0	375	381.0	2.35	280.40	2.46
								6.13	**1010**										
55-65 ELM DRIVE W.			3		1.75		990	1.75	990										
ELM DRIVE W.	3		3A		0.05		0	7.93	2000	25.14	1.59	0.000	26.72	3.0	375	381.0	2.80	306.07	2.68
ELM DRIVE W.	3A		3B		0.00		0	7.93	2000	25.14	1.59	0.000	26.72	5.5	375	381.0	2.93	313.09	2.75
								7.93	**2000**										
24-38 ELM DRIVE W.			3B		0.67		10	0.67	10										
ELM DRIVE W.	3B		3C		0.00		0	8.60	2010	25.25	1.72	0.000	26.97	20.0	375	381.0	2.39	282.77	2.48
ELM DRIVE W.	3C		4		0.09		0	8.69	2010	25.25	1.74	0.000	26.99	39.5	375	381.0	3.72	352.79	3.09
								8.69	**2010**										
33 ELM DRIVE W.			4		0.51		975	0.51	975										
ELM DRIVE W.	4		5		0.15		0	9.35	2985	36.04	1.87	0.000	37.91	41.3	375	381.0	1.00	182.91	1.60
ELM DRIVE W.	5		6		0.00		0	9.35	2985	36.04	1.87	0.000	37.91	19.5	375	381.0	1.00	182.91	1.60
								9.35	**2985**										
1 ELM DRIVE W.			6		0.29		960	0.29	960										
ELM DRIVE W.	6		3A		0.18		0	9.82	3945	46.17	1.96	0.000	48.13	83.3	375	381.0	1.00	182.91	1.60
ELM DRIVE E.	3A		4A		0.09		0	9.91	3945	46.17	1.98	0.000	48.15	51.8	250	254.0	2.00	87.74	1.73
								9.91	**3945**										
34-50 ELM DRIVE E.			4A		1.76		760	1.76	760										
30 ELM DRIVE E.			4A		1.48		760	1.48	760										
ELM DRIVE E.	4A		5A		0.18		0	13.33	5465	61.47	2.67	0.000	64.13	91.4	250	254.0	3.62	118.04	2.33
ELM DRIVE E.	5A		TRUNK		0.00		0	13.33	5465	61.47	2.67	0.000	64.13	42.7	250	254.0	4.86	136.77	2.70
								13.33	**5465**										

SUBDIVISION Elm Drive West
(CITY OF MISSISSAUGA)

CONSULTANT Schaeffer & Associates Ltd.

DRAINAGE AREA PLAN NO.

REGISTERED PROFESSIONAL ENGINEER — H. G. TOZCU — Jul.04/19 — PROVINCE OF ONTARIO

REGIONAL MUNICIPALITY OF PEEL

SANITARY SEWER DESIGN SHEET

POST-DEVELOPMENT CONDITIONS

PROJECT No. 2013-3931
DESIGNED BY H.S.
DATE 4-Jul-19

LOCATION	From MH	Up Stream Inv.	To MH	Down Stream Inv.	AREA (ha)	DENSITY persons per ha	POP	CUM. AREA (ha)	CUM. POP.	SEWAGE FLOW (L/sec)	INFILTRATION FLOW (L/sec)	FOUNDATION DRAINS (L/sec)	TOTAL FLOW (L/sec)	Length (m)	Pipe Dia NOM (mm)	Pipe Dia ACT (mm)	Grade (%)	Capacity (L/sec)	Full Velocity (m/s)
KARIYA DRIVE			1A		5.10		1000	5.10	1000										
KARIYA DRIVE	1A		1		0.15		0	5.25	1000	13.32	1.05	0.000	14.37	34.0	250	254.0	1.10	65.07	1.28
ELM DRIVE W.	1		2		0.07		0	5.32	1000	13.32	1.06	0.000	14.38	42.1	375	381.0	1.00	182.91	1.60
ELM DRIVE W.	2		3		0.38		0	5.70	1000	13.32	1.14	0.000	14.46	67.0	375	381.0	2.35	280.40	2.46
								5.70	**1000**										
55-65 ELM DRIVE W.			3		1.75		990	1.75	990										
ELM DRIVE W.	3		3A		0.05		0	7.50	1990	25.02	1.50	0.000	26.52	3.0	375	381.0	2.80	306.07	2.68
								7.50	**1990**										
38-68 ELM DRIVE W.			~~2~~		~~0.69~~		~~10~~	~~0.69~~	~~10~~										
PROPOSED PHASE I			3A		0.51		873	0.51	873										
ELM DRIVE W.	3A		3B		0.00		0	8.01	2863	34.72	1.60	0.000	36.32	5.5	375	381.0	2.93	313.09	2.75
ELM DRIVE W.	3B		3C		0.00		0	8.01	2863	34.72	1.60	0.000	36.32	20.0	375	381.0	2.39	282.77	2.48
								8.01	**2863**										
24-38 ELM DRIVE W.			~~3B~~		~~0.67~~		~~10~~	~~0.67~~	~~10~~										
PROPOSED PHASE II			3C		0.41		1129	0.41	1129										
ELM DRIVE W.	3C		4		0.09		0	8.51	3992	46.65	1.70	0.000	48.35	39.5	375	381.0	3.72	352.79	3.09
								8.51	**3992**										
33 ELM DRIVE W.			4		0.51		975	0.51	975										
ELM DRIVE W.	4		5		0.15		0	9.17	4967	56.54	1.83	0.000	58.37	41.3	375	381.0	1.00	182.91	1.60
								9.17	**4967**										
PROPOSED PHASE III			5		0.37		1746	0.37	1746										
ELM DRIVE W.	5		6		0.00		0	9.54	6713	73.51	1.91	0.000	75.42	19.5	375	381.0	1.00	182.91	1.60
								9.54	**6713**										
1 ELM DRIVE W.			6		0.29		960	0.29	960										
ELM DRIVE W.	6		3A		0.18		0	10.01	7673	82.51	2.00	0.000	84.51	83.3	375	381.0	1.00	182.91	1.60
ELM DRIVE E.	3A		4A		0.09		0	10.10	7673	82.51	2.02	0.000	84.53	51.8	250	254.0	2.00	87.74	1.73
								10.10	**7673**										

SUBDIVISION Elm Drive West
(CITY OF MISSISSAUGA)

CONSULTANT Schaeffer & Associates Ltd.

