May 2020

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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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
FSR/SWM Report (Phase I)	December 19th, 2019	Re - Issued for Rezoning Application
FSR/SWM Report (Phase II)	May 12th, 2020	Re - Issued for Site Plan 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 II), in support of a Site Plan 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

Under post-development conditions, during a 100-year storm event, storm runoff drained from the north portion of the property towards Cawthra Road, will be less than the 2-year pre-development conditions. Moreover, for the south portion, all storm runoff will be contained on site for events up to a 100-year event. Therefore, this development will not adversely affect flow conditions downstream, the existing infrastructure on Cawthra Road will be adequate to service this development and a new storm sewer lateral connection will not be required for the proposed development. 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 277.98 m^3 of storage will be required. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of Environment, Conservation and Parks (MECP). Quality control will be provided for the subject site for 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 0.63 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.

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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 II), in support of a Site Plan 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 regarding storm drainage, sanitary sewers, and water supply.

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 August 13, 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 two (2) 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 3,304 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 0.015 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 0.521 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 a detailed Stormwater Management (SWM) review of the pre-development and post-development conditions and comments on opportunities to reduce peak flows. This is illustrated on a proposed servicing connection plan.

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 the Environment, Conservation and Park (MECP) 2003 Stormwater Management Planning and Design Manual (SWMPD). The following design criteria will be reviewed:

- Post-development peak flow for the 100-year event 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 have 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	0.151	0.50	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	12.6	16.9	20.8	29.5

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 12.6 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 – Storm runoff from the rooftops, the driveway area and the landscape areas, controlled into an underground infiltration gallery (trench).
2. A2 Post – Uncontrolled storm runoff from the north portion of the site, flowing towards 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	0.466	0.64	0.80	15
A2 Post	0.055	0.40	0.50	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.

5.3. 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.

5.3.1. 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	Maximum Storm Runoff (L/s)	Required Storage Volume in Infiltration Trench (m^3)	Provided Storage Volume in Infiltration Trench (m^3)	Controlled Site Release Rate (L/s)	Uncontrolled Flow (L/s)	Total Site Release Rate (L/s)
A1 Post (Controlled)	2-year	52.7	93.67	93.67	0	0	0
	5-year	70.8	125.92	125.92			
	10-year	87.2	155.10	155.10			
	100-year	146.5	277.98	277.98			

According to our calculations, the storm runoff volume for the south portion (A1 Post) of the site reaches 277.98 m^3 after 180 minutes from the beginning of the 100-year storm event. Based on this information and given that under existing conditions, storm runoff from this area is draining towards the south-west portion of the adjacent dwellings, we can accept that at least 277.98 m^3 of storage will be adequate to accommodate all post-development flows up to a 100-year event.

Quantity control for the proposed development will be achieved by the implementation of three (3) underground infiltration trenches, with a total area of 413.51 m^2 and a tota^l storage capability of 277.98 m^3.

More specifically, storm runoff from the rooftops, the driveway area, the landscaped areas and walkways south of the site will be gravity driven into the proposed three underground infiltration trenches located east, west and south of the property.

To conclude, there will be no post-development release rate from the south portion of the site and all post-development flows will be controlled/utilized on site.

<u>Underground Infiltration Trenches</u>

Three underground infiltration trenches are proposed to meet the quantity control requirements, set forth by the City's guidelines. Controlled stormwater flows from the south site area will be driven into the infiltration trenches. Assuming the infiltration trenches have 40% void space, their size has to be at least 2.5 times the water volume required to be stored. Therefore, the infiltration trenches must have a minimum storage depth of 1.76 m with a total storage capacity of 291.21 m^3 (1.68m of active storage depth, accounting for a quantity control storage of 277.98 m^3 and another 0.08m for the water balance requirement, accounting 13.23 m^3 of storage), during the hundred-year storm event.

5.3.2. 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)
A2 Post (Uncontrolled)	2-year	12.6	3.7
	5-year		5.0
	10-year		6.1
	100-year		10.8

As shown on **Table 5-5** above, 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.

5.4. 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 26.05 m^3. Based on the initial abstraction values, the site will provide 14.25 m^3 of initial abstraction in post-development conditions. The remaining 11.80 m^3 will be provided through the proposed infiltration trenches, as mentioned in **Section 5.3**. Assuming the infiltration trenches have 40% void space, their size has to be at least 2.5 times the water volume required to be stored. Therefore, the infiltration trenches must have an additional minimum storage volume of (2.5x11.80=) 29.50 m^3, for Water Balance purposes. The result of the water balance analysis is summarized in **Table 5-6** below.

