April 2019

UD17-094

Functional Servicing and Stormwater Management Report (Phase I)

Project: 1444-1458 Cawthra Road

2530173 Ontario Corporation

Lithos Group Inc.
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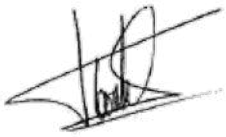

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LITHOS GROUP INC.

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Issues and Revisions Registry

Identification	Date	Description of issued and/or revision
FSR/SWM Report (Phase I)	September 28th, 2018	Issued for Rezoning Application
FSR/SWM Report (Phase I)	April 15th, 2019	Re - Issued for Rezoning Application

Statement of Conditions

This Report / Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner / Client, the City of Mississauga and its affiliates (the "Intended User"). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of Lithos Group Inc. and its Owner. Lithos Group Inc. expressly excludes liability to any party except the intended User for any use of, and/or reliance upon, the work.

Executive Summary

Lithos Group Inc. (Lithos) was retained by 2530173 Ontario Corporation (the "Owner") to prepare a Functional Servicing and Stormwater Management (FSR-SWM) Report (Phase I), in support of a Rezoning Application, for a proposed residential use development to be located at 1444-1458 Cawthra Road, in the City of Mississauga (the "City"). The following summarizes our conclusions:

Storm Drainage

More details for the Stormwater Management (SWM) Section of this report will be prepared at the Site Plan Application stage (Phase II). The site stormwater discharge will be controlled to the 2-year pre-development flow and will be connected to the existing 1050 mm diameter storm sewer on Cawthra Road. In order to achieve the target flows and meet the City's Storm Water Quantity Control requirements, quantity controls will be utilized and up to 131.3 m^3 of storage will be required. The stormwater management (SWM) system will be designed to provide enhanced level (Level 3) protection as specified by the Ministry of Environment, Conservation and Park (MECP). During Site Plan Application, a detailed analysis will be provided to assess the water quality on site and determine additional measures in order to achieve a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

Sixteen (16) separate ownerships will comprise the proposed development, one for each townhouse unit and one for each detached dwelling. In order to provide separate connection for each residential dwelling and townhouse development, an easement will be incorporated during the detailed design stage. The proposed development, will connect to the existing 250 mm sanitary sewer on Cawthra Road, via a 150mm diameter sanitary lateral. The additional net discharge flow from the proposed buildings, is anticipated at approximately 0.62 L/s, which represents less than 1% of the full flow capacity of the existing 250mm diameter sanitary sewer along Cawthra Road, therefore it is considered negligible. Following that fact, the existing infrastructure can support the proposed development.

Water Supply

The proposed development will be comprised by sixteen (16) separate ownerships. Similarly to sanitary connections, each ownership will connect to the proposed water service which will be located within the proposed easement. The proposed water service will connect to the existing 300 mm diameter watermain located on the south side of Cawthra Road. It is anticipated that a total design flow of 83.42 L/s will be required to support the proposed development. The results of the hydrant flow test reveal the existing water infrastructure can support the proposed development.

Site Grading

The proposed grades will improve the existing drainage conditions to meet the City's/Regional requirements. Grades will be maintained along the property line wherever feasible and emergency overland flow will continue draining according to the existing draining pattern.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 Introduction

Lithos Group Inc. (Lithos) was retained by 2530173 Ontario Corporation (the "Owner") to prepare a Functional Servicing and Stormwater Management Report (Phase I), in support of Rezoning Application for a proposed residential development, located at 1444-1458 Cawthra Road in the City of Mississauga (City).

The purpose of this report is to provide site-specific information for the City's review with respect to infrastructure required to support the proposed development. More specifically, the report will present details on sanitary discharge, water supply and an outline of the storm pattern.

We contacted the City's engineering department to obtain existing information in preparation of this report. The following documents were available for our review:

- Plan and profile drawings of Cawthra Road, Drainage and Utilities, drawing No.
    - 8313 – D, dated May 1985;
    - 8315 – D, dated May 1985;
    - 8325 – D, dated May 1985;
    - C – 5966, dated March 1963;
- Site Plan and Statistics prepared by KFA Architects and Planners Inc., dated April 12, 2019; and,
- Topographical Survey prepared by Tom A. Senkus, dated March 30, 2017.

2.0 Site Description

The existing site is approximately 0.536 hectares of residential-use land. It is currently occupied by four (4) detached residential dwellings, outdoor paved parking area and landscaped area, as indicated by the topographic survey in **Appendix B**. The site is bound by Cawthra Road to the north and residential dwellings to the south, east and west. Refer to **Figures 1** and **2** following this report and site photographs in **Appendix A**.

3.0 Site Proposal

The proposed development will include four (4) blocks of two-storey stacked townhouses as well as four (4) two-storey detached residential dwellings and it will be comprised of sixteen (16) ownerships, one for each of the proposed townhouses and single residential dwellings. The proposed development will include approximately a total 3,642 m^2 of Gross Floor Area (GFA). Please refer to **Appendix B** for the proposed site plan and site statistics.

Note that there is approximate portion of 0.03 ha on the north side of the property, which will be conveyed to the City (future extension of Cawthra Road). Therefore, the future private property will be 0.506 ha. Please refer to **Appendix B** for the proposed site plan and site statistics.

4.0 Terms of Reference and Methodology

4.1. Terms of Reference

The Terms of Reference used for the scope of this report were based on:

- City of Mississauga Development Requirements Manual, revised September 2016;
- Region of Peel Watermain Design Criteria, revised June 2010;
- Region of Peel Sanitary Sewer Design Criteria, revised March 2017;
- Ministry of Environment: Guidelines for the Design of Sanitary Sewage Works – 2008;
- Ministry of Environment: Design Guidelines for Drinking Water Systems – 2008;
- Ministry of Environment: Stormwater Management Planning and Design Manual – 2003; and
- Ontario Building Code 2012 (O.B.C.)

4.2. Methodology: Stormwater Drainage and Management

This report provides an overview of the pre and post-development conditions, and comments on opportunities to reduce peak flows. A detailed Stormwater Management (SWM) report will be prepared at the Site Plan Application Stage (Phase II).

The proposed development will be designed to meet the Region's and the standards of the Province of Ontario as set out in the Ministry of Environment and Climate Change (MOECC) 2003 Stormwater Management Planning and Design Manual (SWMPD). The following design criteria will be reviewed:

- Post-development peak flow for the 100-year from the site should be controlled to the two (2)-year target flow according to the Credit Valley Conservation (CVC) Flood Control Criteria of Cooksville Creek;
- A specified rainfall depth of 5 mm is to be retained on-site as required by the City of Mississauga Development Requirements Manual for stormwater runoff volume reduction;
- A safe overland flow will be provided for all flows in excess of the 100-year storm event.

4.3. Methodology: Sanitary Discharge

The sanitary sewage discharge from the site will be determined using sanitary sewer design sheets that incorporate the land use and building statistics as supplied by the design team. The calculated values provide peak sanitary flow discharge that considers infiltration.

The estimated sanitary discharge flows from the proposed site will be calculated based on the criteria shown in **Table 4.1.**

Table 4.1 – Sanitary Flows

Usage	Design Flow	Units	Population Equivalent
Residential	302.8	Litres / capita / day	Single & Semi-detached dwellings = 4.15 ppu Townhouses = 3.5 ppu

Based on the calculated peak flows, the adequacy of the existing infrastructure to support the proposed development will be discussed.

4.4. Methodology: Water Usage

The domestic water usage was calculated based on the City's design criteria outlined in **Table 4.2**.

Table 4.2 – Water Usage

Usage	Water Demand	Units
Typical Residential Water Demand	280	Litres / capita / day

Pressure and flow testing has been conducted on the existing hydrants located near the site along Cawthra Road to obtain existing flows, residual and static pressure.

5.0 Stormwater Management and Drainage

5.1. Existing Conditions

The property is currently occupied by four (4) detached residential dwellings, outdoor paved parking area and landscaped area. According to available records, there is an existing 1050 mm diameter storm sewer along Cawthra Road running south-east. In addition, according to our review along the property limits of the existing site, there is no external storm flow from the adjacent lands draining towards our site under pre-development conditions.

There are two (2) internal drainage areas in the existing site:

1. A1 Pre – Uncontrolled storm runoff from the south portion of the site, draining towards the rear yards, south-west of the existing dwellings;

2. A2 Pre – Uncontrolled storm runoff from the east portion of the site, which comprises mainly by runoff from the outdoor parking area and buildings' rooftops, discharged into the City's storm network along Cawthra Road.

Table 5.1 shows the input parameters which are illustrated on the pre-development drainage area plan in **Figure DAP-1** in **Appendix C**.

Table 5.1 – Target Input Parameters

Catchment	Drainage Area (ha)	C	Tc (min.)
A1 Pre	0.370	0.34	15
A2 Pre	0.136	0.59	15

Peak flows calculated for the existing conditions are shown in **Table 5.2** below. Detailed calculations are in **Appendix C**.

Table 5.2 – Target Peak Flows

Catchment	Peak Flow Rational Method (L/s)			
	2-year	5-year	10-year	100-year
A1 Pre	20.9	28.1	34.7	49.2
A2 pre	13.3	17.9	22.1	31.3

As shown in **Table 5.2**, the post-development flows will need to be controlled to the target flow of 20.9 L/s and 13.3 L/s for the areas draining towards the east portion of the site and Cawthra Road, respectively.

5.2. Stormwater Management

In order to meet the City's Storm Design requirements, the development flow rate is to be controlled to the two (2)-year target flow established in **Section 5.1**.

The site has been separated into two (2) internal drainage areas:

1. A1 Post – Uncontrolled storm runoff from the north portion of the site, flowing towards Cawthra Road.
2. A2 Post – Storm runoff from the rooftops, the driveway area and the landscape areas, retained on-site, and eventually discharged into the existing 1050 mm diameter storm sewer along Cawthra Road.

The post-development drainage areas and runoff coefficients are indicated on **Figure DAP-2**, located in **Appendix C** and summarized in **Table 5.3** below.

Table 5.3 – Post-development Input Parameters

Drainage Area	Drainage Area (ha)	Runoff Coefficient for 2,5,10-Year Return Period "c"	Runoff Coefficient for 100-Year Return Period "c"	Tc (min.)
A1 Post	0.501	0.58	0.73	15
A2 Post	0.005	0.25	0.31	15

As per City's stormwater management guidelines, in order to account for increase in storm runoff due to saturation of the catchment surface, an adjustment factor of 1.25 will be used for the 100-year storm.

5.2.1. Stormwater Runoff Volume Reduction

As required by the City's guidelines, a rainfall depth of 5 mm must be retained over the entire parcel area. A 5 mm rainfall over the entire site equates to a required water balance volume of 25.3 m^3. In order to achieve this, the following low impact development (LID) techniques may be implemented.

- Soakway pit to infiltrate roof runoff;
- Permeable materials/Infiltration galleries/trenches to infiltrate surface runoff;
- Reuse for irrigation purposes;
- Rainwater barrels and/or tank;

Detailed calculations will be provided during the detailed design stage of Site Plan Application (Phase II).

5.2.2. Quantity Controls

As mentioned on **Section 5.1**, storm runoff from the south portion of the existing property is draining towards the south-west corner of the site while the north portion is draining towards Cawthra Road. Therefore, a quantity control analysis has been prepared for each drainage area adjacent to the site in order to assess the pre to post development impacts on each area.

5.2.2.1 Post Development Flows – South Portion of the Site

Using the City's intensity-duration-frequency (IDF) data, modified rational method calculations were undertaken to determine the maximum storage required during each storm event. Results for the 2, 5, 10 and 100-year storm events are provided in **Table 5.4** below. The detailed post-development quantity control calculations are provided in **Appendix C**.

Table 5.4 – Post-development Quantity Control as per City Requirements (South Portion of the Site)

Drainage Areas	Storm Event	Target Flow (L/s)	Required Storage Tank Volume (m^3)
A1 Post (Controlled)	2-year	20.9	24.8
	5-year		40.4
	10-year		56.0
	100-year		131.3

According to the City's Guidelines and Credit Valley Conservation (CVC) Watershed Boundaries the proposed development is located within Cawthra Creek Subwatershed, therefore the 100-year post runoff will be controlled to the 2-year pre-development condition. Watershed Boundaries can be found in **Appendix B**.

As shown in **Table 5.4**, in order to control post-development flows to 2-year pre-development conditions, a target flow of 20.9 L/s is to be satisfied. The minimum required on-site storage is 131.3 m^2. This can be achieved through the design and installation of stormwater holding tanks, flow control devices and/or parking ponding, underground chambers and infiltration trenches. Details will be provided through the detailed design stage of Site Plan Application (Phase II).

5.2.2.2 Post Development Flows – North Portion of the Site

Using the City's intensity-duration-frequency (IDF) data, modified rational method calculations were undertaken to determine the maximum storage required during each storm event. Results for the 2, 5, 10 and 100-year storm events are provided in **Table 5.5** below. The detailed post-development quantity control calculations are provided in **Appendix C**.

Table 5.5 – Post-development Quantity Control as per City Requirements (North Portion of the Site)

Drainage Areas	Storm Event	Target Flow (L/s)	Post-Development Uncontrolled Flow (L/s)
A1 Post (Controlled)	2-year	13.3	0.2
	5-year		0.3
	10-year		0.3
	100-year		0.6

As shown on **Table 5.5**, under post-development conditions, uncontrolled flow towards Cawthra Road during a 100-year storm event is smaller than the two (2)-year pre-development target flow, therefore, no stormwater storage is required.

5.2.3. Quality Controls

Stormwater treatment must meet Enhanced Protection criteria as defined by the MOE 2003 SWMPD Manual, including a minimum 80% of total suspended solids removal (TSS). Water quality control can be provided by the rooftop/terraces and by an oil-grit separator (OGS) that will be required for the driveway area which will be exposed to oil and grit.

More details regarding sizing of the OGS and the total quality control achieved for the total site, will be provided through the detailed design stage of Site Plan Application (Phase II).

5.3. Proposed Storm Connection

The storm sewer system will be designed to meet the City's Storm requirements and discharge into the existing 1050 mm diameter storm sewer on Cawthra Road via a 200 mm diameter storm sewer service connection with a minimum grade of 2.00% (or equivalent design). The post-development 100-year storm will be designed to match the two (2)-year pre-development storm. Therefore, this development will not adversely affect flow conditions downstream and the existing infrastructure on Cawthra Road will be adequate to service this development. Refer to engineering drawing "**SS-01**" (submitted separately) indicating the stormwater service connection.

6.0 Sanitary Drainage System

6.1. Existing Sanitary Drainage System

The existing site is currently occupied by four (4) residential dwellings, outdoor paved parking area and landscaped area. According to available records there is an existing 250mm diameter sanitary sewer fronting the property along Cawthra Road running south-east.

6.2. Existing and Proposed Sanitary Flows

The sanitary flow generated by the proposed residential use development at 1444-1458 Cawthra Road was compared to the existing flow in order to quantify the net increase in the sanitary sewer.

Using the design criteria outlined in **Section 4.3** and existing site information, the sanitary discharge flow from the existing residential dwellings is estimated at 0.36 L/s. Detailed calculations can be found in **Appendix D**.

Similarly, using the design criteria and the proposed development statistics, the new development will discharge 0.98 L/s into the City's infrastructure.

The additional flow will be considered within the sanitary discharge rate, therefore, there is an increase in sanitary flow of approximately 0.62 L/s, which represents less than 1% of the full flow capacity of the existing 250mm diameter sanitary sewer along Cawthra Road, therefore it is considered negligible. Following that fact, the existing infrastructure can support the proposed development.

6.3. Proposed Sanitary Connection

Sixteen (16) separate ownerships will comprise the proposed development, one for each townhouse unit and one for each detached residential dwelling. In order to provide separate connection for each residential dwelling and townhouse development, an easement will be incorporated during the detailed design stage. Each ownership will connect into a proposed 150mm diameter sanitary sewer within the easement, which will discharge into the existing 250mm diameter sanitary sewer on the south side of Cawthra Road, at a minimum grade of 2.00% (or equivalent pipe design). Refer to engineering drawing "**SS-01**" (submitted separately) for details.