DRAINAGE AREA PLAN NO.

REGIONAL MUNICIPALITY OF PEEL

SANITARY SEWER DESIGN SHEET

POST-DEVELOPMENT CONDITIONS

PROJECT No. 2013-3931

DESIGNED BY H.S.

DATE 4-Jul-19

LOCATION	From MH	Up Stream Inv.	To MH	Down Stream Inv.	AREA (ha)	DENSITY persons per ha	POP	CUM. AREA (ha)	CUM. POP.	SEWAGE FLOW (L/sec)	INFILTRATION FLOW (L/sec)	FOUNDATION DRAINS (L/sec)	TOTAL FLOW (L/sec)	Length (m)	Pipe Dia NOM (mm)	Pipe Dia ACT (mm)	Grade (%)	Capacity (L/sec)	Full Velocity (m/s)
34-50 ELM DRIVE E.			4A		1.76		760	1.76	760										
30 ELM DRIVE E.			4A		1.48		760	1.48	760										
ELM DRIVE E.	4A		5A		0.18		0	13.52	9193	96.37	2.70	0.000	99.08	91.4	250	254.0	3.62	118.04	2.33
ELM DRIVE E.	5A		TRUNK		0.00		0	13.52	9193	96.37	2.70	0.000	99.08	42.7	250	254.0	4.86	136.77	2.70
								13.52	**9193**										

Sanitary Flow Calculation

Project No. 3931

Proposed Residential Development - Building A, City of Mississauga

Site Area: 0.51 ha
Infiltration Rate: 0.2 l/ha/sec
Generation Rate: 302.8 l/person/day‡

Estimated Site Discharge

Land Use	Type	Units or area‡	Pop. Density (person/unit)†	Population	Average Flow (L/s)	Harmon's Peaking Factor	Peak Flow (L/s)	Infiltration (L/s)	Total Flow (L/s)
Residential	Suites	323	2.7	873	3.10	3.84	11.90	0.10	**12.00**
			Total	**873**	3.10		11.90	0.10	**12.00**

† As per Region of Peel Design Criteria
‡ Based on site plan prepared by R. Varacalli Architects

Sanitary Flow Calculation

Project No. 3931

Proposed Residential Development - Building B, City of Mississauga

Site Area: 0.41 ha
Infiltration Rate: 0.2 l/ha/sec
Generation Rate: 302.8 l/person/day‡

Estimated Site Discharge

Land Use	Type	Units or area‡	Pop. Density (person/unit)†	Population	Average Flow (L/s)	Harmon's Peaking Factor	Peak Flow (L/s)	Infiltration (L/s)	Total Flow (L/s)
Residential	Suites	418	2.7	1129	4.00	3.77	15.10	0.08	**15.18**
			Total	**1129**	4.00		15.10	0.08	**15.18**

† As per Region of Peel Design Criteria
‡ Based on site plan prepared by R. Varacalli Architects

Sanitary Flow Calculation

Project No. 3931

Proposed Residential Development - Building C, City of Mississauga

Site Area: 0.37 ha
Infiltration Rate: 0.2 l/ha/sec
Generation Rate: 302.8 l/person/day‡

Estimated Site Discharge

Land Use	Type	Units or area‡	Pop. Density (person/unit)†	Population	Average Flow (L/s)	Harmon's Peaking Factor	Peak Flow (L/s)	Infiltration (L/s)	Total Flow (L/s)
Residential	Suites	645	2.7	1742	6.10	3.63	22.20	0.07	**22.27**
Commercial	Retail	637	50	4	0.01	4.45	0.06	0.00	**0.06**
			Total	**1746**	6.11	3.63	22.26	0.07	**22.34**

† As per Region of Peel Design Criteria
‡ Based on site plan prepared by R. Varacalli Architects

APPENDIX D: STORMWATER MANAGEMENT CALCULATIONS

Veljko Pirkovic

From: Ghazwan Yousif <Ghazwan.Yousif@mississauga.ca>
Sent: September-30-15 2:44 PM
To: veljko pirkovic
Cc: koryun shahbikian
Subject: RE: FW: Solmar OZ 13-022 Elm Drive

Hi Veljko,
My comment read as following :-
Updated Sept. 01, 2015: Based on email from Koryun Shahbikian (Schaeffers Consulting Engineers), an updated information had been provided the only outstaring issue is the 750mm storm sewer under Elm Drive is to be confirmed by the surveyor if it was design as stormwater underground storage.

Regards,

Ghazwan

From: veljko pirkovic [mailto:vpirkovic@schaeffers.com]
Sent: 2015/09/30 2:32 PM
To: Ghazwan Yousif
Cc: koryun shahbikian
Subject: RE: FW: Solmar OZ 13-022 Elm Drive

Hello Ghazwan,

I'm sending this email as a follow-up on my previous message (see below).
Could you please let us know if the comments we received from you in May, and we discussed about in August, have been addressed?

The meeting is on Friday, and we need to be sure that everything is resolved.
Please let us know if something is missing (except the survey).

Thanks for your time.