Table 5-6 - Water Balance Analysis Results

Total Site Area (m^2)	Depth of Rainfall (mm)	Water Balance Requirement (m^3)	Water Balance Provided through Initial Abstraction (m^3)	Water Balance Provided in the Underground Infiltration Trenches (m^3)	Total Water Balance Volume Provided (m^3)
5,209.4	5.0	26.03	14.25	13.23	27.48

5.5. Quality Controls

Stormwater treatment must meet Enhanced Protection criteria as defined by the MECP 2003 SWMPD Manual, including a minimum 80% of total suspended solids removal (TSS). Stormwater discharged from the south areas that will not be polluted by car waste (rooftops, landscaped areas), is considered "clean" and will be directly driven into the underground infiltration trench. Polluted water from the driveway area will be directed towards the proposed Oil-Grit-Separator (Stormceptor EF04) before being discharged into the infiltration trench located south of the site.

The detailed quality control calculations and OGS sizing are provided in **Appendix C**. A summary of the site quality control is included in **Table 5-7** below.

Table 5-7- Site TSS Removal

Drainage Area	Drainage Area (ha)	Overall TSS Removal	Additional Quality Control Required
Rooftop/Terraces/Landscaped Area	0.176	80%	Inherent
Driveway Area	0.290	80%	Stormseptor EF04

5.6. Proposed Storm Connection

A new storm sewer connection will not be required for the proposed development. Under post-development conditions, during a 100-year storm event, storm runoff drained from the north portion of the property towards Cawthra Road, will be less than the 2-year pre-development conditions. Moreover, for the south portion, all storm runoff will be contained on site for events up to a 100-year event. Therefore, this development will not adversely affect flow conditions downstream and the existing infrastructure on Cawthra Road will be adequate to service this development.

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 0.99 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 0.63 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. Each residential dwelling and townhouse development sanitary connection will be according to the City of Mississauga and Region of Peel criteria. 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 residential dwelling and townhouse development watermain connection will be according to the City of Mississauga and Region of Peel criteria. Furthermore, a private hydrant is proposed within the driveway area of the site, as per Region of Peel standard drawing 1-8-2.

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 and the adjacent landscape area will be directed towards the City's network along Cawthra Street. Storm runoff from the rest of the site will be directed towards the three proposed infiltration trenches. 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 5.3.**

9.0 Conclusions and Recommendations

Based on our investigations, we conclude the following:

Storm Drainage

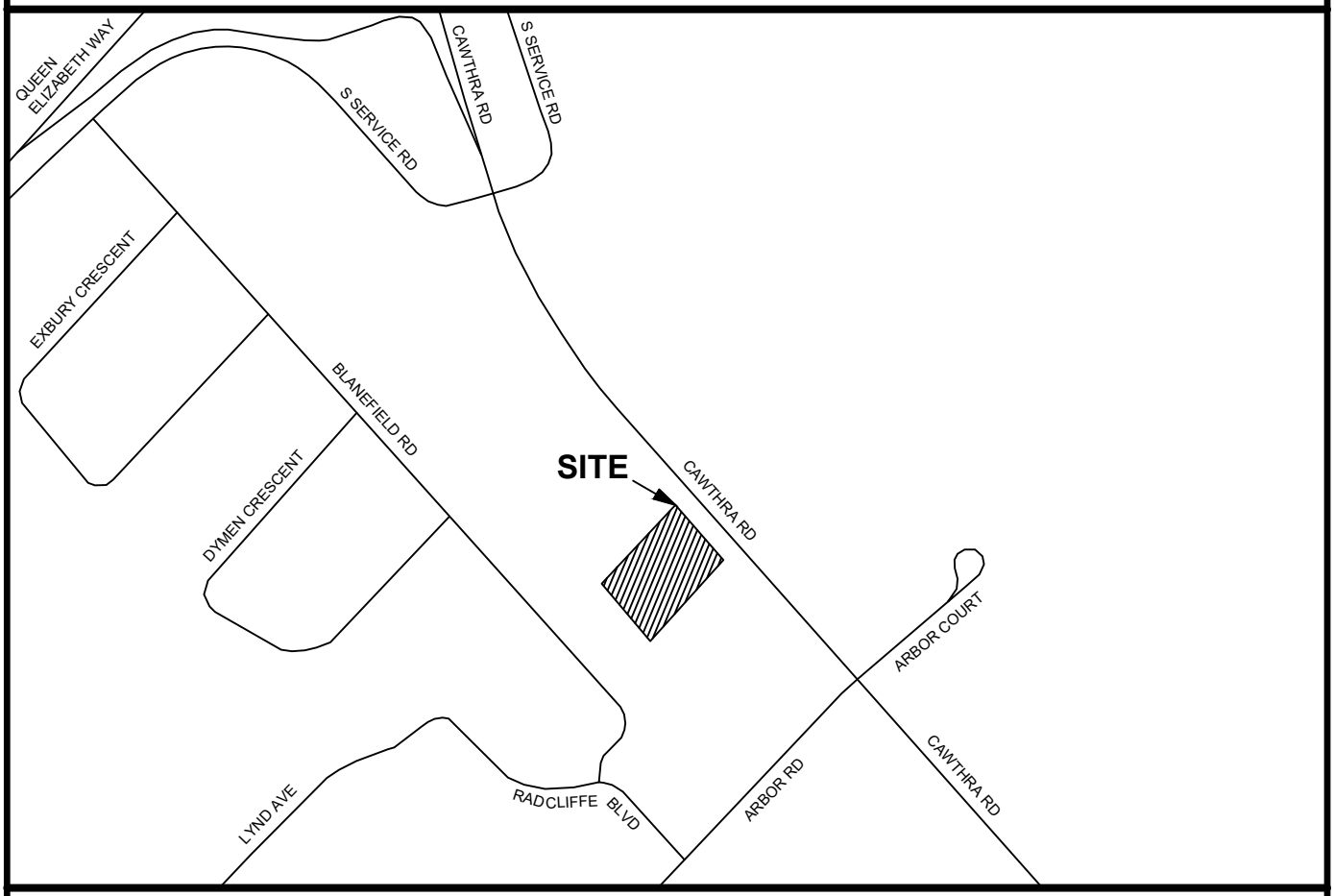
Under post-development conditions, during a 100-year storm event, storm runoff drained from the north portion of the property towards Cawthra Road, will be less than the 2-year pre-development conditions. Moreover, for the south portion, all storm runoff will be contained on site for events up to a 100-year event. Therefore, this development will not adversely affect flow conditions downstream, the existing infrastructure on Cawthra Road will be adequate to service this development and a new storm sewer lateral connection will not be required for the proposed development. 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 277.98 m^3 of storage will be required. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of Environment, Conservation and Parks (MECP). Quality control will be provided for the subject site for 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 0.63 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.