7.0 Water Supply System

7.1. Existing System

The existing watermain system consists of a 300 mm diameter watermain on the south side of Cawthra Road. Hydrant flow tests were carried out by Cole Engineering on April 11, 2018 along Cawthra Road Trail, to determine the flow and pressure in the existing water.

The results of the test indicate the existing static pressure is 441 KPa (64 psi) and 123.0 L/sec (1950 USPGM) of water is available with a residual pressure of 400 KPa (58 psi). The full detailed report is included in **Appendix E**.

7.2. Proposed Water Supply Requirements

The estimated water consumption was calculated based on the occupancy rates shown on **Table 4.2**, based on the Region's Watermain Design Criteria, revised June 2010. It is anticipated that an average consumption of approximately 0.14 L/s (12,096 L/day), a maximum daily consumption of 0.29 L/s (25,056 L/day) and a peak hourly demand of 0.43 L/s (1,548 L/hr) will be required to service this development with domestic water. Detailed calculations can be found in **Appendix E**.

The fire flow requirements were estimated using the method prescribed by the Fire Underwriters Survey (FUS) be undertaken to assess the minimum requirement for fire suppression. The fire flow calculation is normally conducted for the largest storey, by area, and for the two immediately adjacent storeys. For this development, we have selected the worst-case scenario for townhouse fire separation of 600m^2/townhouse unit, according to the OBC requirements which translates to an equal separation of 200m^2/floor for the three storey townhouse units. **Table 7.1** below illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 83.13 L/s (1,317 USGPM) will be required. Refer to detailed calculations found in **Appendix E**.

Table 7.1 – Fire Flow Input Parameters

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				North	West	South	East
Value according to FUS options	Ordinary Construction	Non-Combustible	No	10.1m-20m	0.0m-3.0m	20.0m-3.0m	20.1m-30m
Surcharge/reduction from base flow	1.0	25%	0%	15%	25%	25%	10%

In summary, the required design flow is the sum of 'the minimum fire suppression flow' and 'maximum daily demand' (83.13+0.29 = 83.42 L/s, 1,322 USGPM).

The results of the hydrant flow test carried out by Cole Engineering on April 11, 2018 along Cawthra Road, indicate that 361.51 L/s (5750 USGPM) of water is available with a pressure of 138KPa (20.0 psi) revealing that the existing water infrastructure will support the proposed development. The hydrant flow tests can be found in **Appendix E**.

7.3. Proposed Watermain Connection

Sixteen (16) separate ownerships will comprise the proposed development, one for each townhouse unit and one for each detached residential dwelling. Similarly to sanitary connections, each ownership will connect to the proposed municipal water service which will be located within a proposed easement (to be provided during detailed design stage).

The proposed municipal water service will connect to the existing 300 mm diameter watermain located on the south side of Cawthra Road. Proposed townhouse developments residential dwellings will be serviced by 25mm diameter domestic services. For details, refer to engineering drawing "**SS-01**" (submitted separately).

8.0 Site Grading

8.1. Existing Grades

The existing property is currently occupied by four (4) residential dwellings, outdoor paved parking area and landscaped area. The existing site drains uncontrolled partially towards Cawthra Road and partially towards the rear yards, south-west of the existing dwellings.

8.2. Proposed Grades

The proposed grades will improve the existing drainage patterns wherever feasible. Grades will be maintained along the property line to the extent possible.

Stormwater consisting of the Cawthra Road access driveway, rooftops and the adjacent landscape area will be directed towards the underground storm tank and then discharged into the City's network. Overland flow for the proposed development will be maintained as is, however stormwater drainage conditions will be improved, due to the stormwater quantity controls described in **Section 5.2.2.**

9.0 Conclusions and Recommendations

Based on our investigations, we conclude the following:

Storm Drainage

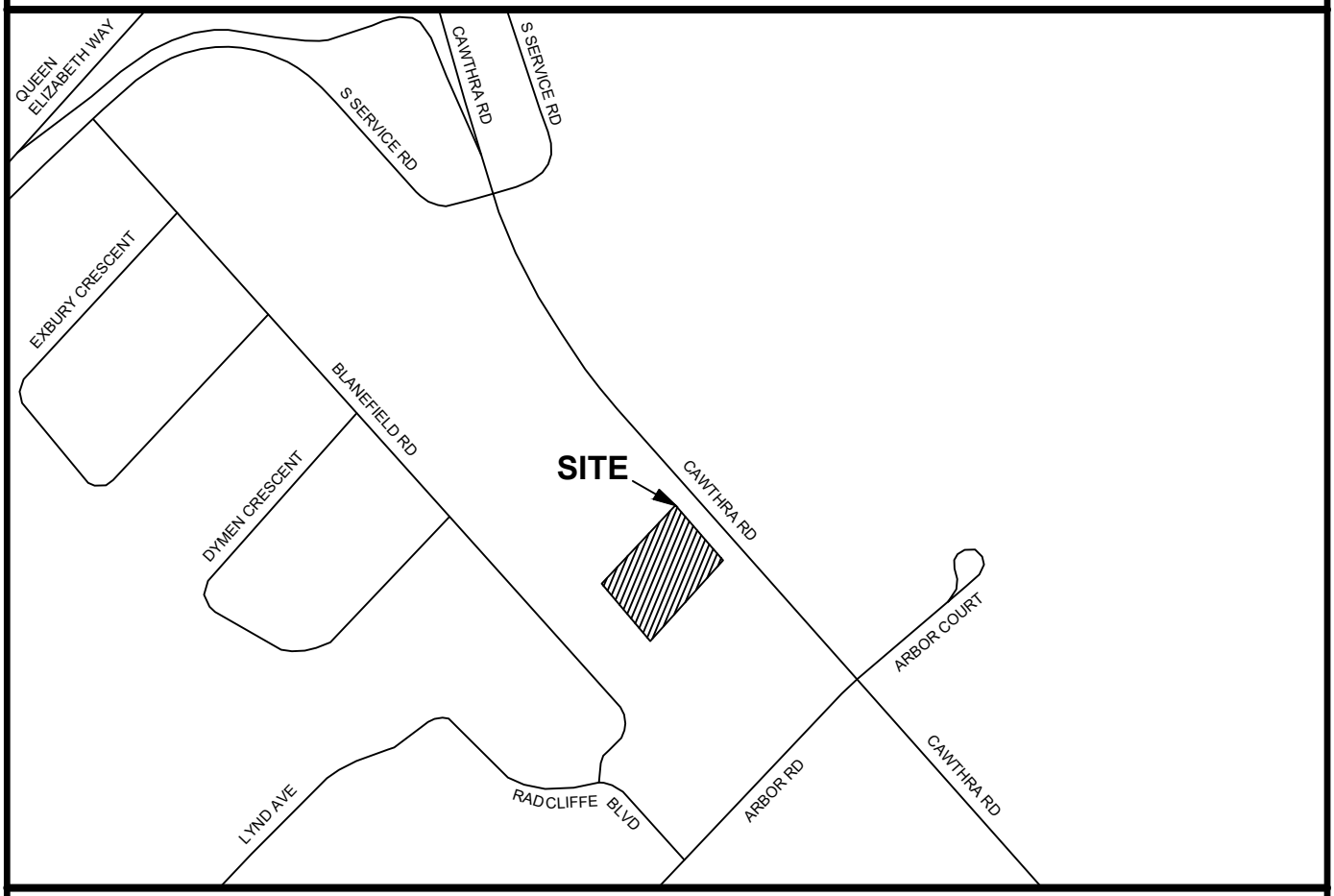
More details for the Stormwater Management (SWM) Section of this report will be prepared at the Site Plan Application stage (Phase II). The site stormwater discharge will be controlled to the 2-year pre-development flow and will be connected to the existing 1050 mm diameter storm sewer on Cawthra Road. In order to achieve the target flows and meet the City's Storm Water Quantity Control requirements, quantity controls will be utilized and up to 131.3 m^3 of storage will be required. The stormwater management (SWM) system will be designed to provide enhanced level (Level 3) protection as specified by the Ministry of Environment, Conservation and Park (MECP). During Site Plan Application, a detailed analysis will be provided to assess the water quality on site and determine additional measures in order to achieve a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

Sixteen (16) separate ownerships will comprise the proposed development, one for each townhouse unit and one for each detached dwelling. In order to provide separate connection for each residential dwelling and townhouse development, an easement will be incorporated during the detailed design stage. The proposed development, will connect to the existing 250 mm sanitary sewer on Cawthra Road, via a 150mm diameter sanitary lateral. The additional net discharge flow from the proposed buildings, is anticipated at approximately 0.62 L/s, which represents less than 1% of the full flow capacity of the existing 250mm diameter sanitary sewer along Cawthra Road, therefore it is considered negligible. Following that fact, the existing infrastructure can support the proposed development.

Water Supply

The proposed development will be comprised by sixteen (16) separate ownerships. Similarly to sanitary connections, each ownership will connect to the proposed water service which will be located within the proposed easement. The proposed water service will connect to the existing 300 mm diameter watermain located on the south side of Cawthra Road. It is anticipated that a total design flow of 83.42 L/s will be required to support the proposed development. The results of the hydrant flow test reveal the existing water infrastructure can support the proposed development.



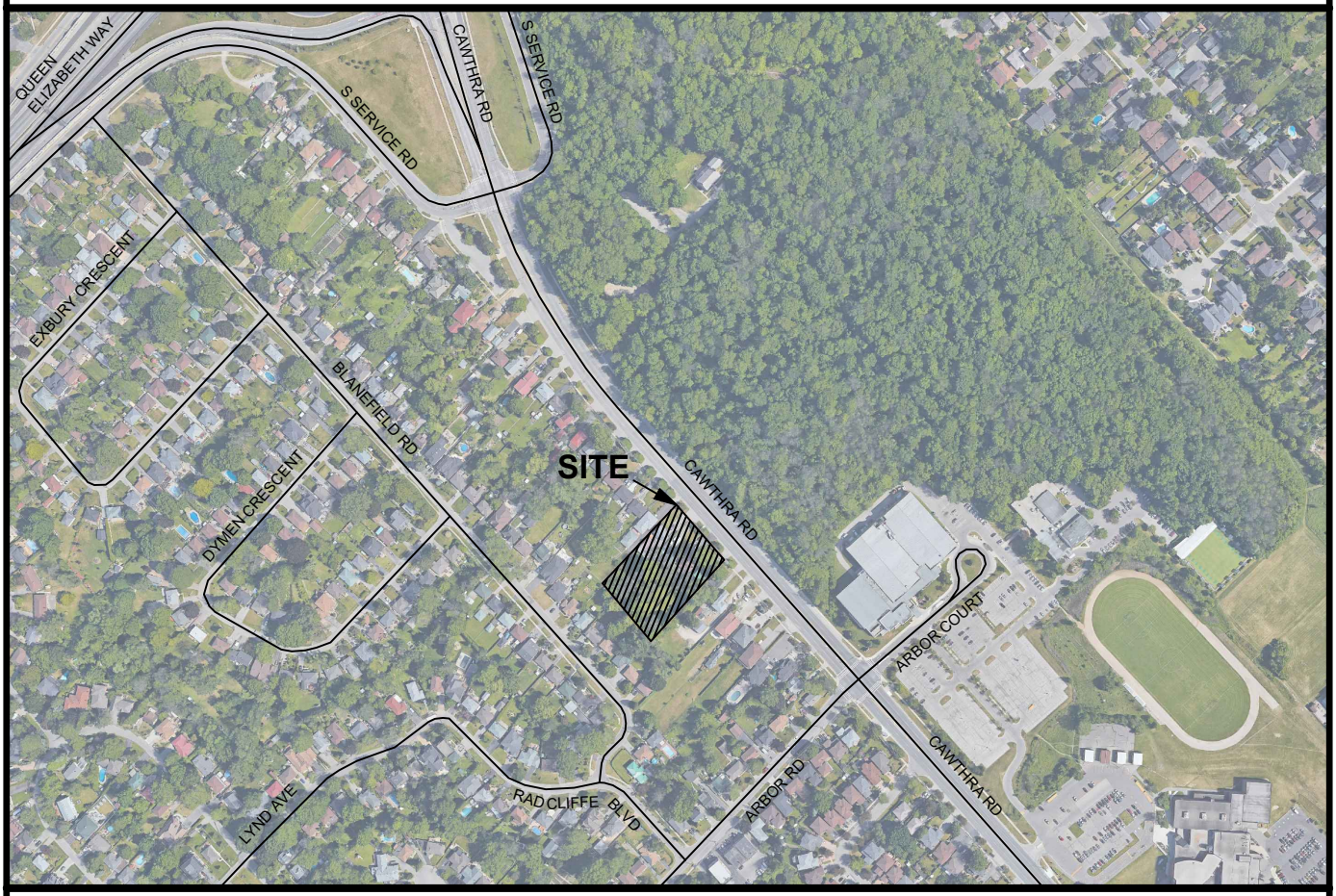
Lithos

150 Bermonsdey Road, North York, Ontario M4A 1Y1

LOCATION PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE:	APRIL 2019	PROJECT No:	UD17-094
SCALE:	N.T.S.	FIGURE No:	FIG 1



Lithos

150 Bermonsdey Road, North York, Ontario M4A 1Y1

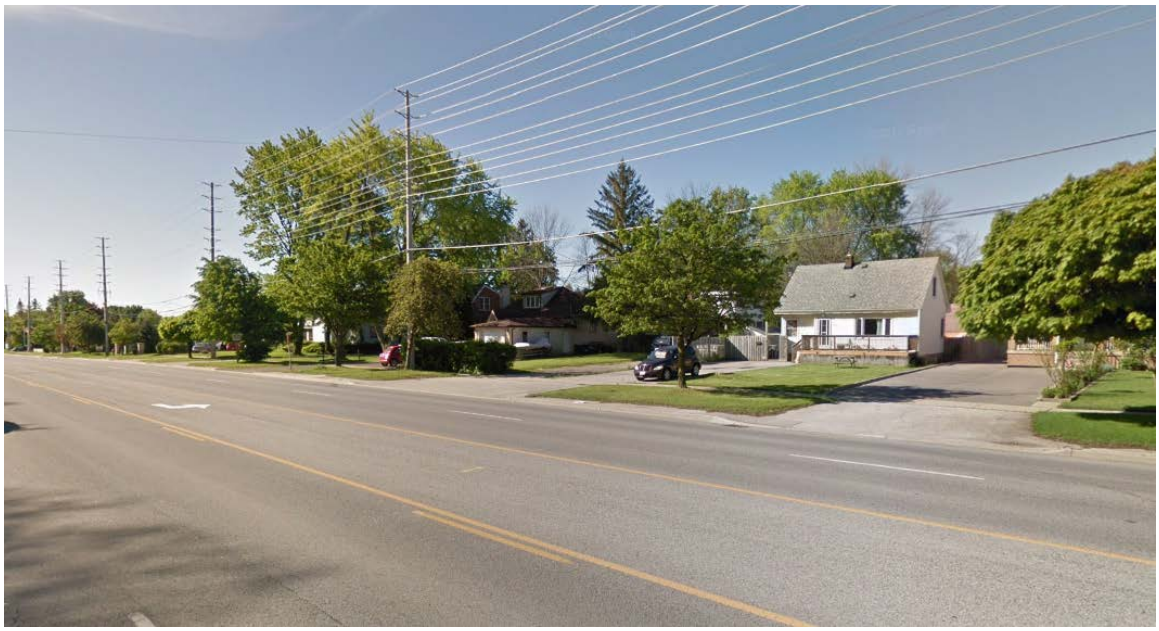
AERIAL PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE:	APRIL 2019	PROJECT No:	UD17-094
SCALE:	N.T.S.	FIGURE No:	FIG 2