Regards,

SCHAEFFERS
CONSULTING ENGINEERS

VELJKO PIRKOVIC, EIT
DESIGNER

6 Ronrose Drive, Concord, Ontario, L4K 4R3
tel: 905.738.6100 cell: 647.994.4803
email: vpirkovic@schaeffers.com

From: veljko pirkovic
Sent: August-31-15 1:03 PM
To: 'Ghazwan.Yousif@mississauga.ca' <Ghazwan.Yousif@mississauga.ca>

Cc: koryun shahbikian <kshahbikian@schaeffers.com>
Subject: FW: Solmar OZ 13-022 Elm Drive
Importance: High

Hi Ghazwan,

Attached please find the files regarding the Elm Drive West development:

- revised calculations (post and pre-development runoff, area and release rate)
- two drainage figures explaining these calculations.

Please disregard the 0.666ha in the previous files and refer to the revised calculations.

The 750mm storm sewer will be surveyed soon and the moment we have the information, we'll let you know.

Please inform us if we resolved the issues with this report and if the comments have been addressed now.
If you have any questions, and if we need to send you something in addition, please let us know.

Thank you for your time.

Regards,

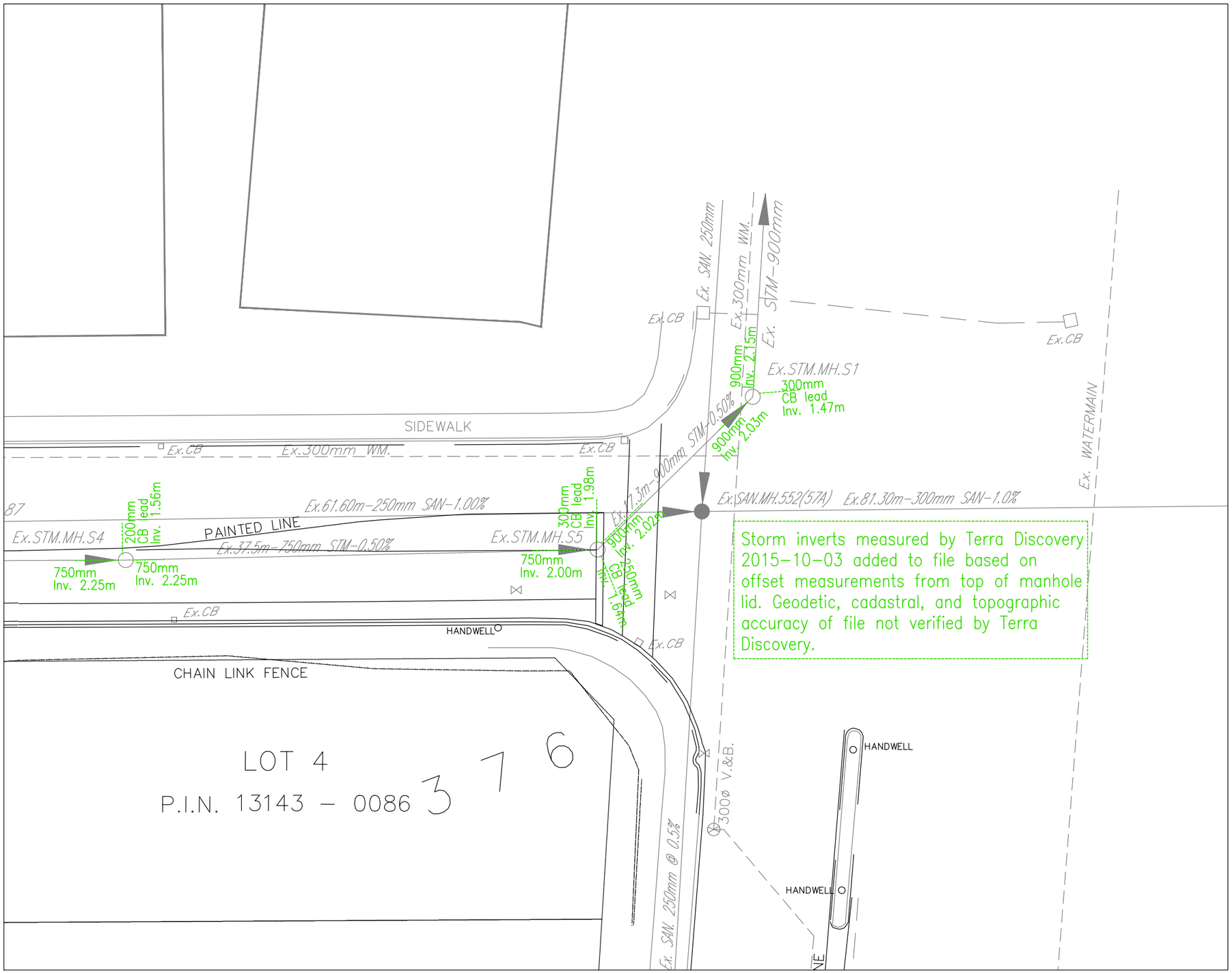
SCHAEFFERS
CONSULTING ENGINEERS

VELJKO PIRKOVIC, EIT
DESIGNER

6 Ronrose Drive, Concord, Ontario, L4K 4R3
tel: 905.738.6100 cell: 647.994.4803
email: vpirkovic@schaeffers.com

PROPOSED HIGH-DENSITY
RESIDENTIAL DEVELOPMENT
ELM DRIVE WEST
CITY OF MISSISSAUGA

LEGEND



Storm inverts measured by Terra Discovery 2015-10-03 added to file based on offset measurements from top of manhole lid. Geodetic, cadastral, and topographic accuracy of file not verified by Terra Discovery.

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

FIIGURE 4
ELM DRIVE STORM SEWER SURVEY
BY TERRADISCOVERY

2013-3931	SEPTEMBER 2015	SCALE: N.T.S.