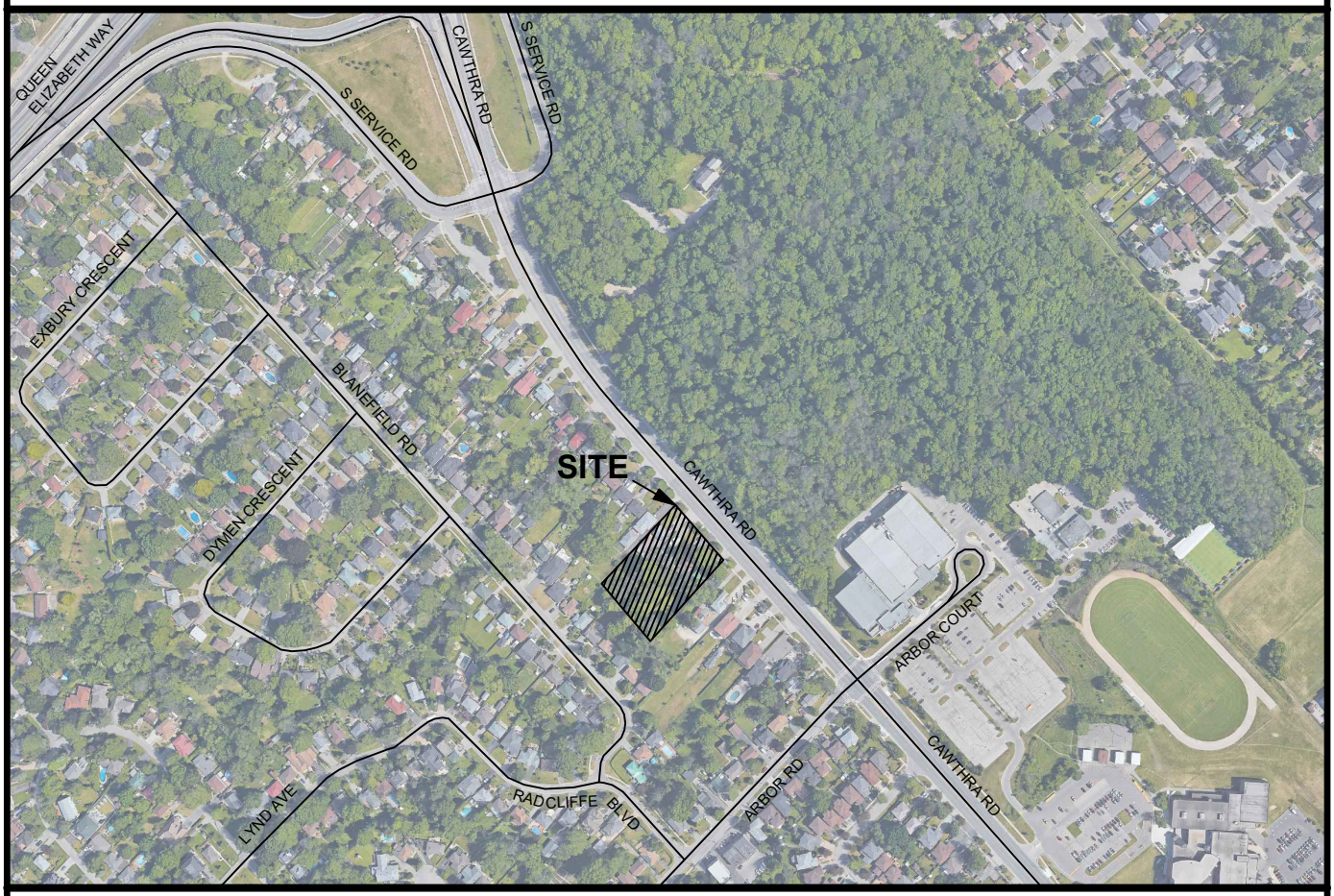
Lithos

150 Bermonsdey Road, North York, Ontario M4A 1Y1

LOCATION PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE:	MAY 2020	PROJECT No:	UD17-094
SCALE:	N.T.S.	FIGURE No:	FIG 1



Lithos

150 Bermonsdey Road, North York, Ontario M4A 1Y1

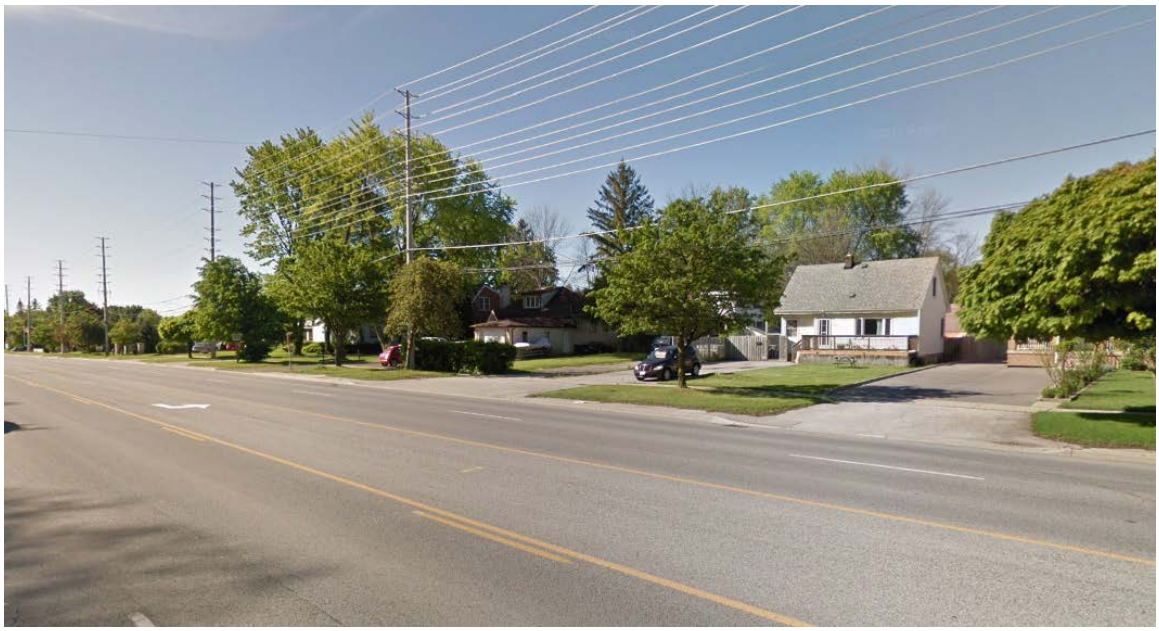
AERIAL PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE:	MAY 2020	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