APPENDIX A
Site Photographs

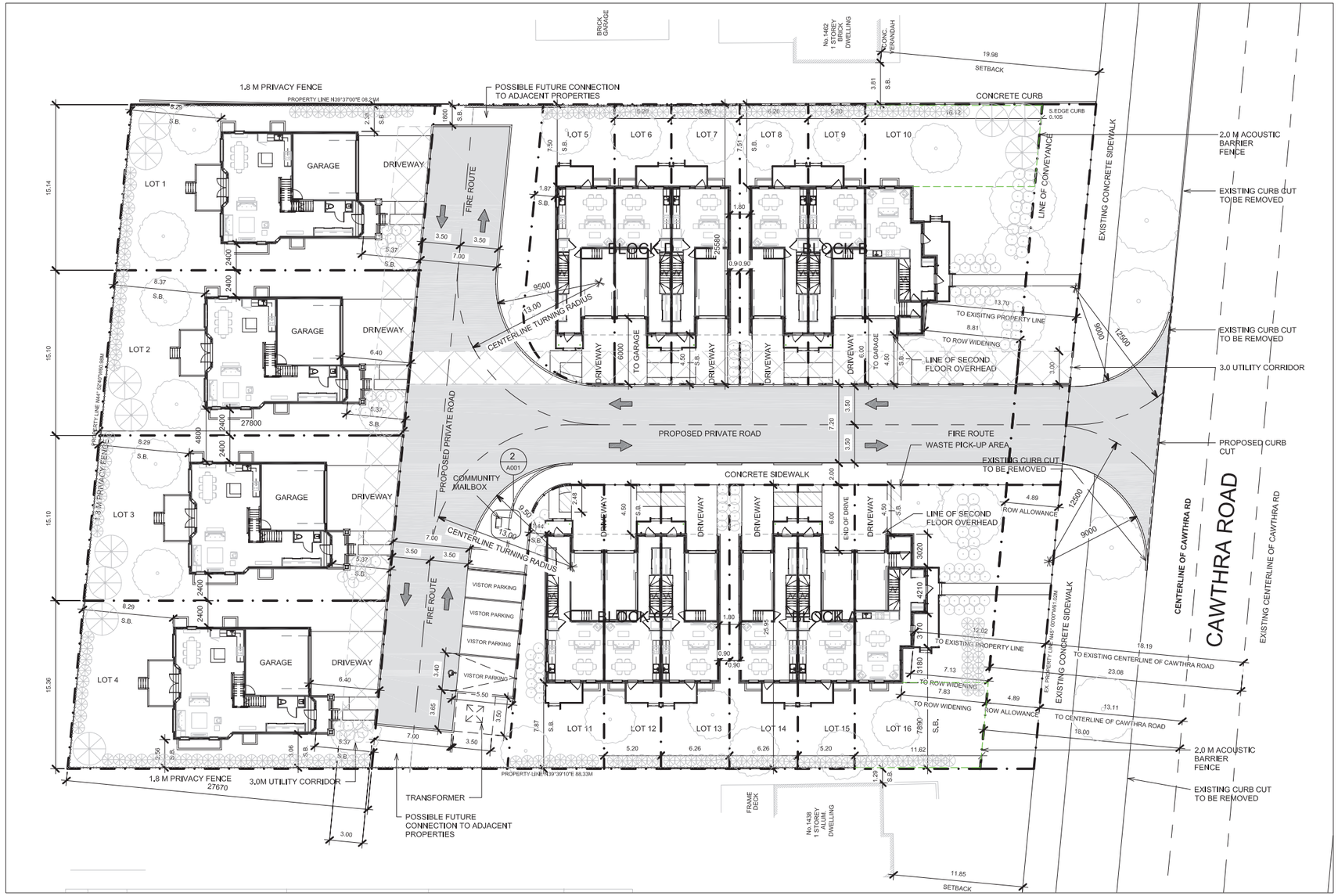
South-east Corner of property along Cawthra Road facing north



North-east Corner of property along Cawthra Road facing south

APPENDIX B
Background Information

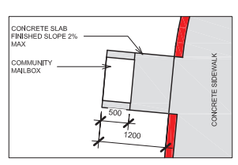
Area Schedule (Gross Building) By...		
RVT Link: Name	Name	Area
Block A	Garage	23 m²
Block A	Type 2	197 m²
Block A	Garage	19 m²
Block A	Type 1	200 m²
Block A	Garage	20 m²
Block A	Type 1	204 m²
Block A: 15		663 m²
Block B	Garage	23 m²
Block B	Type 2	197 m²
Block B	Garage	19 m²
Block B	Type 1	200 m²
Block B	Garage	20 m²
Block B	Type 1	204 m²
Block B: 15		663 m²
Block C	Garage	20 m²
Block C	Type 1	205 m²
Block C	Garage	20 m²
Block C	Type 1	200 m²
Block C	Garage	21 m²
Block C	Type 1	205 m²
Block C: 15		671 m²
Block D	Garage	20 m²
Block D	Type 1	205 m²
Block D	Garage	20 m²
Block D	Type 1	200 m²
Block D	Garage	21 m²
Block D	Type 1	205 m²
Block D: 15		671 m²
Detached 1	Basement	89 m²
Detached 1	Level 1	88 m²
Detached 1	Level 2	126 m²
Detached 1	Garage	38 m²
Detached 1: 4		341 m²
Detached 2	Basement	89 m²
Detached 2	Level 1	88 m²
Detached 2	Level 2	126 m²
Detached 2	Garage	38 m²
Detached 2: 4		341 m²
Detached 3	Basement	89 m²
Detached 3	Level 1	88 m²
Detached 3	Level 2	126 m²
Detached 3	Garage	38 m²
Detached 3: 4		341 m²
Detached 4	Basement	89 m²
Detached 4	Level 1	88 m²
Detached 4	Level 2	126 m²
Detached 4	Garage	38 m²
Detached 4: 4		341 m²
Area Schedule Total		
		4032 m²

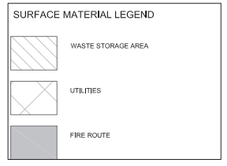


NOTES:

1. THIS SITE HAS BEEN PREPARED IN ACCORDANCE WITH THE CITY OF MISSISSAUGA ZONING BYLAW NO.
2. FOR STORM WATER MANAGEMENT, SITE SERVICING AND GRADING INFORMATION REFER TO DRAWINGS PREPARED BY LITHOS GROUP INC. 150 BERMONDSEY ROAD UNIT #200 TORONTO ON, M4A 1Y1
3. FOR LANDSCAPE INFORMATION, REFER TO DRAWINGS PREPARED BY JOHN RUSSO LANDSCAPE ARCHITECT
4. SURVEY CREDIT
   INFORMATION TAKEN FROM PLAN OF PART OF LOTS 188, 189, 190,& 191 REGISTERED PLAN B-19, CITY OF MISSISAUGA
   PREPARED BY: TOM A. SENKUS ONTARIO LAND SURVEYOR, 40 BURROWS AVENUE TORONTO (ISLINGTON), ON M9B 4W7
5. ANY GRADE ELEVATIONS ARE SHOWN FOR REFERENCE ONLY, REFER TO GRADING AND SITE SERVICING PLAN FOR GRADING AND I/G SERVICES
6. ALL SITE AREA LIGHTING TO BE DIRECTED DOWNWARD AND DEFECTED AWAY FROM ADJACENT LOTS ROADS AND STREETS
7. ALL CURBING AND DRIVEWAY ENTRANCES TO BE DESIGNED IN ACCORDANCE WITH THE CITY 'S MATERIALS STANDARDS AND SPECIFICATIONS MANUAL
8. GUARD RAILS IN ACCORDANCE TO THE OBC 2012 SHALL BE PROVIDED WHENEVER GRADE DEFERENCE EXCEEDS 600MM DETAILS TO BE SUBMITTED AND BUILDING PERMIT STAGE.
9. BOULEVARD TO BE REINSTATED IN ACCORDANCE WITH CITYSTANDARDS AND TO THE SATISFACTION OF THE CHEIF ENGINEER, EXECUTIVE DIRECTOR OF ENGINEERING AND CONSTRUCTION SERVICES
10. EXISTING WATER SERVICE TO BE DISCONNECTED BY THE CITY OF MISSISAUGA
11. SNOW WILL BE REMOVED OFF SITE

SITE SERVICES DISCLAIMER
BE ADVISED THAT SHOULD ANY PARTY INCLUDING THE APPLICANT OR ANY SUBSEQUENT OWNER, APPLY FOR MORE THAN ONE CONDOMINIUM CORPORATION ENCOMPASSING ANY OR ALL OF THIS DEVELOPMENT OR MAKE AN APPLICATION THAT RESULTS IN A LAND DIVISION, STAFF MAY REQUIRE LEGAL ASSURANCES, INCLUDING BUT NOT LIMITED TO EASEMENTS WITH RESPECT TO THE APPROVED SERVICES, SUCH ASSURANCES WILL BE DETERMINED AT THE TIME OF THE APPLICATION FOR CONDOMINIUM APPROVAL.





2 Community Mailbox Plan
1 : 50

1444 - 1458

1444-1458 CAWTHRA ROAD
MISSISSAUGA, ON

1	Issue to Consultants	2018.09.12
2	Issue for OP/RZ	

Project North

KFA architects + planners inc.

Project No:	16071
Scale:	As Indicated
Date:	2017/04/05
Drawn by:	R.V.W.

Drawing Title

Site Plan

Drawing Number

A001

SURVEYOR'S REAL PROPERTY REPORT AND TOPOGRAPHIC DETAIL
PART 1) PLAN OF SURVEY OF
PART OF LOTS 188, 189, 190 AND 191
REGISTERED PLAN B-19
CITY OF MISSISSAUGA
REGIONAL MUNICIPLAITY OF PEEL

SCALE 1:250

5m 0m 5m 10m 15m

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

PART 2) PLAN REPORT

EASEMENTS AND/OR RIGHT-OF-WAYS
NO REGISTERED EASEMENTS

MONUMENTATION
CORNERS MARKED/WITNESSED BY SURVEY MONUMENTERE SHOWN ON PLAN.

REMARKS
NOTE POSITION OF FENCES AS SHOWN ON PLAN.

BOUNDARIES
DISTANCES AS MEASURED ARE IN GENERAL AGREEMENT WITH DIMENSIONS SHOWN ON REGISTERED PLAN.

COMPLIANCE WITH ZONING BY-LAWS
NO INVESTIGATION WAS MADE REGARDING MUNICIPAL ZONING BY-LAWS FOR SETBACK REQUIREMENTS.

THIS REPORT WAS PREPARED FOR:
ATKINSON LAW
AND THE UNDERSIGNED ACCEPTS NO RESPONSIBILITY FOR USE BY OTHER PARTIES.

THIS REPORT REFLECTS CONDITIONS OF TIME OF SURVEY. UPDATING MAY BE REQUIRED TO ISSUE ADDITIONAL COPIES SUBSEQUENT TO DATE OF SURVEYOR'S CERTIFICATE.

NOTES AND LEGEND

□	DENOTES SURVEY MONUMENT PLANTED
■	DENOTES SURVEY MONUMENT FOUND
SIB	DENOTES STANDARD IRON BAR
IB	DENOTES IRON BAR
WIT	DENOTES WITNESS
OU	DENOTES ORIGIN UNKNOWN
RSC	DENOTES R.S. CODE, O.L.S. (MAY 21, 1948)
BC	DENOTES BROWNE, CAVELL, O.L.S. (NOV. 27, 1953)
PK	DENOTES PAUL KIDD, O.L.S. (OCT. 20, 1999)
SVN	DENOTES SPEIGHT & VAN NOSTRAND , O.L.S. (JAN. 29, 1987)
JW	DENOTES JAMES & WANDABENSE, O.L.S. (NOV. 28, 1958)
Plan	DENOTES REGISTERED PLAN B-19
PL	DENOTES REGISTERED PLAN 460
℄	DENOTES CENTRE LINE
DIA	DENOTES DIAMETER
CB	DENOTES CATCH BASIN
TCZ	DENOTES TOM CZERWINSKI, O.L.S. (NOV. 3, 1987)
TM	DENOTES TARASICK, McMILLAN, O.L.S. (NOV. 4, 1996)
B50	DENOTES CUNNINGHAM, McCONNELL, O.L.S.
D	DENOTES INST. No. VB13504
IT	DENOTES IRON TUBE
CBLK	DENOTES CONCRETE BLOCK
FDN	DENOTES FOUNDATION
Fd	DENOTES FOUND

BEARING NOTE
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE SOUTH WESTERLY LIMIT OF CAWTHRA ROAD AS SHOWN ON REGISTERED PLAN B-19 HAVING A BEARING OF N45°00'00"W.

ELEVATION NOTE
ELEVATIONS ARE REFERRED TO CITY OF MISSISSAUGA BENCHMARK No. 75 ELEVATION 98.306 METRES . (NON GEODETIC)

AREA=5360.50 Sq.m.
0.536 Ha
1.325 Ac

SURVEYOR'S CERTIFICATE
I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM
2. THE SURVEY WAS COMPLETED ON THE 28th DAY OF MARCH, 2017