From City of Mississauga project: **07-1350**

DeLCan London, Sept.21 1987

STORM SEWER DESIGN SHEET

CITY OF MISSISSAUGA
ELM DRIVE WEST - PRE-DEVELOPMENT

PROJECT No.: 2013-3931
DESIGNED BY: K.Sh.
DATE: November 6, 2015

AREA NO	STREET	LAND USE	UPSTREAM		DOWNSTREAM		NO. OF HECTARES		AREA x STORM C0-EFF.				TIME		$I10_{YR}$	Q_{10}=2.78 x CIA / 1000 (m^3/s)	PIPE						
									C	INCR AxC	TOTAL SECT AxC	TOTAL AxCx2.78					Length (m)	SIZE		GRADE	TYPE OF PIPE	CAPACITY (m^3/s)	VELOCITY (m/s)
		INV	MH	INV	MH	INV	IN AREA	TOTAL					IN AREA	TOT				NOM (mm)	ACT (mm)				
A-1	Elm Drive West	RES	1		2		0.622	0.622	0.40	0.249	0.249	0.692	0.00	15.00	**99.17**	0.069	0.0	450	457	3.00	UR-PVC	0.446	2.72
A-2	Elm Drive West	ROW	1		2		0.459	1.081	0.85	0.390	0.639	1.776	0.00	15.00	**99.17**	0.176	0.0	450	457	3.00	UR-PVC	0.446	2.72
A-3	Elm Drive West	SCHOOL	1		2		0.567	1.648	0.30	0.170	0.809	2.249	0.00	15.00	**99.17**	0.223	0.0	450	457	3.00	UR-PVC	0.446	2.72
A-4	Elm Drive West	ROW	1		2		0.267	1.915	0.85	0.227	1.036	2.880	0.00	15.00	**99.17**	0.286	0.0	450	457	3.00	UR-PVC	0.446	2.72
A-5	Elm Drive West	SCHOOL	1		2		0.127	2.042	0.30	0.038	1.074	2.986	0.28	15.00	**99.17**	0.296	45.0	450	457	3.00	UR-PVC	0.446	2.72
								2.042			**1.074**			**15.28**									
A-6	Elm Drive West	RES	2		3		0.242	2.284	0.40	0.097	1.171	3.255	0.00	15.28	**98.09**	0.319	0.0	450	457	2.99	UR-PVC	0.446	2.72
A-7	Elm Drive West	ROW	2		3		0.231	2.515	0.85	0.196	1.367	3.801	0.58	15.28	**98.09**	0.373	94.5	450	457	2.99	UR-PVC	0.446	2.72
								2.515			**1.367**			**15.86**									
A-8	Elm Drive West	COMM	3		4		0.983	3.498	0.90	0.885	2.252	6.260	0.00	15.86	**95.91**	0.600	0.0	750	762	0.50	CONC.	0.821	1.80
A-9	Elm Drive West	COMM	3		4		0.391	3.889	0.90	0.352	2.604	7.239	0.00	15.86	**95.91**	0.694	0.0	750	762	0.50	CONC.	0.821	1.80
A-10	Elm Drive West	ROW	3		4		0.168	4.057	0.85	0.143	2.747	7.636	0.00	15.86	**95.91**	0.732	0.0	750	762	0.50	CONC.	0.821	1.80
A-11	Elm Drive West	RES	3		4		0.144	4.201	0.40	0.058	2.804	7.796	0.60	15.86	**95.91**	0.748	65.0	750	762	0.50	CONC.	0.821	1.80
								4.201			**2.804**			**16.46**									
A-12	Elm Drive West	ROW	4		5		0.104	4.305	0.85	0.088	2.893	8.042	0.48	16.46	**93.77**	0.754	52.3	750	762	0.50	CONC.	0.821	1.80
								4.305			**2.893**			**16.94**									
A-13	Elm Drive West	RES	5		6		0.204	4.509	0.40	0.082	2.974	8.268	0.00	16.94	**92.12**	0.762	0.0	900	914	0.50	CONC.	1.335	2.03
A-14	Elm Drive West	ROW	5		6		0.267	4.776	0.85	0.227	3.201	8.899	0.13	16.94	**92.12**	0.820	11.0	900	914	0.26	CONC.	0.963	1.47
								4.776			**3.201**			**17.07**									
A-15	Hurontario (HWY 10)	ROW	6		7		0.428	5.204	0.85	0.364	3.565	9.911	1.09	17.07	**91.71**	0.909	95.7	900	914	0.26	CONC.	0.963	1.47
								5.204			**3.565**			**18.15**									
A-16	Hurontario (HWY 10)	COMM	7		CULV		0.738	5.942	0.90	0.664	4.229	11.757	0.00	18.15	**88.27**	1.038	0.0	900	914	0.72	CONC.	1.603	2.44
A-17	Hurontario (HWY 10)	ROW	7		CULV		0.128	6.070	0.85	0.109	4.338	12.060	0.18	18.15	**88.27**	1.065	26.0	900	914	0.72	CONC.	1.603	2.44
								6.070			**4.338**			**18.33**									

$I10_{YR}=35.1(T)^{-0.695}$, T in hours
Inlet Time = 10 min

From City of Mississauga project: **07-1350**

DeLCan London, Sept.21 1987

STORM SEWER DESIGN SHEET

CITY OF MISSISSAUGA
ELM DRIVE WEST - POST-DEVELOPMENT

PROJECT No.: 2013-3931
DESIGNED BY: V.P. EIT
CHECKED BY: K.Sh. P.ENG
DATE: July 1, 2019

AREA NO	STREET	LAND USE	UPSTREAM		DOWNSTREAM		NO. OF HECTARES		AREA x STORM C0-EFF.				TIME		$I10_{YR}$	Q_{10}=2.78 x CIA / 1000 (m^3/s)	PIPE						
									C	INCR AxC	TOTAL SECT AxC	TOTAL AxCx2.78	IN AREA	TOT			Length (m)	SIZE NOM (mm)	SIZE ACT (mm)	GRADE	TYPE OF PIPE	CAPACITY (m^3/s)	VELOCITY (m/s)
		INV	MH	INV	MH	INV	IN AREA	TOTAL															
A-1	Elm Drive West	RES	1		2		0.622	0.622	0.40	0.249	0.249	0.692	0.00	15.00	**99.17**	0.069	0.0	450	457	2.60	UR-PVC	0.416	2.53
A-2	Elm Drive West	ROW	1		2		0.459	1.081	0.85	0.390	0.639	1.776	0.00	15.00	**99.17**	0.176	0.0	450	457	2.60	UR-PVC	0.416	2.53
A-3	Elm Drive West	SCHOOL	1		2		0.567	1.648	0.30	0.170	0.809	2.249	0.00	15.00	**99.17**	0.223	0.0	450	457	2.60	UR-PVC	0.416	2.53
A-4	Elm Drive West	ROW	1		2		0.216	1.864	0.85	0.184	0.993	2.760	0.23	15.00	**99.17**	0.274	35.5	450	457	2.60	UR-PVC	0.416	2.53
								1.864			**0.993**			**15.23**									
A-5	Elm Drive West	SCHOOL	2		3		0.127	0.127	0.85	0.108	0.108	0.300	0.00	15.00	**99.17**	0.030	0.0	450	457	1.49	UR-PVC	0.315	1.92
A-51	Elm Drive West	ROW	2		3		0.051	2.042	0.85	0.043	1.144	3.180	0.24	15.23	**98.25**	0.312	27.5	450	457	1.49	UR-PVC	0.315	1.92
								2.042			**1.144**			**15.47**			ALLOWABLE RELEASE RATE					
A-6	Elm Drive West	RES	3		3P		0.082	2.124	0.85	0.070	1.214	3.374	0.20	15.47	**97.34**	0.328	32.3	450	457	2.99	UR-PVC	0.446	2.72
PARK	Elm Drive West	PARK	2P		3P		0.303	0.303	0.25	0.076	0.076	0.211	0.00	15.67	**96.60**	***0.008***	0.0	450	457	2.99	UR-PVC	0.446	2.72
A-7	Elm Drive West	ROW	3P		4		0.161	2.285	0.85	0.137	1.351	3.754	0.38	15.67	**96.60**	0.371	62.1	450	457	2.99	UR-PVC	0.446	2.72
								2.285			**1.351**			**16.05**			ALLOWABLE RELEASE RATE					
PH.1	Elm Drive West	RES	1B		4		0.513	0.513	0.85	0.436	0.436	1.212	0.00	15.67	**96.60**	***0.014***	0.0	450	457	2.99	UR-PVC	0.446	2.72
A-8	Elm Drive West	COMM	4		5		0.983	3.268	0.90	0.885	2.235	6.214	0.00	16.05	**95.20**	0.592	0.0	750	762	0.50	CONC.	0.821	1.80
A-9	Elm Drive West	COMM	4		5		0.391	3.659	0.90	0.352	2.587	7.192	0.00	16.05	**95.20**	0.685	0.0	750	762	0.50	CONC.	0.821	1.80
A-10	Elm Drive West	ROW	4		5		0.168	3.827	0.85	0.143	2.730	7.589	0.00	16.05	**95.20**	0.722	0.0	750	762	0.50	CONC.	0.821	1.80
PH.2	Elm Drive West	RES	2B		5		0.410	0.410	0.80	0.328	0.328	0.912	0.00	16.05	**95.20**	***0.014***	0.0	750	762	0.50	CONC.	0.821	1.80
PH.3	Elm Drive West	RES	3B		5		0.370	0.370	0.85	0.315	0.315	0.874	0.00	16.05	**95.20**	***0.010***	0.0	750	762	0.50	CONC.	0.821	1.80
A-11	Elm Drive West	RES	4		5		0.000	3.827	0.00	0.000	2.730	7.589	0.60	16.05	**95.20**	0.769	65.0	750	762	0.50	CONC.	0.821	1.80
								3.827			**2.730**			**16.65**			ALLOWABLE RELEASE RATES					
A-12	Elm Drive West	ROW	5		6		0.104	3.931	0.85	0.088	2.818	7.835	0.35	16.65	**93.09**	0.776	37.5	750	762	0.50	CONC.	0.821	1.80
								3.931			**2.818**			**17.00**									
A-13	Elm Drive West	RES	6		7		0.000	3.931	0.00	0.000	2.818	7.835	0.00	17.00	**91.92**	0.767	0.0	900	914	0.50	CONC.	1.335	2.03
A-14	Elm Drive West	ROW	6		7		0.267	4.198	0.85	0.227	3.045	8.466	0.14	17.00	**91.92**	0.825	17.3	900	914	0.50	CONC.	1.335	2.03
								4.198			**3.045**			**17.14**									
A-15	Hurontario (HWY 10)	ROW	7		8		0.428	4.626	0.85	0.364	3.409	9.477	1.09	17.14	**91.46**	0.913	95.7	900	914	0.26	CONC.	0.963	1.47
								4.626			**3.409**			**18.23**									
A-16	Hurontario (HWY 10)	COMM	8		CULV		0.738	5.364	0.90	0.664	4.073	11.324	0.00	18.23	**88.04**	1.043	0.0	900	914	0.72	CONC.	1.603	2.44
A-17	Hurontario (HWY 10)	ROW	8		CULV		0.128	5.492	0.85	0.109	4.182	11.626	0.18	18.23	**88.04**	1.070	26.0	900	914	0.72	CONC.	1.603	2.44
								5.492			**4.182**			**18.41**									

$I10_{YR}=35.1(T)^{-0.695}$, T in hours
Inlet Time = 10 min

City of Mississauga- Design Criteria
Allowable Release Rate

Project: 3931 - Elm Drive West
Phase I

Criteria:
The Runoff Coefficients were taken from City's Design Criteria.