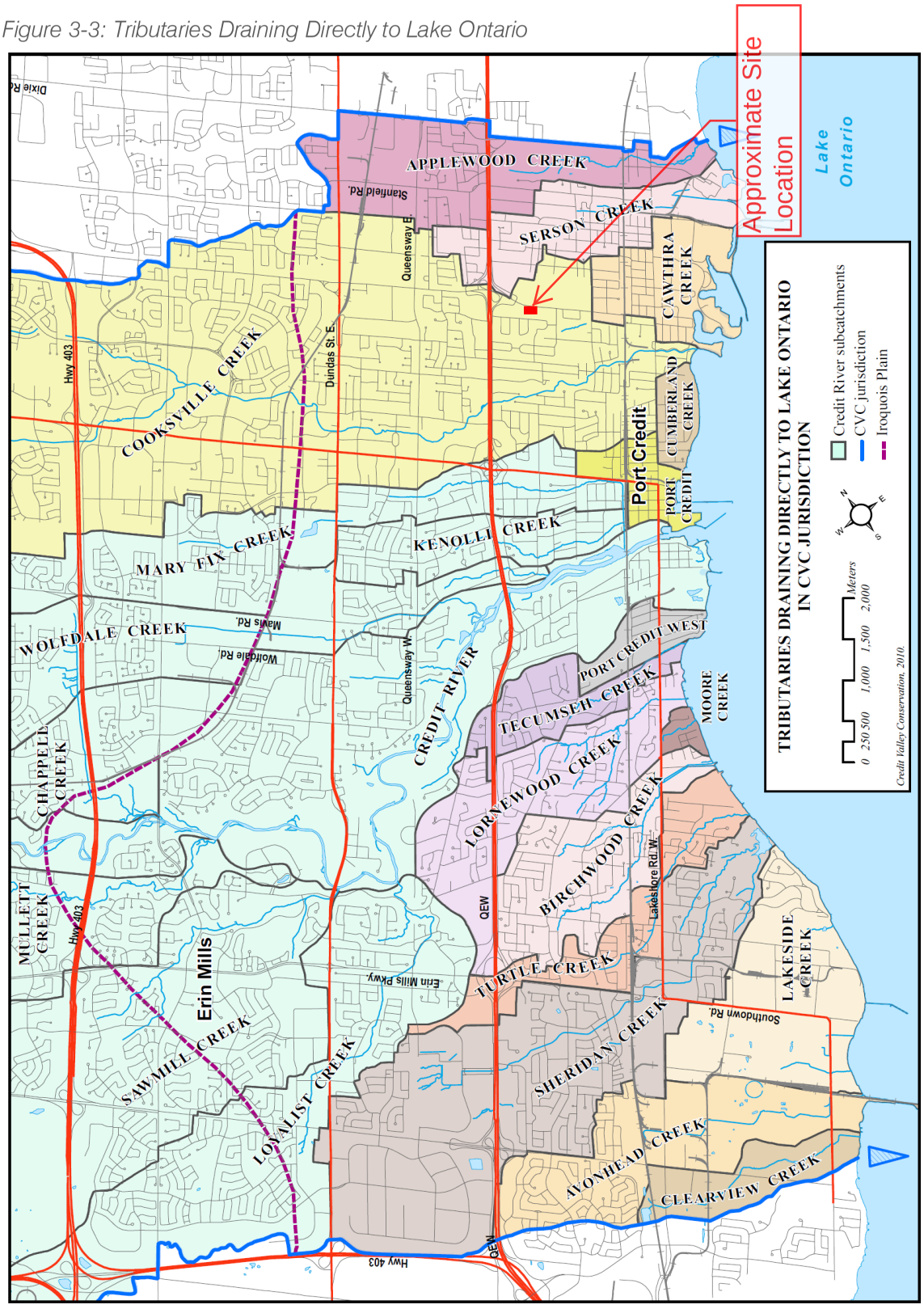
DATE: MARCH 30, 2017

T. A. SENKUS
ONTARIO LAND SURVEYOR

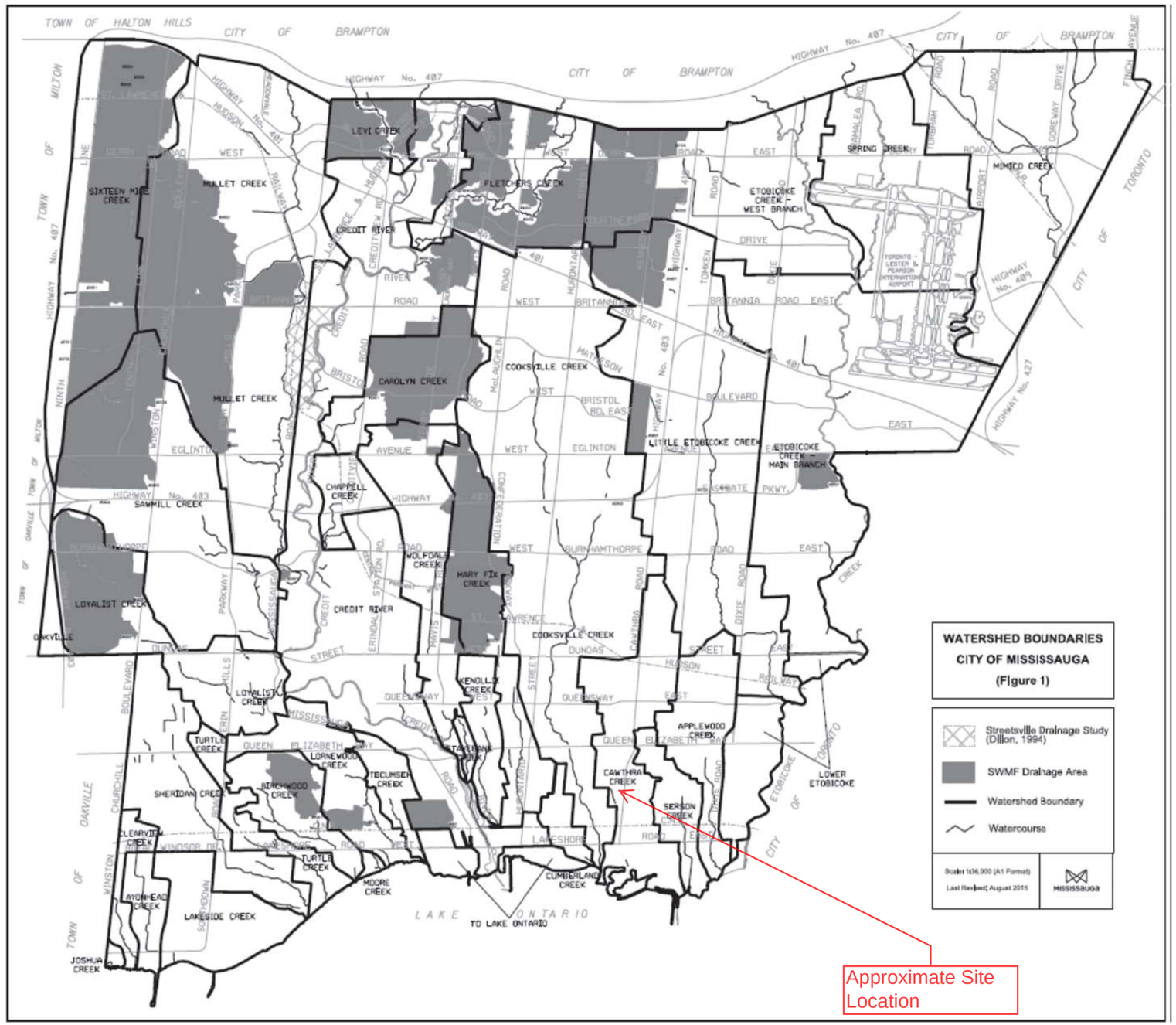
TOM A. SENKUS
ONTARIO LAND SURVEYOR
40 BURROWS AVENUE
TORONTO (ISLINGTON), ONTARIO
M9B 4W7
PHONE: (416) 237-1893
E-MAIL: tomsenkus@rogers.com
maposd@rogers.com

FILE: 02-77A
CAD FILE: CAWTHRA-SRPR-TOPO

Figure 3-3: Tributaries Draining Directly to Lake Ontario



A-1 - Watershed Boundaries



LIMIT OF CONTRACT
STA 10+610

10+600

10+700

10+800

ATWATER AVENUE

300 GATE VALVE IN CHAMBER STD I-3-3
STA.10+753.6

TWO 45° BENDS
STA.10+748.8
STA.10+751.2

300mm X 300mm TEE (MJ) AND PLUG. STA. 10+728.6

1244
25mm STEEL

1240
20mm COPPER

MATCH LINE - STA 0+970 - SEE DWG. 8317-D

EX. WM. O.D. 6.95"

TWO 45° BENDS

150mm GATE VALVE M.J & BOX

TWO 300mm X 150 mm TEES M.J.
WEST STA. 10+769.7
EAST STA. 10+773.9

300mm DIA. WATERMAIN
D.I. CL 52 TYTON JOINT
OR P.V.C. CL 150

1274
12mm C

1280
12mm C

45° BEND STA. 10+794.7
45° BEND STA. 10+796.8

EXIST. 150mm DIA. C.I. WM. L.J. (TO BE ABANDONED)

150 mm DIA. WATERMAIN
D.I. CL52 TYTON JOINT
OR P.V.C. CL 150

EXISTING 400mm DIA. C.I. WM. L.J. (TO BE ABANDONED)

REMOVE VALVE BOX

REMOVE AND SALVAGE WATER VALVES

REMOVE VALVE BOX

HORIZONTAL DEFLECTION

150mm GATE VALVE M.J. & BOX

TWO 45° BENDS

FOR TESTING, CONNECT TO EXISTING MAIN

MATCH LINE - STA 10+900 - SEE DWG. 8314-D

STM M.H.O No.2

EX. WM. O.D. 17.40"

90° BEND STA.10+728.3
300mmX400mm REDUCER
300mm X 150mm TEE 7.74m LT ℄ CAWTHRA RD.
150mm GATE VALVE M.J. & BOX STA.10+727.9
45°BEND STA.10+725.8
45°BEND STA.10+724.6

EX. STM. M.H.

REMOVE TO 1.5m BELOW FUTURE TOP OF PAVEMENT

P/L

NORTH

CAWTHRA ROAD

DISCLAIMER

These records are based upon available and unverified information and may prove inaccurate.
The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.

SERVICE DATA

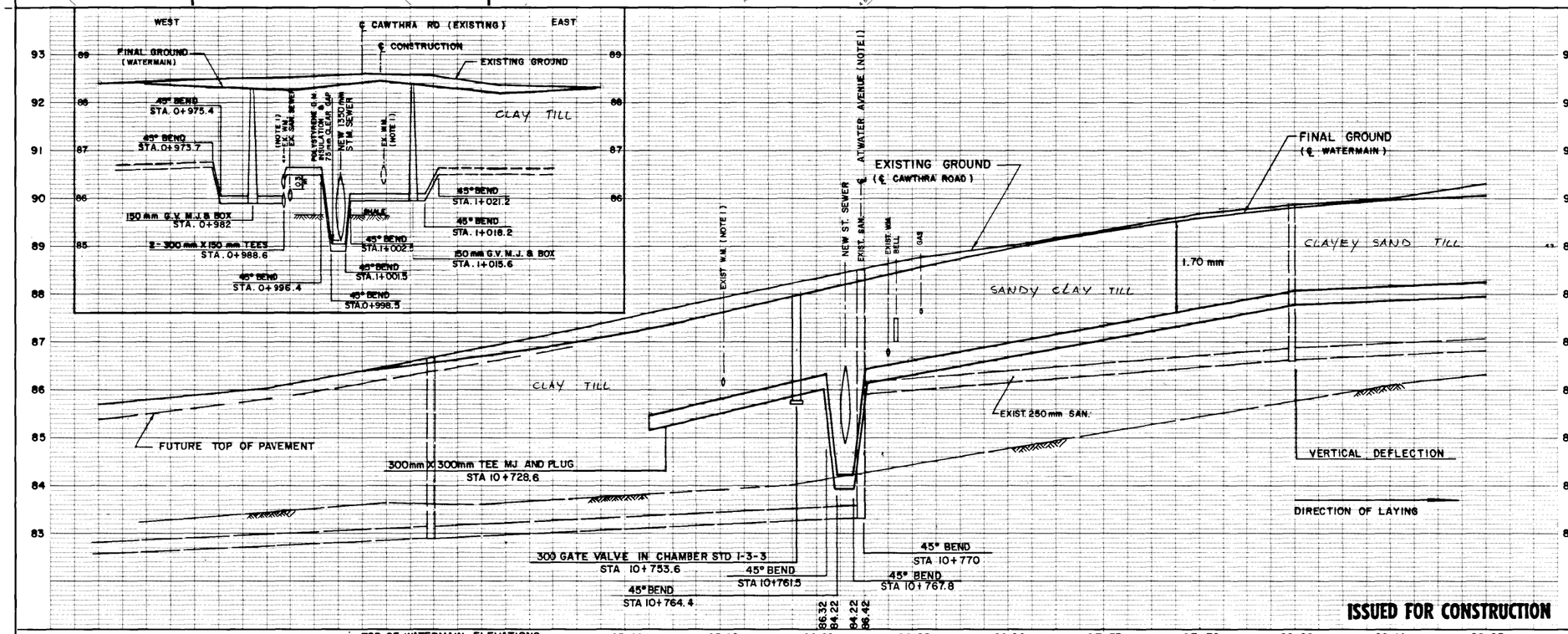
SERVICE	DATE	INIT.	SERVICE	DATE	INIT
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
NOV. 6, 1986	AS CONSTRUCTED	Y.C.

GENERAL NOTES

1. Elevation and location of existing watermains and services are to be verified in the field.
2. All 12 mm copper, lead or galvanized services are to be replaced with 19 mm copper service from the proposed watermain to the street line including new main stop, curb stop and box.
3. Connect 32 mm and 19 mm copper services to the proposed watermain.
4. The Contractor shall locate, replace and transfer existing service connections to the new main after the main is tested, flushed, chlorinated and accepted by the Region.
5. The Contractor shall provide temporary caps, plugs and blow offs for testing where required by the Engineer.
6. Stations for bends, tees, etc., refer to centre of construction.
7. All salvaged valves and hydrants shall be returned to 3190 Mavis Road, Mississauga.
8. All open ends of abandoned watermain shall be sealed with concrete.
9. Prior to construction of services on Dexter Cres. the Region shall notify Skira and Assoc. Ltd. so that their staff can ensure the installation of services will match Skira's subdivision plans.



ISSUED FOR CONSTRUCTION

TOP OF WATERMAIN ELEVATIONS			85.46	85.80	86.26	86.60	86.96	87.33	87.70	88.09	88.14	88.25				
+	10+620	10+640	10+660	10+680	10+700	10+720	10+740	10+760	10+780	10+800	10+820	10+840	10+860	10+880	10+900	

General Notes

- All Driveways Gravel Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In Field.
- Denotes Building – Not Located
- Denotes Building Located
  Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. N° Elev.

The Contractor is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

REGISTERED PROFESSIONAL ENGINEER
R. I. ROOK
PROVINCE OF ONTARIO

Designed by

chkd.

Approved by

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

McCORMICK RANKIN
CONSULTING ENGINEERS

Region of Peel

Department of Public Works

CAWTHRA ROAD

ATWATER AVENUE TO SOUTH SERVICE ROAD

300mm DIA. WATERMAIN & REMOVALS

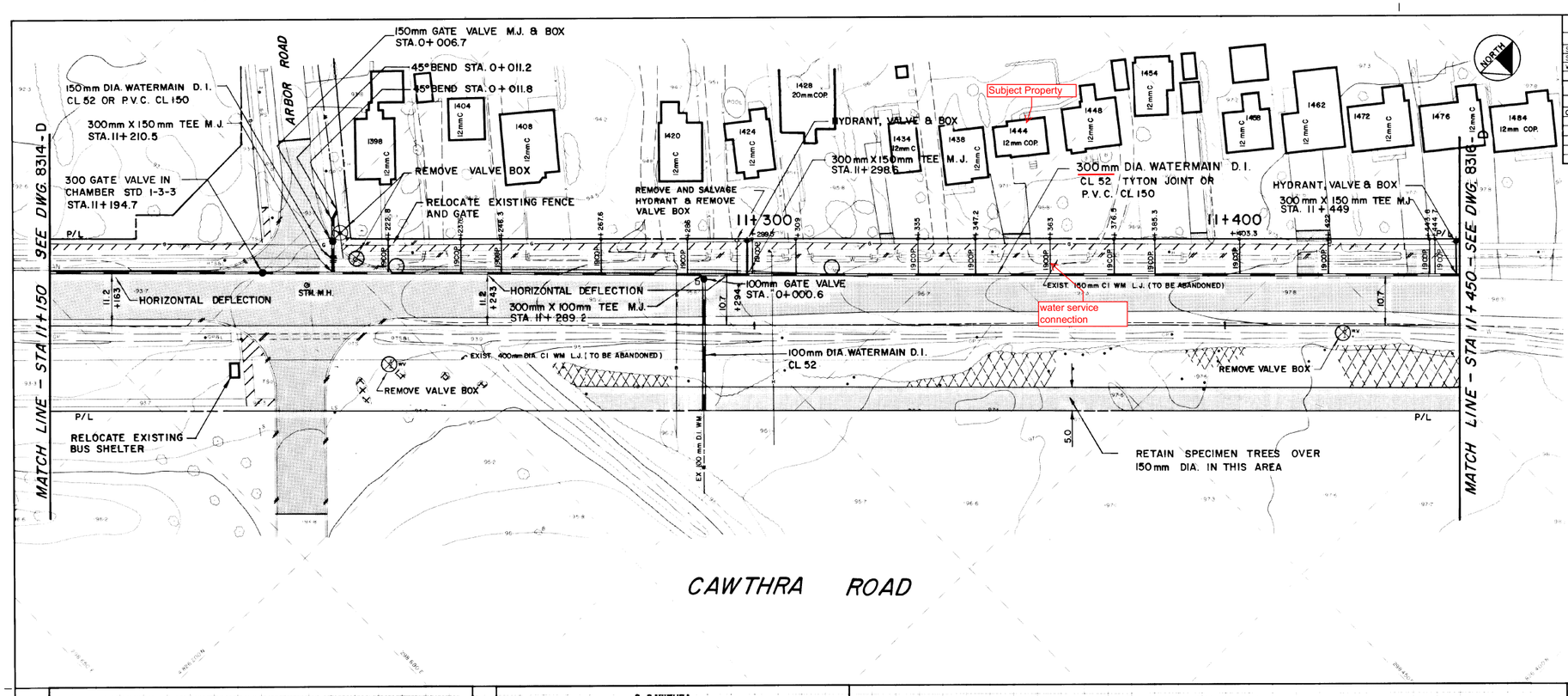
Sta. To Sta. 10+900

Lots		Area Z - 7	Project No. 86-1310
Scale	Hor. 1:800 Ver. 1:80	Drawn by B.J.H.	Checked by R. I. R.
Date MAY 1986		Sheet 3 of 27	Plan No. 8313-D