Rainfall intensity

Design Storm Event	A	B	C	I (mm/hr)
2-Year	610	4.6	0.78	59.892
5-Year	820	4.6	0.78	80.511
10-Year	1010	4.6	0.78	99.166
25-Year	1160	4.6	0.78	113.893
50-Year	1300	4.7	0.78	127.133
100-Year	1450	4.9	0.78	140.690

Note:
T=15 minutes
I=A / (T+B)^C

External flow to the Site

Runoff Coefficient, C	**0.00**	
Drainage Area	0.000	ha
2-Year Peak Flow, Qex	0.00	l/s

Existing Peak Discharge Rate to Storm Sewer on Elm Drive West

Runoff Coefficient, C	**0.47**	
Drainage Area	**0.18**	ha
2-Year Peak Flow, Q2	14.11	l/s
5-Year Peak Flow, Q5	18.97	l/s
10-Year Peak Flow, Q10	23.36	l/s
25-Year Peak Flow, Q25	26.83	l/s
50-Year Peak Flow, Q50	29.95	l/s
100-Year Peak Flow, Q100	33.14	l/s

Total Maximum Allowable Release rate from the site = Qex+Q2= 14.11 l/s

Schaeffers Consulting Engineers
Printed: 20-Dec-17

Storage Volume Calculation - Phase I

Project: Elm Drive West Development (City of Mississauga)

Modified Rational Method

Internal Area	Area (ha) =	0.513
	C =	0.85
	Maximum Release Rate (l/s) =	**14.11**
External Area	Area (ha) =	0.000
	C =	0.00
Roof Storage	Release Rate from roof(l/s) =	0.00

100 Year Storm

Design Storm =	City of Mississauga
A =	1450
B =	4.9
C =	0.78

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Rooftop	External	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Runoff	Runoff	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
15	140.69	170.55	0.00	0.00	170.55	153.49	12.70	140.79
16	135.41	164.15	0.00	0.00	164.15	157.58	13.55	144.04
17	130.56	158.27	0.00	0.00	158.27	161.44	14.39	147.04
18	126.09	152.85	0.00	0.00	152.85	165.08	15.24	149.84
19	121.96	147.84	0.00	0.00	147.84	168.54	16.09	152.45
20	118.12	143.19	0.00	0.00	143.19	171.83	16.93	154.90
25	102.41	124.14	0.00	0.00	124.14	186.22	21.17	165.05
30	90.77	110.04	0.00	0.00	110.04	198.07	25.40	172.67
35	81.77	99.13	0.00	0.00	99.13	208.17	29.63	178.53
40	74.58	90.41	0.00	0.00	90.41	216.97	33.86	183.11
45	68.68	83.26	0.00	0.00	83.26	224.80	38.10	186.70
50	63.75	77.28	0.00	0.00	77.28	231.85	42.33	189.52
55	59.56	72.20	0.00	0.00	72.20	238.27	46.56	191.71
60	55.95	67.83	0.00	0.00	67.83	244.17	50.80	193.38
65	52.81	64.01	0.00	0.00	64.01	249.64	55.03	194.62
70	50.03	60.65	0.00	0.00	60.65	254.74	59.26	195.48
75	47.58	57.67	0.00	0.00	57.67	259.52	63.50	196.03
80	45.38	55.00	0.00	0.00	55.00	264.02	67.73	196.30
85	43.39	52.60	0.00	0.00	52.60	268.28	71.96	196.32
90	41.60	50.43	0.00	0.00	50.43	272.32	76.19	196.12
95	39.97	48.45	0.00	0.00	48.45	276.16	80.43	195.73
100	38.47	46.64	0.00	0.00	46.64	279.83	84.66	195.17

Required Storage (m^3):	**196.32**
Provided Storage (m^3):	**210.37**
Provided Irrigation Storage (m^3):	**10.65**

Address:
Elm Street West Development
City of Mississauga
Size Upstream Orifice Plate - Phase I

Allowable Release Rate = 0.0141 m^3/s

CALCULATE DIAMETER KNOWING Q & H	
Q(m^3/s)=	0.0141
Td(m) =	1.50
Approx A=	0.0042
Approx D=	73
A(m^2) =	0.004
D(mm) =	**74**

Control Manhole Orifice Plate

DIA (mm)=	**75**	
AREA m^2	0.004	
COEFF =	**0.62**	
GRAVITY =	9.81	
K =	1.0	
D/S HGL=	138.94	m
Orifice Inv.	137.54	m
Spill elev.	140.50	m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	1.398	0.0000	0.0000	138.94
0.110	1.508	0.0040	0.0040	139.05
1.360	**2.758**	**0.0141**	**0.0141**	**140.30**
1.600	2.998	0.0153	0.0153	140.54
1.700	3.098	0.0158	0.0158	140.64
1.800	3.198	0.0163	0.0163	140.74
1.920	3.318	0.0168	0.0168	140.86

ORIFICE FLOW Q(m^3/s)= COEF*AREA*(2*GRAVITY*HEAD/K)^0.5
WEIR FLOW Q(m^3/s)= CLH^1.5 C=1.5

Schaeffers Consulting Engineers
Printed: 20-Dec-17

Address:
Elm Street West Development
City of Mississauga
Size Control Orifice Plate - Phase I

Allowable Release Rate = 0.0141 m^3/s

CALCULATE DIAMETER KNOWING Q & H	
Q(m^3/s)=	0.0141
Td(m) =	1.50
Approx A=	0.0042
Approx D=	73
A(m^2) =	0.004
D(mm) =	**74**

Control Manhole Orifice Plate

DIA (mm)=	**75**	
AREA m^2	0.004	
COEFF =	**0.62**	
GRAVITY =	9.81	
K =	1.0	
D/S HGL=	N/A	m
Orifice Inv.	137.54	m
Spill elev.		m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	0.037	0.0000	0.0000	137.58
0.110	0.148	0.0040	0.0040	137.69
1.360	**1.398**	**0.0141**	**0.0141**	**138.94**
1.600	1.637	0.0153	0.0153	139.18
1.700	1.738	0.0158	0.0158	139.28
1.800	1.838	0.0163	0.0163	139.38
1.920	1.958	0.0168	0.0168	139.50

ORIFICE FLOW Q(m^3/s)= COEF*AREA*(2*GRAVITY*HEAD/K)^0.5
WEIR FLOW Q(m^3/s)= CLH^1.5 C=1.5

Schaeffers Consulting Engineers
Printed: 20-Dec-17

City of Mississauga- Design Criteria
Allowable Release Rate

Project: 4577 - Elm Drive West
Phase II - TOWER B

Criteria:
The Runoff Coefficients were taken from City's Design Criteria.

Rainfall intensity

Design Storm Event	A	B	C	I (mm/hr)
2-Year	610	4.6	0.78	59.892
5-Year	820	4.6	0.78	80.511
10-Year	1010	4.6	0.78	99.166
25-Year	1160	4.6	0.78	113.893
50-Year	1300	4.7	0.78	127.133
100-Year	1450	4.9	0.78	140.690

Note:
T=15 minutes
I=A / (T+B)^C

External flow to the Site

Runoff Coefficient, C	**0.00**	
Drainage Area	0.000	ha
2-Year Peak Flow, Qex	0.00	l/s

Existing Peak Discharge Rate to Storm Sewer on Elm Drive West

Runoff Coefficient, C	**0.47**	
Drainage Area	**0.17**	ha
2-Year Peak Flow, Q2	13.68	l/s
5-Year Peak Flow, Q5	18.39	l/s
10-Year Peak Flow, Q10	22.66	l/s
25-Year Peak Flow, Q25	26.02	l/s
50-Year Peak Flow, Q50	29.04	l/s
100-Year Peak Flow, Q100	32.14	l/s

Total Maximum Allowable Release rate from the site = Qex+Q2= 13.7 l/s

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Printed: 25-Jun-19

Elm Street West Development
City of Mississauga
Size Control Orifice Plate - Tower B

Allowable Release Rate = 0.0137 m^3/s

DIA (mm)=	**105**	
AREA m^2	0.009	
COEFF =	**0.62**	
GRAVITY =	9.81	
K =	1.0	
D/S HGL=	N/A	m
Orifice Inv.	137.54	m
Spill elev.		m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	0.053	0.0000	0.0000	137.59
0.110	0.162	0.0079	0.0079	137.70
0.330	**0.382**	**0.01366**	**0.0137**	**137.92**
1.600	1.653	0.0301	0.0301	139.19
1.700	1.753	0.0310	0.0310	139.29
1.800	1.852	0.0319	0.0319	139.39
1.920	1.973	0.0330	0.0330	139.51

ORIFICE FLOW Q(m^3/s)= COEF*AREA*(2*GRAVITY*HEAD/K)^0.5

WEIR FLOW Q(m^3/s)= CLH^1.5 C=1.5

Schaeffers Consulting Engineers

Printed: 24-Jun-19

Elm Street West Development
City of Mississauga
Size Upstream Orifice Plate - Tower B

Allowable Release Rate = 0.0137 m^3/s

DIA (mm)=	**75**	
AREA m^2	0.004	
COEFF =	**0.62**	
GRAVITY =	9.81	
K =	1.0	
D/S HGL=	137.92	m
Orifice Inv.	137.54	m
Spill elev.	139.18	m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	0.382	0.0000	0.0000	137.92
0.980	1.362	0.0120	0.0120	138.90
1.262	**1.644**	**0.01363**	**0.0136**	**139.18**
1.600	1.982	0.0153	0.0153	139.52
1.700	2.082	0.0158	0.0158	139.62
1.800	2.183	0.0163	0.0163	139.72
1.920	2.302	0.0168	0.0168	139.84

ORIFICE FLOW Q(m^3/s)= COEF*AREA*(2*GRAVITY*HEAD/K)^0.5
WEIR FLOW Q(m^3/s)= CLH^1.5 C=1.5

Schaeffers Consulting Engineers
Printed: 24-Jun-19

Storage Volume Calculation - Phase II

Project: TOWER B - Elm Drive West Development (City of Mississauga)

Modified Rational Method

Internal Area

Area (ha) =	0.41
C =	0.80
Actual Release Rate (l/s) =	13.63

100 Year Storm

Design Storm =	City of Mississauga
A =	1450
B =	4.9
C =	0.78

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Rooftop	External	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Runoff	Runoff	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
15	140.69	128.21	0.00	0.00	128.21	115.39	12.27	103.12
16	135.41	123.40	0.00	0.00	123.40	118.46	13.08	105.38
17	130.56	118.98	0.00	0.00	118.98	121.36	13.90	107.46
18	126.09	114.91	0.00	0.00	114.91	124.10	14.72	109.38
19	121.96	111.14	0.00	0.00	111.14	126.70	15.54	111.16
20	118.12	107.64	0.00	0.00	107.64	129.17	16.36	112.81
25	102.41	93.32	0.00	0.00	93.32	139.99	20.45	119.54
30	90.77	82.72	0.00	0.00	82.72	148.90	24.53	124.36
35	81.77	74.52	0.00	0.00	74.52	156.49	28.62	127.86
40	74.58	67.96	0.00	0.00	67.96	163.11	32.71	130.40
45	68.68	62.59	0.00	0.00	62.59	168.99	36.80	132.19
50	63.75	58.10	0.00	0.00	58.10	174.29	40.89	133.40
55	59.56	54.28	0.00	0.00	54.28	179.12	44.98	134.14
60	55.95	50.99	0.00	0.00	50.99	183.56	49.07	134.49
65	52.81	48.12	0.00	0.00	48.12	187.67	53.16	134.51
70	50.03	45.60	0.00	0.00	45.60	191.50	57.25	134.25
75	47.58	43.35	0.00	0.00	43.35	195.09	61.34	133.76
80	45.38	41.35	0.00	0.00	41.35	198.48	65.42	133.05
85	43.39	39.54	0.00	0.00	39.54	201.68	69.51	132.16
90	41.60	37.91	0.00	0.00	37.91	204.71	73.60	131.11
95	39.97	36.42	0.00	0.00	36.42	207.60	77.69	129.91
100	38.47	35.06	0.00	0.00	35.06	210.36	81.78	128.58

Required Storage (m^3):	**134.5**
Provided Storage (m^3):	**156.0**

Schaeffers Consulting Engineers

City of Mississauga- Design Criteria
Allowable Release Rate

Project: 3931 - Elm Drive West
Phase III

Criteria:
The Runoff Coefficients were taken from City's Design Criteria.