D-1-3

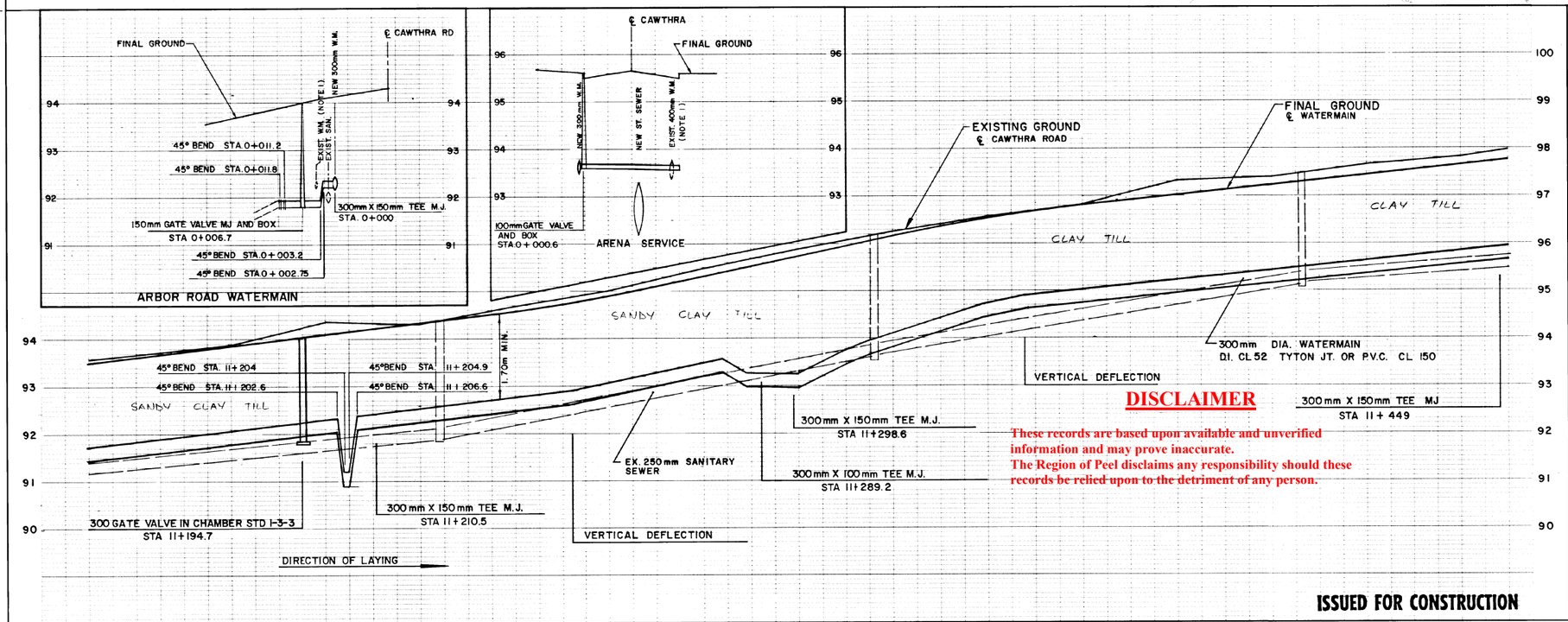
Table 3-2: CVC Flood Control Criteria for Tributaries Draining Directly to Lake Ontario

#	Subwatershed Name	Flood Control Criteria	References & Notes
21	Clearview Creek	100 Year Post to 2 Year Pre-development Control	Southdown District Master Drainage Plan dated August, 2000 by TSH
	Avonhead Creek	100 Year Post to 2 Year Pre-development Control	Southdown District Master Drainage Plan dated August, 2000 by TSH
	Lakeside Creek	100 Year Post to 2 Year Pre-development Control	Southdown District Master Drainage Plan dated August, 2000 by TSH
	Sheridan Creek	100 Year Post to 2 Year Pre-development Control	-
	Turtle Creek	2 to 10 year – Post to Pre Control	-
	Birchwood Creek	100 Year Post to 2 Year Pre-development Control	-
	Moore Creek	2 to 10 year – Post to Pre Control	No floodline mapping study
	Lornewood Creek	100 Year Post to 2 Year Pre-development Control	-
	Tecumseh Creek	100 Year Post to 2 Year Pre-development Control	-
22	Cumberland Creek	2 to 10 year – Post to Pre Control	No floodline mapping study
	Cooksville Creek	100 Year Post to 2 Year Pre-development Control	Revised development standards – Cooksville Creek from City of Mississauga
	Cawthra Creek	2 to 10 year – Post to Pre Control	Drainage diversion to Cooksville Creek and a very small area draining to creek.
	Serson Creek	100 Year Post to 2 Year Pre-development Control	Large number of buildings (> 150) in the regulated flood plain
	Applewood Creek	100 Year Post to 2 Year Pre-development Control	-



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
OCT. 8, 1986	AS CONSTRUCTED	Y.C.



TOP OF WATERMAIN ELEVATIONS															
91.83	92.06	92.30	92.54	92.77	93.08	93.48	93.25	94.10	94.72	95.01	95.22	95.42	95.63	95.83
+ 11+160	11+180	11+200	11+220	11+240	11+260	11+280	11+300	11+320	11+340	11+360	11+380	11+400	11+420	11+440

ISSUED FOR CONSTRUCTION

General Notes

- – All Driveways Gravel Unless Otherwise Noted.
- – All Service Locations Are Approximate And Must Be Located Accurately In Field.
- ● Denotes Building - Not Located
- ▭ Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN.)

B.M. No. Elev.

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

REGISTERED PROFESSIONAL ENGINEER R. I. ROOK PROVINCE OF ONTARIO

Designed by _____ chkd. _____

Approved by _____

NOTICE TO CONTRACTOR
48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMM. CITY OF BRAMPTON
HYDRO ELECTRIC COMM. PORT CREDIT
HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

DISCLAIMER

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McCORMICK RANKIN
CONSULTING ENGINEERS

Region of Peel

Department of Public Works

CAWTHRA ROAD

ATWATER AVENUE TO SOUTH SERVICE ROAD

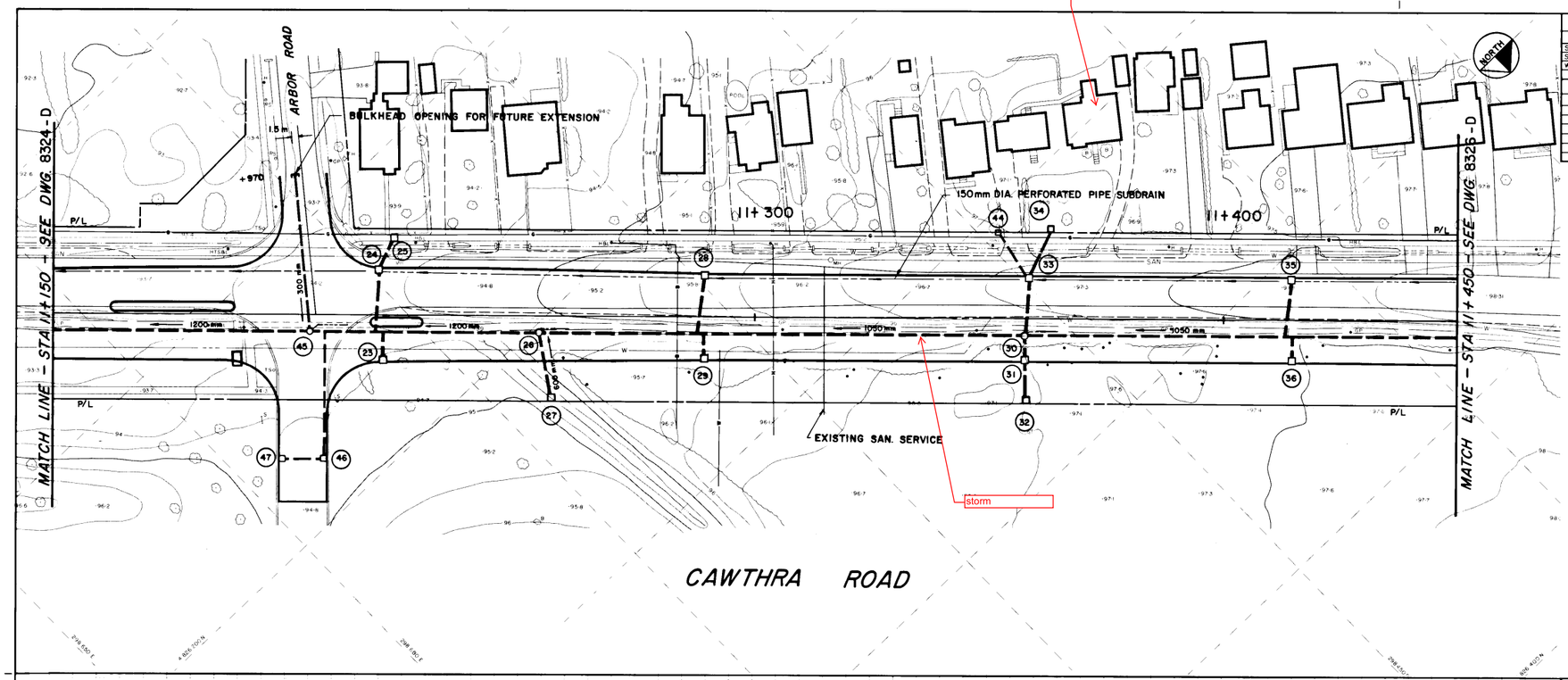
300mm DIA. WATERMAIN & REMOVALS

Sta. 11+150 To Sta. 11+450

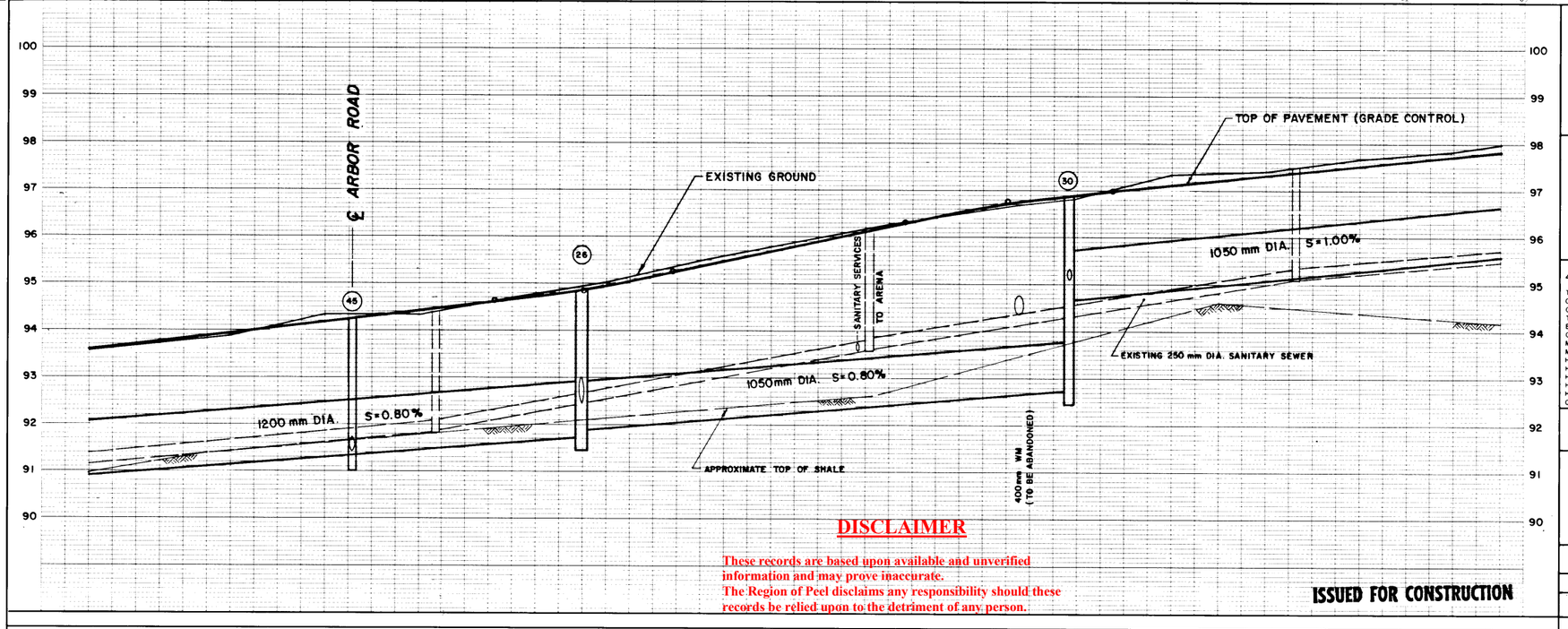
Lots		Area Z-7	Project No. 85-1310
Scale	Hor. 1:500 Ver. 1:50	Drawn by B.J.H.	Checked by R.I.R.
Date MAY 1985		Sheet 5 of 27	Plan No. 8315-D

8315-D

Subject Property



Storm



SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.

General Notes

- All Driveways Gravel Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In Field.
- Denotes Building – Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. № 75 Elev. 98.308

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

REGISTERED PROFESSIONAL ENGINEER R. I. ROOK PROVINCE OF ONTARIO

Designed by ____ chkd. ____

Approved by ____

NOTICE TO CONTRACTOR

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THE REGIONAL MUNICIPALITY OF PEEL
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CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
MINISTRY OF ENVIRONMENT
HYDRO ELECTRIC POWER COMM. OF ONTARIO
HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
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HYDRO ELECTRIC COMM. STREETSVILLE
CABLE TELEVISION

McCORMICK RANKIN
CONSULTING ENGINEERS

Region of Peel

Department of Public Works

CAWTHRA ROAD

ATWATER AVENUE TO SOUTH SERVICE ROAD

STORM SEWERS

Sta. 11+150 To Sta. 11+450

Lots		Area	Project No.
Scale	Hor. 1:500 Ver. 1:50	Drawn by B.J.H.	Checked by R.I.R.
Date	MAY 1985	Sheet 15 of 27	Plan No. 8325-D

8325-D

DISCLAIMER

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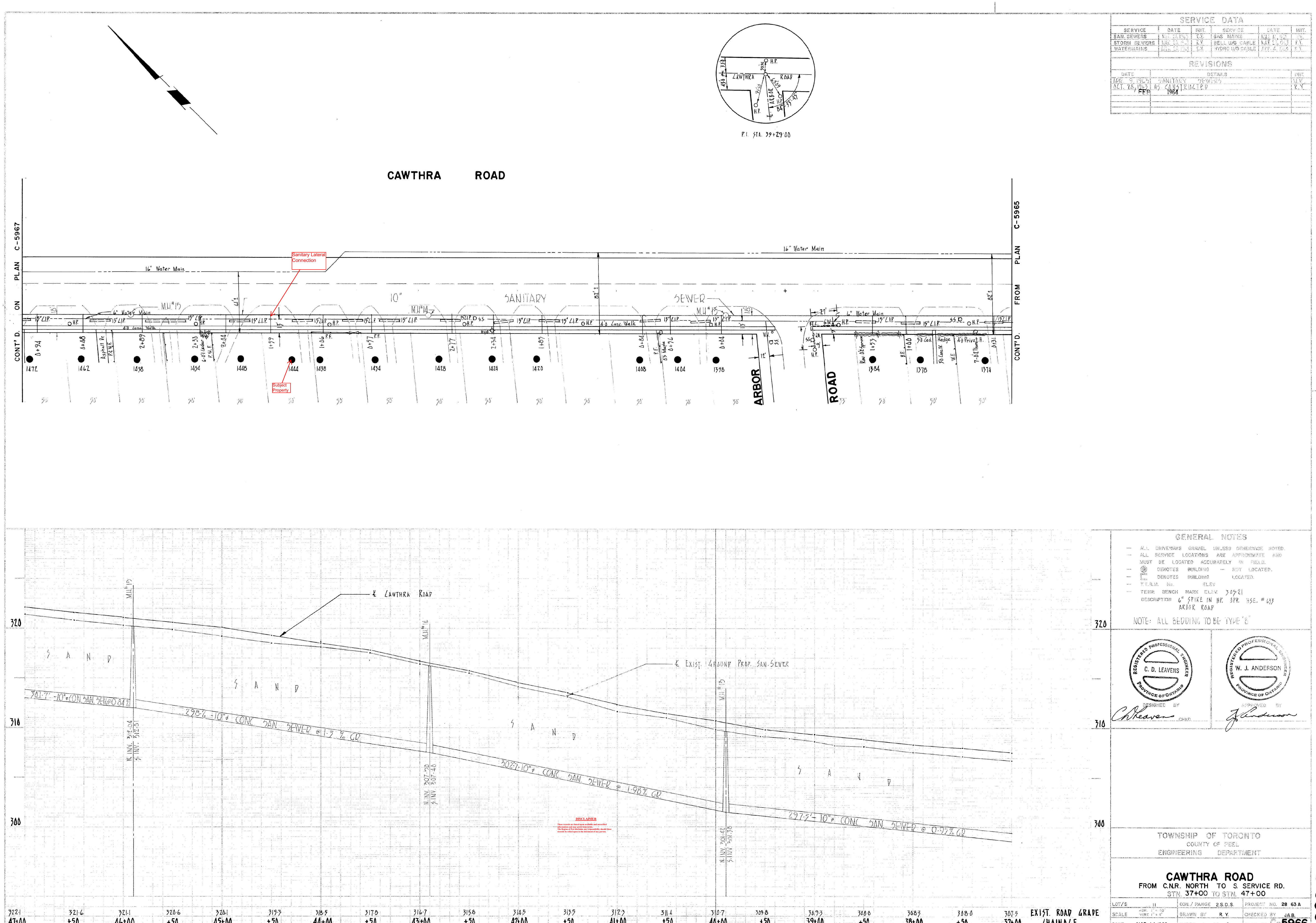
The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.

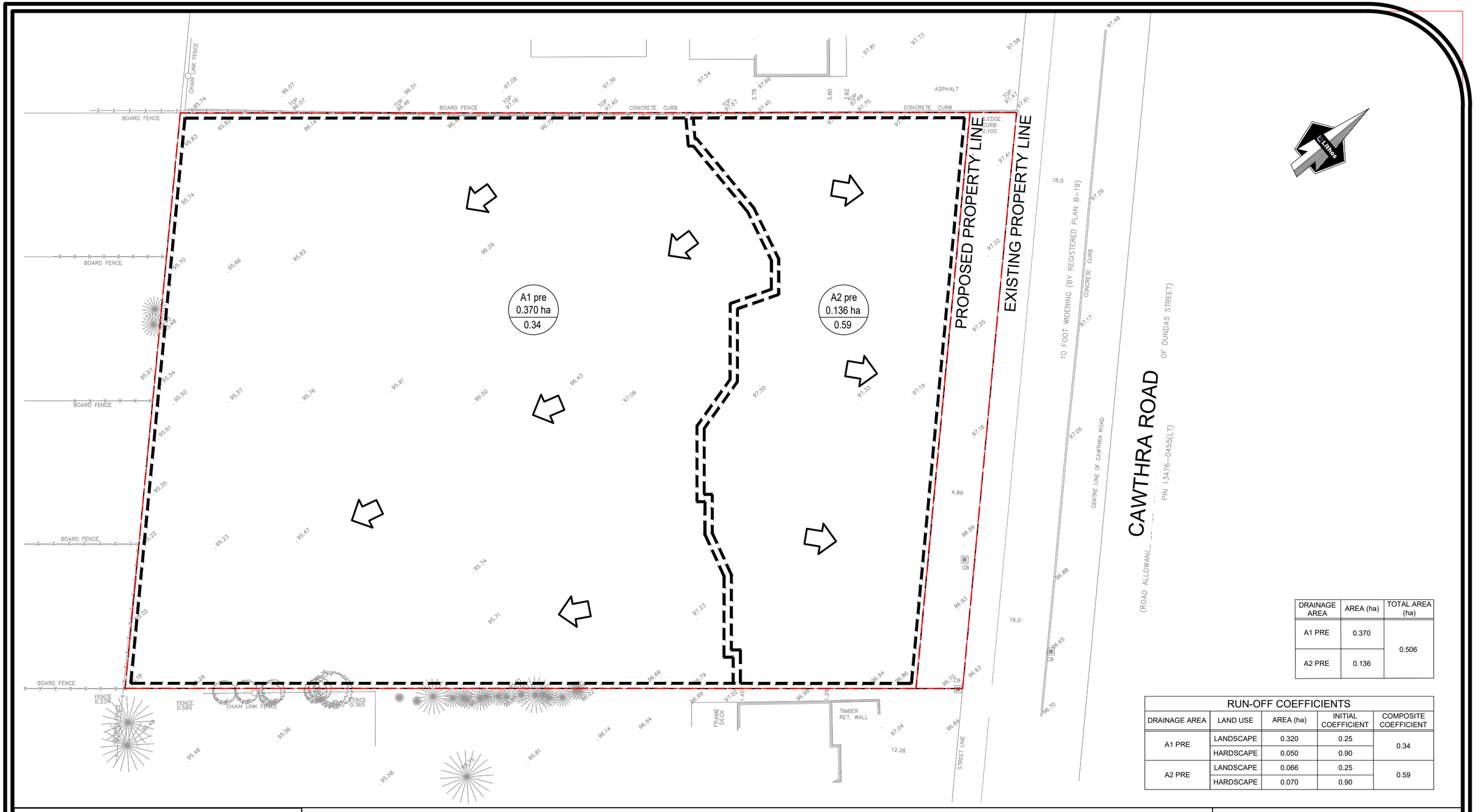
ISSUED FOR CONSTRUCTION

+ 11+160 11+180 11+200 11+220 11+240 11+260 11+280 11+300 11+320 11+340 11+360 11+380 11+400 11+420 11+440



CAWTHRA ROAD
16" Water Main
Sanitary Lateral Connection
SANITARY SEWER
MH#15
MH#14
MH#13
4" Water Main
ARBOR
ROAD
Subject Property
PLAN C-5967
CONT'D. ON
PLAN C-5965
CONT'D. FROM
P.I. STN. 39+29.00
SERVICE DATA
REVISIONS
GENERAL NOTES
— ALL DRIVEWAYS GRAVEL UNLESS OTHERWISE NOTED.
— ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
— DENOTES BUILDING — NOT LOCATED.
— DENOTES BUILDING LOCATED.
— T.T.B.M. No. ELEV
— TEMP. BENCH MARK ELEV. 305.21
DESCRIPTION 6" SPIKE IN H.P. OPP. HSE. #633 ARBOR ROAD
NOTE: ALL BEDDING TO BE TYPE "B"
C. D. LEAVENS
W. J. ANDERSON
DESIGNED BY
APPROVED BY
℄ CAWTHRA ROAD
℄ EXIST. GROUND PROF. SAN. SEWER
SAND
DISCLAIMER
EXIST. ROAD GRADE
CHAINAGE
TOWNSHIP OF TORONTO
COUNTY OF PEEL
ENGINEERING DEPARTMENT
CAWTHRA ROAD
FROM C.N.R. NORTH TO S. SERVICE RD.
STN. 37+00 TO STN. 47+00
LOT/S 11
CON./RANGE 2.S.D.S.
PROJECT NO. 28 63 A
SCALE HOR. 1" = 40' VERT. 1" = 4'
DRAWN BY R. Y.
CHECKED BY J.A.B.
DATE MAR. 14, 1963
SHEET 4 OF 6
PLAN NO. C-5966
C-5966

APPENDIX C
Storm Analysis



DRAINAGE AREA	AREA (ha)	TOTAL AREA (ha)
A1 PRE	0.370	0.506
A2 PRE	0.136	

RUN-OFF COEFFICIENTS

DRAINAGE AREA	LAND USE	AREA (ha)	INITIAL COEFFICIENT	COMPOSITE COEFFICIENT
A1 PRE	LANDSCAPE	0.320	0.25	0.34
	HARDSCAPE	0.050	0.90	
A2 PRE	LANDSCAPE	0.066	0.25	0.59
	HARDSCAPE	0.070	0.90	

LEGEND

- A1 pre / 0.04 ha / 0.50 — STORM DRAINAGE AREA NUMBER; DRAINAGE AREA (ha); COMPOSITE RUNOFF COEFFICIENT
- PRE-DEVELOPMENT STORM DRAINAGE AREA
- PROPERTY LINE
- DRAINAGE DIRECTION - BOTH MANOR AND MAJOR DRAINAGE PATTERNS

Lithos
150 Bermonsdey Road, North York, Ontario M4A 1Y1

PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE: APRIL 2019 | PROJECT No: UD17-094
SCALE: N.T.S. | FIGURE No: DAP1

Lithos

Prepared by: John Pasalidis, P.E., M.A.Sc.
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

Rational Method
Pre-Development Flow Calculation
1444-1458 Cawthra Road
File No. UD17-094
City of Mississauga
Date: April 2019

Input Parameters

Area Number	Area (ha)	C	Tc (min.)
A1 pre (Towards South - West corner of the Site)	0.370	0.34	15
A2 pre (Towards Cawthra Road)	0.136	0.59	15

$$Q = 0.0028\ C\ I\ A$$

Rational Method Calculation

Event 2 yr
IDF Data Set City of Missisauga
a = 610
b = 4.6
c = 0.78

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
A1 pre (Towards South - West corner of the Site)	0.370	0.34	0.13	15	59.9	0.021	20.9
A2 pre (Towards Cawthra Road)	0.136	0.59	0.08	15	59.9	0.013	13.3

Event 5 yr
IDF Data Set City of Missisauga
a = 820
b = 4.6
c = 0.78

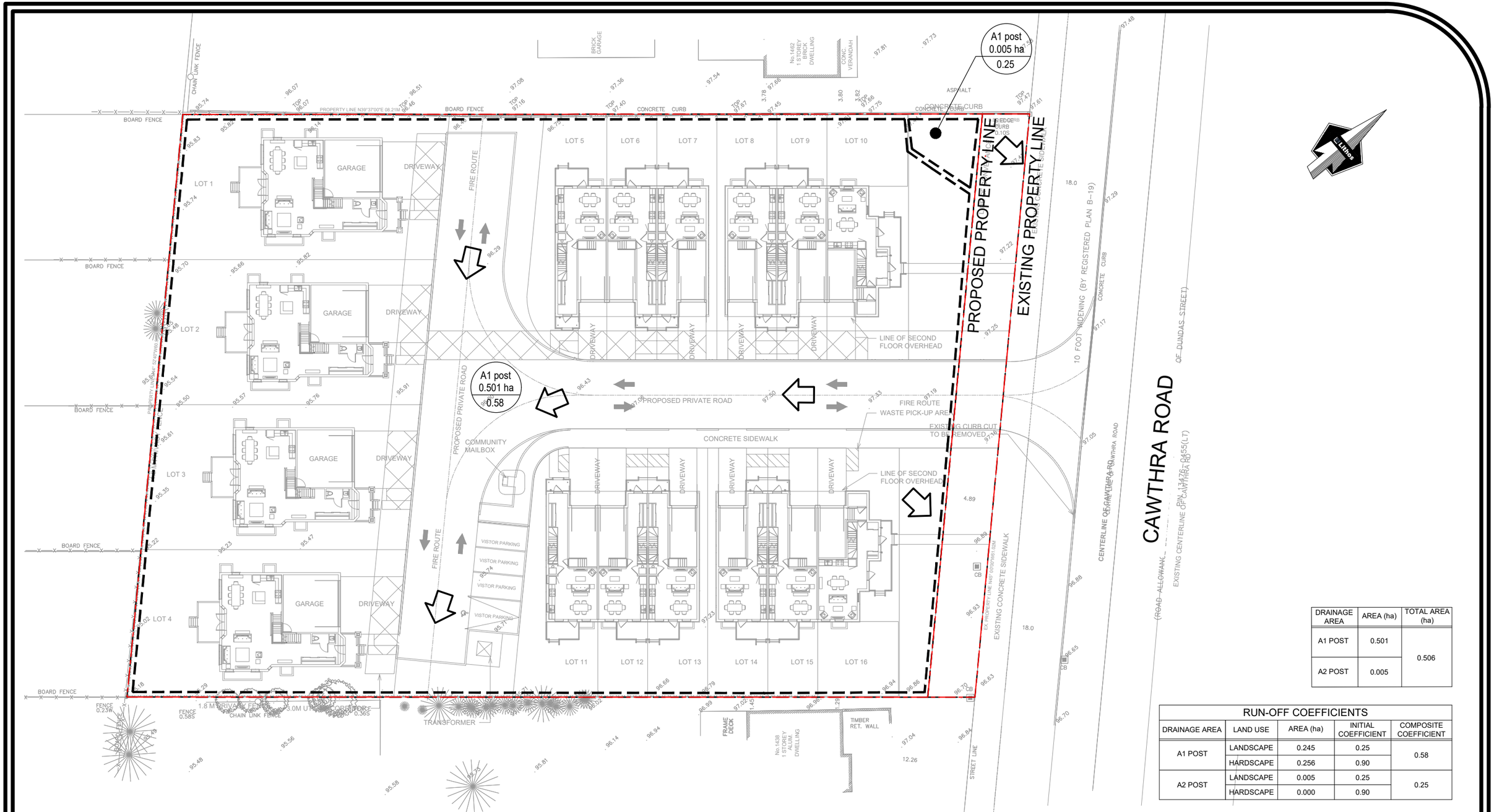
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
A1 pre (Towards South - West corner of the Site)	0.370	0.34	0.13	15	80.5	0.028	28.1
A2 pre (Towards Cawthra Road)	0.136	0.59	0.08	15	80.5	0.018	17.9

Event 10 yr
IDF Data Set City of Missisauga
a = 1010
b = 4.6
c = 0.78

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
A1 pre (Towards South - West corner of the Site)	0.370	0.34	0.13	15	99.2	0.035	34.7
A2 pre (Towards Cawthra Road)	0.136	0.59	0.08	15	99.2	0.022	22.1

Event 100 yr
IDF Data Set City of Missisauga
a = 1450
b = 4.9
c = 0.78

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
A1 pre (Towards South - West corner of the Site)	0.370	0.34	0.13	15	140.7	0.049	49.2
A2 pre (Towards Cawthra Road)	0.136	0.59	0.08	15	140.7	0.031	31.3



DRAINAGE AREA	AREA (ha)	TOTAL AREA (ha)
A1 POST	0.501	0.506
A2 POST	0.005	

RUN-OFF COEFFICIENTS

DRAINAGE AREA	LAND USE	AREA (ha)	INITIAL COEFFICIENT	COMPOSITE COEFFICIENT
A1 POST	LANDSCAPE	0.245	0.25	0.58
	HARDSCAPE	0.256	0.90	
A2 POST	LANDSCAPE	0.005	0.25	0.25
	HARDSCAPE	0.000	0.90	

LEGEND

- STORM DRAINAGE AREA NUMBER
- DRAINAGE AREA (ha)
- COMPOSITE RUNOFF COEFFICIENT
- POST-DEVELOPMENT STORM DRAINAGE AREA
- PROPERTY LINE

Lithos

150 Bermondsey Road, North York, Ontario M4A 1Y1

POST-DEVELOPMENT STORM DRAINAGE AREA PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE: APRIL 2019	PROJECT No: UD17-094
SCALE: N.T.S.	FIGURE No: DAP2