Rainfall intensity

Design Storm Event	A	B	C	I (mm/hr)
2-Year	610	4.6	0.78	59.892
5-Year	820	4.6	0.78	80.511
10-Year	1010	4.6	0.78	99.166
25-Year	1160	4.6	0.78	113.893
50-Year	1300	4.7	0.78	127.133
100-Year	1450	4.9	0.78	140.690

Note:
T=15 minutes
I=A / (T+B)^C

External flow to the Site

Runoff Coefficient, C	**0.00**	
Drainage Area	0.000	ha
2-Year Peak Flow, Qex	0.00	l/s

Existing Peak Discharge Rate to Storm Sewer on Elm Drive West

Runoff Coefficient, C	**0.28**	
Drainage Area	**0.22**	ha
2-Year Peak Flow, Q2	10.16	l/s
5-Year Peak Flow, Q5	13.66	l/s
10-Year Peak Flow, Q10	16.82	l/s
25-Year Peak Flow, Q25	19.32	l/s
50-Year Peak Flow, Q50	21.57	l/s
100-Year Peak Flow, Q100	23.87	l/s

Total Maximum Allowable Release rate from the site = Qex+Q2= 10.16 l/s

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Printed: 07-Nov-15

Address:
Elm Street West Development
City of Mississauga
Size Orifice Plate - Phase III

Allowable Release Rate = 0.0102 m^3/s

CALCULATE DIAMETER KNOWING Q & H	
Q(m^3/s)=	0.0102
Td(m) =	0.80
Approx A=	0.0041
Approx D=	73
A(m^2) =	0.004
D(mm) =	**73**

Control Manhole Orifice Plate

DIA (mm)=	**75**	
AREA m^2	0.004	
COEFF =	**0.62**	
GRAVITY =	9.81	
K =	1.0	
D/S HGL=		m
Orifice Inv.	137.25	m
Spill elev.	138.00	m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	0.037	0.0000	0.0000	137.29
0.110	0.148	0.0040	0.0040	137.40
0.710	**0.748**	**0.0102**	**0.0102**	**138.00**
1.600	1.637	0.0153	0.0153	138.89
1.700	1.738	0.0158	0.0158	138.99
1.800	1.838	0.0163	0.0163	139.09
1.920	1.958	0.0168	0.0168	139.21

ORIFICE FLOW Q(m^3/s)= COEF*AREA*(2*GRAVITY*HEAD/K)^0.5
WEIR FLOW Q(m^3/s)= CLH^1.5 C=1.5

Schaeffers Consulting Engineers
Printed: 07-Nov-15

Storage Volume Calculation - Phase III

Project: Elm Drive West Development (City of Mississauga)

Modified Rational Method

Internal Area	Area (ha) =	0.370
	C =	0.85
	Maximum Release Rate (l/s) =	10.16
External Area	Area (ha) =	0.000
	C =	0.00
Roof Storage	Release Rate from roof(l/s) =	0.00

100 Year Storm

Design Storm =	City of Mississauga
A =	1450
B =	4.9
C =	0.78

	100 Year					Total	Maximum	Required
Time	Intensity	Total	Rooftop	External	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Runoff	Runoff	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
15	140.69	123.01	0.00	0.00	123.01	110.71	9.14	101.56
16	135.41	118.39	0.00	0.00	118.39	113.66	9.75	103.90
17	130.56	114.15	0.00	0.00	114.15	116.44	10.36	106.07
18	126.09	110.25	0.00	0.00	110.25	119.07	10.97	108.09
19	121.96	106.63	0.00	0.00	106.63	121.56	11.58	109.98
20	118.12	103.28	0.00	0.00	103.28	123.93	12.19	111.74
25	102.41	89.54	0.00	0.00	89.54	134.31	15.24	119.07
30	90.77	79.37	0.00	0.00	79.37	142.86	18.29	124.57
35	81.77	71.49	0.00	0.00	71.49	150.14	21.34	128.80
40	74.58	65.21	0.00	0.00	65.21	156.49	24.38	132.11
45	68.68	60.05	0.00	0.00	60.05	162.14	27.43	134.70
50	63.75	55.74	0.00	0.00	55.74	167.22	30.48	136.74
55	59.56	52.08	0.00	0.00	52.08	171.85	33.53	138.32
60	55.95	48.92	0.00	0.00	48.92	176.11	36.58	139.53
65	52.81	46.17	0.00	0.00	46.17	180.06	39.62	140.43
70	50.03	43.75	0.00	0.00	43.75	183.73	42.67	141.06
75	47.58	41.60	0.00	0.00	41.60	187.18	45.72	141.46
80	45.38	39.67	0.00	0.00	39.67	190.43	48.77	141.66
85	43.39	37.94	0.00	0.00	37.94	193.50	51.82	141.68
90	41.60	36.37	0.00	0.00	36.37	196.41	54.86	141.54
95	39.97	34.94	0.00	0.00	34.94	199.18	57.91	141.27
100	38.47	33.64	0.00	0.00	33.64	201.83	60.96	140.87

Required Storage (m^3): 141.68

APPENDIX E: ENGINEERING DRAWINGS

PLEASE REFER TO ENGINEERING DRAWINGS IN THE SUBMISSION PACKAGE