Lithos

Modified Rational Method - Two Year Storm
Site Flow and Storage Summary

1444-1458 Cawthra Road
File No. UD17-094
Date: April 2019

Prepared By: John Pasalidis, P.E., M.A.Sc.
Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Controlled - A1 Post

Drainage Areas	**A1 Post**	
Area (A1) =	**0.501**	ha
"C" =	**0.58**	
AC1=	**0.29**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Controlled Release Rate =	**20.9**	**L/s**
Min. Storage =	**24.8**	**m^3**

2-Year Design Storm

a=	610.00
b=	4.60
c=	0.78
I =	$a\ (b + t)^c$

Type	Area (ha)	"C"
Landscaped	0.245	0.25
Hardscaped	0.256	0.90
Total Area (A1)	**0.501**	**0.58**

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity** (mm/hr)	**Storm Runoff (A1 post)** (m^3/s)	**Runoff Volume (A1 post)** (m^3)	**Target Released Volume (A1 post)** (m^3)	**Total Required Storage (A1 post)** (m^3)
15.0	59.9	0.049	43.67	18.85	24.82
20.0	50.2	0.041	48.77	25.13	23.64
25.0	43.4	0.035	52.77	31.41	21.36
30.0	38.4	0.031	56.06	37.69	18.37
35.0	34.6	0.028	58.87	43.97	14.90
40.0	31.5	0.026	61.32	50.26	11.07
45.0	29.0	0.024	63.50	56.54	6.96
50.0	26.9	0.022	65.46	62.82	2.64
55.0	25.2	0.020	67.25	69.10	0.00
60.0	23.6	0.019	68.90	75.39	0.00
65.0	22.3	0.018	70.42	81.67	0.00
70.0	21.1	0.017	71.85	87.95	0.00
75.0	20.1	0.016	73.18	94.23	0.00
80.0	19.1	0.016	74.44	100.51	0.00
85.0	18.3	0.015	75.62	106.80	0.00
90.0	17.5	0.014	76.75	113.08	0.00
95.0	16.9	0.014	77.83	119.36	0.00
100.0	16.2	0.013	78.85	125.64	0.00
105.0	15.6	0.013	79.83	131.92	0.00
110.0	15.1	0.012	80.77	138.21	0.00
115.0	14.6	0.012	81.68	144.49	0.00
120.0	14.2	0.011	82.55	150.77	0.00
125.0	13.7	0.011	83.39	157.05	0.00
130.0	13.3	0.011	84.20	163.33	0.00
135.0	13.0	0.010	84.99	169.62	0.00
140.0	12.6	0.010	85.75	175.90	0.00
145.0	12.3	0.010	86.49	182.18	0.00
150.0	12.0	0.010	87.21	188.46	0.00
155.0	11.7	0.009	87.90	194.74	0.00
160.0	11.4	0.009	88.58	201.03	0.00
165.0	11.1	0.009	89.24	207.31	0.00
170.0	10.9	0.009	89.89	213.59	0.00

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Modified Rational Method - Five Year Storm
Site Flow and Storage Summary

1444-1458 Cawthra Road
File No. UD17-094
Date: April 2019

Prepared By: John Pasalidis, P.E., M.A.Sc.
Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Controlled - A1 Post

Drainage Areas	**A1 Post**	
Area (A1) =	**0.501**	ha
"C" =	**0.58**	
AC1=	**0.29**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Controlled Release Rate =	**20.9**	**L/s**
Min. Storage =	**40.4**	**m^3**

5-Year Design Storm

a=	820.00
b=	4.60
c=	0.78
I =	$a\ (b + t)^c$

Type	Area (ha)	"C"
Landscaped	0.245	0.25
Hardscaped	0.256	0.90
Total Area (A1)	**0.501**	**0.58**

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity** (mm/hr)	**Storm Runoff (A1 post)** (m^3/s)	**Runoff Volume (A1 post)** (m^3)	**Target Released Volume (A1 post)** (m^3)	**Total Required Storage (A1 post)** (m^3)
15.0	80.5	0.065	58.70	18.85	39.86
20.0	67.4	0.055	65.56	25.13	40.43
25.0	58.4	0.047	70.93	31.41	39.52
30.0	51.7	0.042	75.36	37.69	37.67
35.0	46.5	0.038	79.14	43.97	35.16
40.0	42.4	0.034	82.43	50.26	32.18
45.0	39.0	0.032	85.36	56.54	28.82
50.0	36.2	0.029	88.00	62.82	25.18
55.0	33.8	0.027	90.41	69.10	21.30
60.0	31.8	0.026	92.62	75.39	17.23
65.0	30.0	0.024	94.67	81.67	13.00
70.0	28.4	0.023	96.58	87.95	8.63
75.0	27.0	0.022	98.37	94.23	4.14
80.0	25.7	0.021	100.06	100.51	0.00
85.0	24.6	0.020	101.66	106.80	0.00
90.0	23.6	0.019	103.17	113.08	0.00
95.0	22.7	0.018	104.62	119.36	0.00
100.0	21.8	0.018	106.00	125.64	0.00
105.0	21.0	0.017	107.32	131.92	0.00
110.0	20.3	0.016	108.58	138.21	0.00
115.0	19.6	0.016	109.80	144.49	0.00
120.0	19.0	0.015	110.97	150.77	0.00
125.0	18.4	0.015	112.10	157.05	0.00
130.0	17.9	0.015	113.19	163.33	0.00
135.0	17.4	0.014	114.25	169.62	0.00
140.0	16.9	0.014	115.27	175.90	0.00
145.0	16.5	0.013	116.26	182.18	0.00
150.0	16.1	0.013	117.23	188.46	0.00
155.0	15.7	0.013	118.17	194.74	0.00
160.0	15.3	0.012	119.08	201.03	0.00
165.0	15.0	0.012	119.97	207.31	0.00
170.0	14.6	0.012	120.83	213.59	0.00

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Modified Rational Method - Ten Year Storm
Site Flow and Storage Summary

1444-1458 Cawthra Road
File No. UD17-094
Date: April 2019

Prepared By: John Pasalidis, P.E., M.A.Sc.
Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Controlled - A1 Post

Drainage Areas	**A1 Post**	
Area (A1) =	**0.501**	ha
"C" =	**0.58**	
AC1=	**0.29**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Controlled Release Rate =	**20.9**	**L/s**
Min. Storage =	**56.0**	**m^3**

10-Year Design Storm

a=	1010.00
b=	4.60
c=	0.78
I =	$a\ (b + t)^c$

Type	Area (ha)	"C"
Landscaped	0.245	0.25
Hardscaped	0.256	0.90
Total Area (A1)	**0.501**	**0.58**

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity** (mm/hr)	**Storm Runoff (A1 post)** (m^3/s)	**Runoff Volume (A1 post)** (m^3)	**Target Released Volume (A1 post)** (m^3)	**Total Required Storage (A1 post)** (m^3)
15.0	99.2	0.080	72.30	18.85	53.46
20.0	83.1	0.067	80.75	25.13	55.62
25.0	71.9	0.058	87.37	31.41	55.96
30.0	63.7	0.052	92.83	37.69	55.13
35.0	57.3	0.046	97.48	43.97	53.50
40.0	52.2	0.042	101.53	50.26	51.28
45.0	48.1	0.039	105.14	56.54	48.60
50.0	44.6	0.036	108.39	62.82	45.57
55.0	41.7	0.034	111.35	69.10	42.25
60.0	39.1	0.032	114.08	75.39	38.69
65.0	36.9	0.030	116.60	81.67	34.94
70.0	35.0	0.028	118.96	87.95	31.01
75.0	33.2	0.027	121.17	94.23	26.93
80.0	31.7	0.026	123.25	100.51	22.73
85.0	30.3	0.025	125.21	106.80	18.42
90.0	29.0	0.024	127.08	113.08	14.00
95.0	27.9	0.023	128.86	119.36	9.50
100.0	26.9	0.022	130.56	125.64	4.91
105.0	25.9	0.021	132.18	131.92	0.26
110.0	25.0	0.020	133.74	138.21	0.00
115.0	24.2	0.020	135.24	144.49	0.00
120.0	23.4	0.019	136.68	150.77	0.00
125.0	22.7	0.018	138.07	157.05	0.00
130.0	22.1	0.018	139.42	163.33	0.00
135.0	21.4	0.017	140.72	169.62	0.00
140.0	20.9	0.017	141.98	175.90	0.00
145.0	20.3	0.016	143.20	182.18	0.00
150.0	19.8	0.016	144.39	188.46	0.00
155.0	19.3	0.016	145.55	194.74	0.00
160.0	18.9	0.015	146.67	201.03	0.00
165.0	18.4	0.015	147.76	207.31	0.00
170.0	18.0	0.015	148.83	213.59	0.00

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Modified Rational Method - Hundred Year Storm
Site Flow and Storage Summary

1444-1458 Cawthra Road
File No. UD17-094
Date: April 2019

Prepared By: John Pasalidis, P.E., M.A.Sc.
Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Controlled - A1 Post

Drainage Areas	**A1 Post**	
Area (A1) =	**0.501**	ha
"C" =	**0.73**	
AC1=	**0.36**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Controlled Release Rate =	**20.9**	**L/s**
Min. Storage =	**131.3**	**m^3**

Adjustment Factor
C(100) =1.25 *C

100-Year Design Storm

a=	1450.00
b=	4.90
c=	0.78
I =	a (b + t)^c

Type	Area (ha)	"C"
Landscaped	0.245	0.25
Hardscaped	0.256	0.90
Total Area (A1)	**0.501**	**0.58**

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity** (mm/hr)	**Storm Runoff (A1 post)** (m^3/s)	**Runoff Volume (A1 post)** (m^3)	**Target Released Volume (A1 post)** (m^3)	**Total Required Storage (A1 post)** (m^3)
15.0	140.7	0.142	128.23	18.85	109.38
20.0	118.1	0.120	143.54	25.13	118.42
25.0	102.4	0.104	155.56	31.41	124.15
30.0	90.8	0.092	165.47	37.69	127.77
35.0	81.8	0.083	173.90	43.97	129.92
40.0	74.6	0.076	181.26	50.26	131.00
45.0	68.7	0.070	187.79	56.54	131.26
50.0	63.8	0.065	193.68	62.82	130.86
55.0	59.6	0.060	199.05	69.10	129.95
60.0	56.0	0.057	203.98	75.39	128.60
65.0	52.8	0.053	208.55	81.67	126.88
70.0	50.0	0.051	212.81	87.95	124.86
75.0	47.6	0.048	216.80	94.23	122.57
80.0	45.4	0.046	220.56	100.51	120.05
85.0	43.4	0.044	224.12	106.80	117.32
90.0	41.6	0.042	227.49	113.08	114.41
95.0	40.0	0.040	230.70	119.36	111.34
100.0	38.5	0.039	233.77	125.64	108.13
105.0	37.1	0.038	236.70	131.92	104.78
110.0	35.8	0.036	239.51	138.21	101.31
115.0	34.7	0.035	242.22	144.49	97.73
120.0	33.6	0.034	244.82	150.77	94.05
125.0	32.6	0.033	247.33	157.05	90.28
130.0	31.6	0.032	249.76	163.33	86.43
135.0	30.7	0.031	252.11	169.62	82.49
140.0	29.9	0.030	254.38	175.90	78.48
145.0	29.1	0.029	256.59	182.18	74.40
150.0	28.4	0.029	258.73	188.46	70.26
155.0	27.7	0.028	260.81	194.74	66.06
160.0	27.0	0.027	262.83	201.03	61.80
165.0	26.4	0.027	264.80	207.31	57.49
170.0	25.8	0.026	266.72	213.59	53.13

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Modified Rational Method
Two Year Storm
Site Flow and Storage Summary - towards Cawthra Road

1444-1458 Cawthra Road

Drainage Area A2 Post

Uncontrolled area towards Cawthra Road

Area (A2) =	**0.005**	ha
"C" =	**0.25**	
AC2=	**0.001**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**0.2**	L/s

2-Year Design Storm	
a=	610.00
b=	4.60
c=	0.78
I =	$a\ (b + t)^c$

Type	Area (ha)	"C"
Landscaped	0.005	0.25
Hardscaped	0.000	0.90
Total Area (A2 Post)	**0.005**	**0.25**

2-yr Pre-Development Site Release Rate towards Cawthra Road (A2-pre)= 13.3 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 0.2 L/s

(1)	(2)	(3)	(4)
Time	**Rainfall Intensity**	**Storm Runoff (A2 post)**	**Runoff Volume (A2 post)**
(min)	**(mm/hr)**	**(m^3/s)**	**(m^3)**
15.0	59.9	0.000	0.19
20.0	50.2	0.000	0.21
25.0	43.4	0.000	0.23
30.0	38.4	0.000	0.24
35.0	34.6	0.000	0.25
40.0	31.5	0.000	0.26
45.0	29.0	0.000	0.27
50.0	26.9	0.000	0.28
55.0	25.2	0.000	0.29
60.0	23.6	0.000	0.30
65.0	22.3	0.000	0.30
70.0	21.1	0.000	0.31
75.0	20.1	0.000	0.31
80.0	19.1	0.000	0.32
85.0	18.3	0.000	0.32
90.0	17.5	0.000	0.33
95.0	16.9	0.000	0.33
100.0	16.2	0.000	0.34
105.0	15.6	0.000	0.34
110.0	15.1	0.000	0.35
115.0	14.6	0.000	0.35
120.0	14.2	0.000	0.35
125.0	13.7	0.000	0.36
130.0	13.3	0.000	0.36
135.0	13.0	0.000	0.36
140.0	12.6	0.000	0.37
145.0	12.3	0.000	0.37
150.0	12.0	0.000	0.37
155.0	11.7	0.000	0.38
160.0	11.4	0.000	0.38
165.0	11.1	0.000	0.38
170.0	10.9	0.000	0.39

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Modified Rational Method
Five Year Storm
Site Flow and Storage Summary - towards Cawthra Road

1444-1458 Cawthra Road

Drainage Area A2 Post

Uncontrolled area towards Cawthra Road

Area (A2) =	**0.005**	ha
"C" =	**0.25**	
AC2=	**0.001**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**0.3**	L/s

5-Year Design Storm	
a=	820.00
b=	4.60
c=	0.78
I =	$a\ (b + t)^c$

Type	Area (ha)	"C"
Landscaped	0.005	0.25
Hardscaped	0.000	0.90
Total Area (A2 Post)	**0.005**	**0.25**

2-yr Pre-Development Site Release Rate towards Cawthra Road (A2-pre)= 13.3 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 0.3 L/s

(1)	(2)	(3)	(4)
Time	**Rainfall Intensity**	**Storm Runoff (A2 post)**	**Runoff Volume (A2 post)**
(min)	**(mm/hr)**	**(m^3/s)**	**(m^3)**
15.0	80.5	0.000	0.25
20.0	67.4	0.000	0.28
25.0	58.4	0.000	0.30
30.0	51.7	0.000	0.32
35.0	46.5	0.000	0.34
40.0	42.4	0.000	0.35
45.0	39.0	0.000	0.37
50.0	36.2	0.000	0.38
55.0	33.8	0.000	0.39
60.0	31.8	0.000	0.40
65.0	30.0	0.000	0.41
70.0	28.4	0.000	0.41
75.0	27.0	0.000	0.42
80.0	25.7	0.000	0.43
85.0	24.6	0.000	0.44
90.0	23.6	0.000	0.44
95.0	22.7	0.000	0.45
100.0	21.8	0.000	0.45
105.0	21.0	0.000	0.46
110.0	20.3	0.000	0.47
115.0	19.6	0.000	0.47
120.0	19.0	0.000	0.48
125.0	18.4	0.000	0.48
130.0	17.9	0.000	0.49
135.0	17.4	0.000	0.49
140.0	16.9	0.000	0.49
145.0	16.5	0.000	0.50
150.0	16.1	0.000	0.50
155.0	15.7	0.000	0.51
160.0	15.3	0.000	0.51
165.0	15.0	0.000	0.51
170.0	14.6	0.000	0.52

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Modified Rational Method
Ten Year Storm
Site Flow and Storage Summary - towards Cawthra Road

1444-1458 Cawthra Road

Drainage Area A2 Post

Uncontrolled area towards Cawthra Road

Area (A2) =	**0.005**	ha
"C" =	**0.25**	
AC2=	**0.001**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**0.3**	L/s

10-Year Design Storm	
a=	1010.00
b=	4.60
c=	0.78
I =	$a\ (b + t)^c$

Type	Area (ha)	"C"
Landscaped	0.005	0.25
Hardscaped	0.000	0.90
Total Area (A2 Post)	**0.005**	**0.25**

2-yr Pre-Development Site Release Rate towards Cawthra Road (A2-pre)= 13.3 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 0.3 L/s

(1)	(2)	(3)	(4)
Time	**Rainfall Intensity**	**Storm Runoff (A2 post)**	**Runoff Volume (A2 post)**
(min)	**(mm/hr)**	**(m^3/s)**	**(m^3)**
15.0	99.2	0.000	0.31
20.0	83.1	0.000	0.35
25.0	71.9	0.000	0.37
30.0	63.7	0.000	0.40
35.0	57.3	0.000	0.42
40.0	52.2	0.000	0.44
45.0	48.1	0.000	0.45
50.0	44.6	0.000	0.46
55.0	41.7	0.000	0.48
60.0	39.1	0.000	0.49
65.0	36.9	0.000	0.50
70.0	35.0	0.000	0.51
75.0	33.2	0.000	0.52
80.0	31.7	0.000	0.53
85.0	30.3	0.000	0.54
90.0	29.0	0.000	0.54
95.0	27.9	0.000	0.55
100.0	26.9	0.000	0.56
105.0	25.9	0.000	0.57
110.0	25.0	0.000	0.57
115.0	24.2	0.000	0.58
120.0	23.4	0.000	0.59
125.0	22.7	0.000	0.59
130.0	22.1	0.000	0.60
135.0	21.4	0.000	0.60
140.0	20.9	0.000	0.61
145.0	20.3	0.000	0.61
150.0	19.8	0.000	0.62
155.0	19.3	0.000	0.62
160.0	18.9	0.000	0.63
165.0	18.4	0.000	0.63
170.0	18.0	0.000	0.64

Lithos

Modified Rational Method
Hundred Year Storm
Site Flow and Storage Summary - towards Cawthra Road

1444-1458 Cawthra Road

Drainage Area A2 Post

Uncontrolled area towards Cawthra Road

Area (A2) =	**0.005**	ha
"C" =	**0.31**	
AC2=	**0.002**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**0.6**	L/s

100-Year Design Storm	
a=	1450.00
b=	4.90
c=	0.78
I =	$a\ (b + t)^c$

Type	Area (ha)	"C"
Landscaped	0.005	0.25
Hardscaped	0.000	0.90
Total Area (A2 Post)	**0.005**	**0.25**
Adjustment Factor = C(100) =1.25 *C		

2-yr Pre-Development Site Release Rate towards Cawthra Road (A2-pre)= 13.3 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 0.6 L/s

(1)	(2)	(3)	(4)
Time	**Rainfall Intensity**	**Storm Runoff (A2 post)**	**Runoff Volume (A2 post)**
(min)	**(mm/hr)**	**(m^3/s)**	**(m^3)**
15.0	140.7	0.001	0.55
20.0	118.1	0.001	0.62
25.0	102.4	0.000	0.67
30.0	90.8	0.000	0.71
35.0	81.8	0.000	0.75
40.0	74.6	0.000	0.78
45.0	68.7	0.000	0.80
50.0	63.8	0.000	0.83
55.0	59.6	0.000	0.85
60.0	56.0	0.000	0.87
65.0	52.8	0.000	0.89
70.0	50.0	0.000	0.91
75.0	47.6	0.000	0.93
80.0	45.4	0.000	0.95
85.0	43.4	0.000	0.96
90.0	41.6	0.000	0.98
95.0	40.0	0.000	0.99
100.0	38.5	0.000	1.00
105.0	37.1	0.000	1.01
110.0	35.8	0.000	1.03
115.0	34.7	0.000	1.04
120.0	33.6	0.000	1.05
125.0	32.6	0.000	1.06
130.0	31.6	0.000	1.07
135.0	30.7	0.000	1.08
140.0	29.9	0.000	1.09
145.0	29.1	0.000	1.10
150.0	28.4	0.000	1.11
155.0	27.7	0.000	1.12
160.0	27.0	0.000	1.13
165.0	26.4	0.000	1.13
170.0	25.8	0.000	1.14

APPENDIX D
Sanitary Data Analysis

SANITARY SEWER DESIGN SHEET

1444-1458 Cawthra Road

CITY OF MISSISSAUGA

LOCATION	RESIDENTIAL				COMMERCIAL		FLOW								SEWER DESIGN				
	SECTION AREA (ha.)	Single & Semi-Dettached Dwellings @ 4.15 ppu	Townhouses @ 3.5 ppu	SECTION POP. (persons)	COMMERCIAL/OFFICE AREA (ha.)	SECTION POP. @ 50p/ha (persons)	TOTAL ACCUM. POP. (persons)	AVERAGE RESIDENTIAL FLOW '@' 302.8 L/c/d (L/s)	HARMON PEAKING FACTOR	RES. PEAK FLOW (L/s)	AVERAGE COMMERCIAL/OFFICE FLOW @ 302.8 L/c/d (L/s)	TOTAL ACCUM. AREA (ha.)	INFILT. @ 0.2 L/s/ha. (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE DIA. (mm)	SLOPE (%)	FULL FLOW CAPACITY n = 0.013 (L/sec)	% of DESIG CAPACITY (%)
column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Existing Condition																			
Residential Development	0.506	4	0	17	0.00	0	17	0.06	4.39	0.255	0.00	0.506	0.101	**0.36**					
Proposed Condition																			
Residential-Use Development	0.506	4	12	59	0.00	0	59	0.21	4.30	0.88	0.00	0.506	0.101	**0.98**					
												Total Net Flow		**0.62**					

Residential/Commercial Flow Rate - 302.8 litres/capita/day
Infiltration - 0.2 L/ha
Peaking Factor = 1 + [14 / (4 + $P^{0.5}$)], P=Population in thousands
Site Area: 0.506 ha

Lithos

Prepared by: John Pasalidis, P.E., M.A.Sc.
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.
Date: April 2019

Project: 1444-1458 Cawthra Road
Project No: UD17-088
City of Mississauga

Sheet 1 OF 1

APPENDIX E
Water Data Analysis

WATER DEMAND

1444-1458 Cawthra Road
File No: PUD17-094
Date: April 2019
Prepared by: Angelos Andreadis, P.E., M.A.Sc.
Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Fire Flow Calculation

1 $F = 220\ C\ (A)^{1/2}$

Where F= Fire flow in Lpm
C= construction type coefficient
= 1.0 Ordinary Construction
A = total floor area in sq.m. excluding basements, includes garage*

			Area Applied
Level 1=	200	m^2	100%
Level 2=	200	m^2	25%
Level -1=	200	m^2	25%
=	300	sq.m.	

Note: The levels indicated, reference the worst case scenario for townhouse fire separation according to the OBC

F = 3,810.51 L/min

F = 3,800 L/min Round to nearest 100 l/min

2 Occupancy Reduction
25% non-combustible occupancy
F = 2850 L/min

3 Sprinkler Reduction
0% Reduction for NFPA Sprinkler System
F = 2850 l/min

4 Separation Charge

15%	N	10.1 to 20m
25%	E	0 to 3m
25%	W	0 to 3m
10%	S	20.1 to 30m
75%	Total Separation Charge	2138 L/min

F = 4,988.00 L/min
83.13 L/s
F = 1318 US GPM

Domestic Flow Calculations

Population = 44 Persons (from sanitary design sheet for Residential)
Commercial Area = 0 Persons (from sanitary design sheet for Commercial)
Average Day Demand = 280 L/cap/day 1 US Gallon=3.785 L
=
= 0.14 L/s
= 2 US GPM 1 US GPM=15.852L/s

Max. Daily Demand Peaking Factor = 2.0 (For residential)
Max. Daily Demand = 0.29 L/s = 5 US GPM

or

Max. Hourly Demand Peaking Factor = 3.0
Max. Hourly Demand = 0.43 L/s = 7 US GPM

Max Daily Demand = 0.29 L/s
Fire Flow = 83.13 L/s

Required 'Design' Flow = 83.42 L/s
1322 US GPM

Note: Required 'Design' Flow is the maximum of either:
1) Fire Flow + Maximum Daily Demand
2) Maximum Hourly Demand

Lithos

WATER DEMAND

1444-1458 Cawthra Road

File No: PUD17-094

Date: April 2019

Prepared by: Angelos Andreadis, P.E., M.A.Sc.

Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Pressure Losses

Hazen-Williams Formula

$V = kCR_h^{0.63}xS^{0.54}$

k= 0.85 - conversion factor (0.849 for SI units and 1.318 for US customary units)

C= 140 - roughness coefficient (PVC : 140-150)

$S = h_f/L$

Rh= D/4 - hydraulic radius (D/4 for full flow, A/P_W for partially flow)

Fire Fighting and Domestic Head Loss

Flow Requirements=	83.4	L/s
Diameter=	150	mm
Area=	1.77E-02	m^2
L=	13	m
V=	4.72	m/s
S=	1.17E-01	
R_h=	0.04	
H_f=	1.52	m
=	2.17	psi

Flow Test *(dated: April 11, 2018)*

when:	Static Pressure =	64	psi	Flow =	0	GPM	=	0.00 L/s
	Residual Pressure =	58	psi	Flow =	1950	GPM	=	123.01 L/s

Pressure (psi)	***Flow (L/s)***
64	0.00
58	123.01
59.9	***83.42***

Based on the Pressure/Flow relationship, we have to confirm that the flow requirement of 83.42 L/s can be provided at minimum pressure (20.3 psi + Losses) as set out by the FUS guidelines

Fire Flow is above minimum of **22.47** psi (20.3+Hf)

Since the flow of 83.42 L/s required for the proposed development is provided in the existing watermain at 59.9 psi (which is more than the minimum of 22.47 psi), we anticipate that the existing watermain infrastructure can support the proposed development.

HYDRANT FLOW TEST FORM

COLE ENGINEERING
Experience Enhancing Excellence

Project No: 2018-0046 Date: Apr. 11, 2018

Site Location: 1444-1458 Cawthra Rd. Hydrants Opened by: Peel Region Water

Mississauga, On. Tested By: Gordon H Samanthak

1) Required photos:

- [x] Site Id & Date
- [x] Location Overview
- [x] Other
- [x] Condition of Flow Hydrant
- [ ] Condition of Residual Hydrant

2) Test Data

Time of Test: 1300

Location of Test: (Flow) In front of 1424 Cawthra Rd, south side

(Residual) In front of 1476 Cawthra Rd, south side

Main Size: 300 mm

Static Pressure: 64 psi

	Number of Outlets & Orifice Size	Pitot Pressure	Flow (USGPM)	Residual Pressure
1	1 x 2.5"	54	1250	60
2	2 x 2.5"	34	1950	58
3				
4				

3) Calculations

$Q = 29.83\ cd^2\sqrt{p}$

Where c- cofficient of discharge (1 in smooth pipe)
d- pipe diameter (inches)
p- pitot reading (psi)
Q- flow (USGPM)

$Q_1 = (29.83)(0.9)(2.5")^2\sqrt{54}$

$= 1233.03$

$Q_1 = \sim 1250$ USGPM

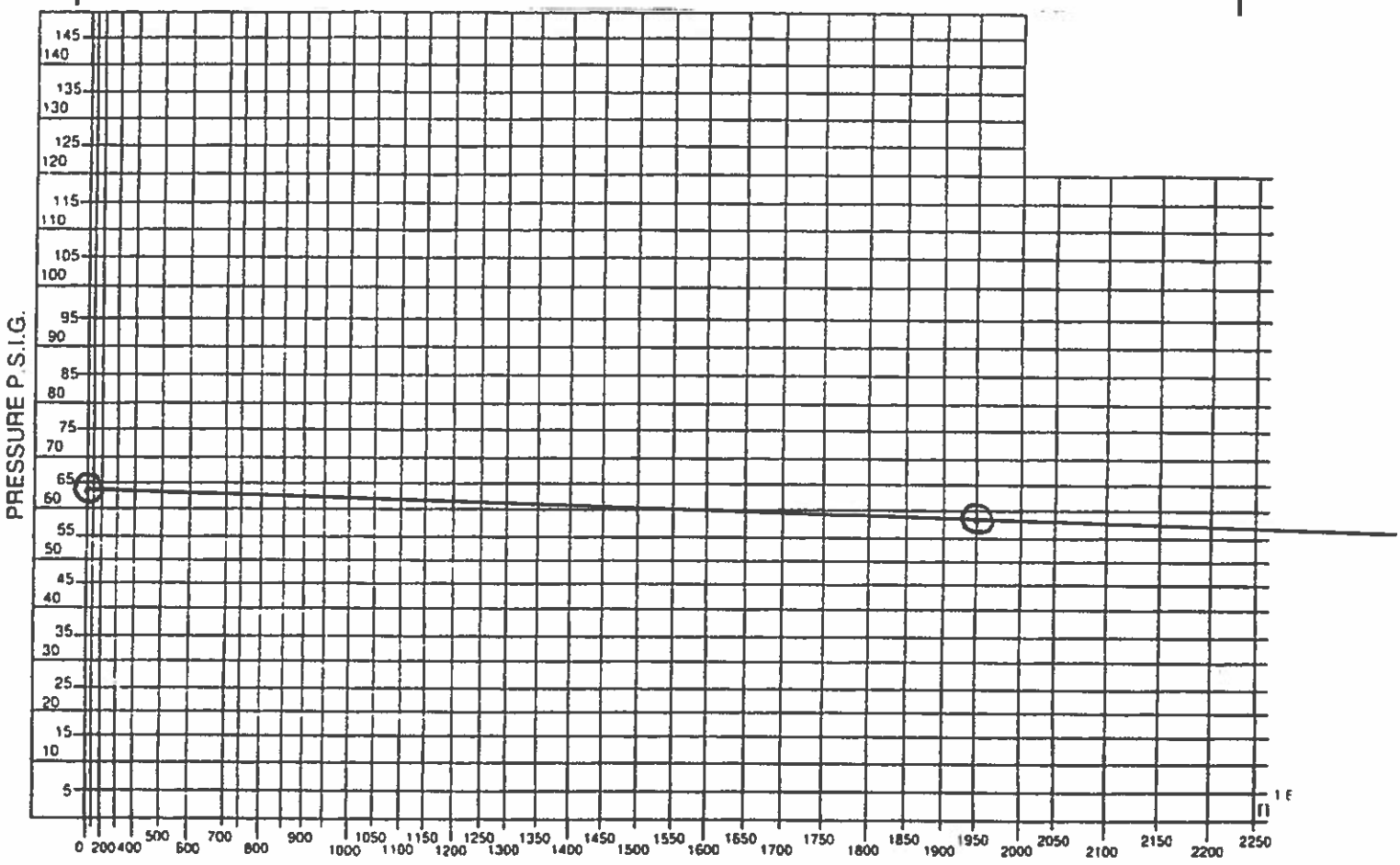
$Q_T = 2(29.83)(0.9)(2.5")^2\sqrt{34}$

$= 1956.79$

$Q_T = \sim 1950$ USGPM

Note: Hydrants tested according to NFPA 291: Recommended Practice for Fire Flow Testing and Marking of Hydrants

4) Plot



Q_{avail} @ 20 psi $= Q_T \left((P_S - P_A) / (P_S - P_R)\right)^{0.54}$

$= 1956.79 \left((64 - 20) / (64 - 58)\right)^{0.54}$

$= 5738.63$

$Q_{avail} \approx 5750$ USGPM

5) Site sketch & Comments