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 MONUMENTRE 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 98.308 METRES . (NON GEODETIC)

AREA=5360.50 Sq.m.
0.536 Ha
1.325 Ac

SURVEYOR'S CERTIFICATE
I CERTIFY THAT:

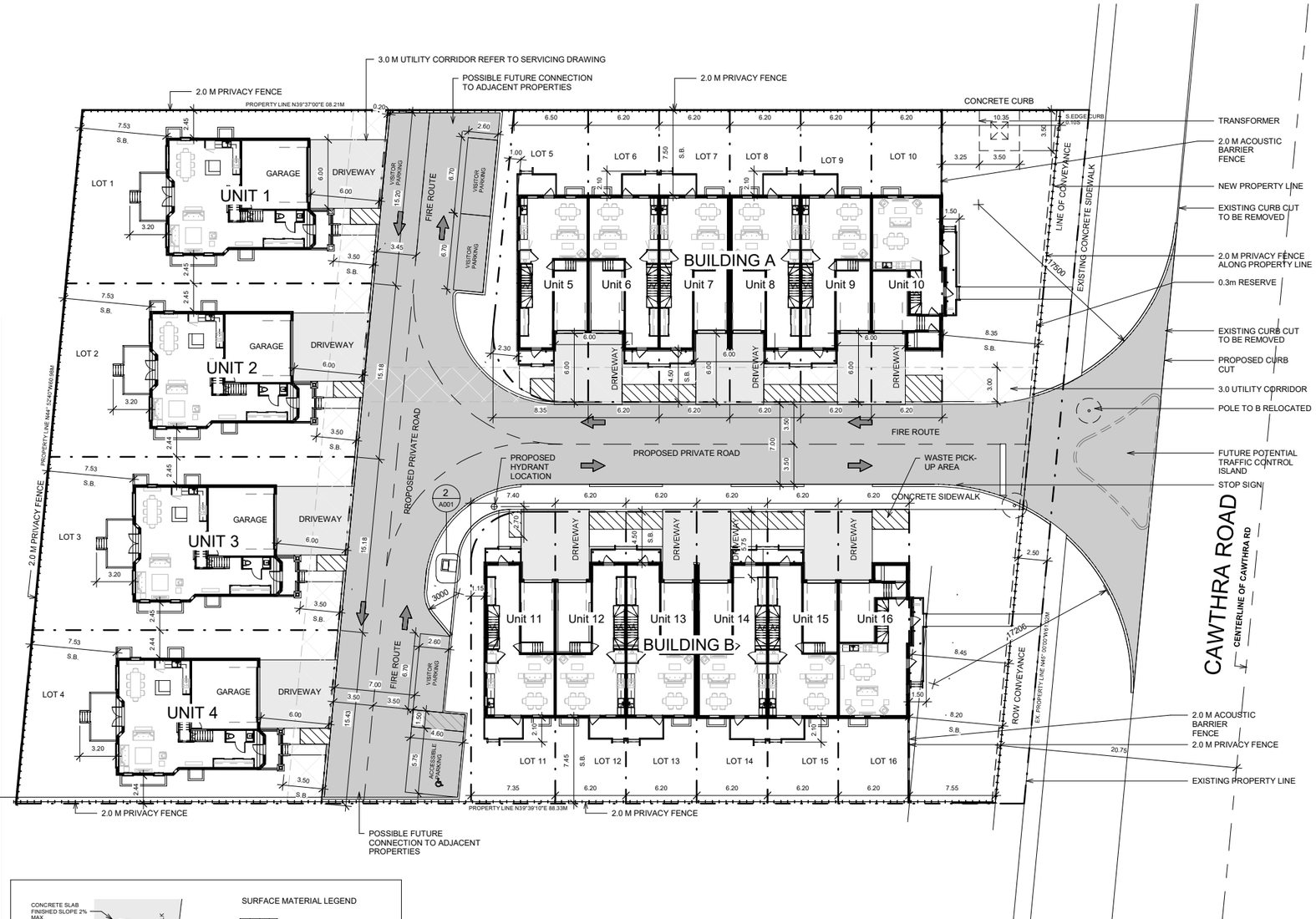
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM
2. THE SURVEY WAS COMPLETED ON THE 28th DAY OF MARCH, 2017

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
mapos@rogers.com

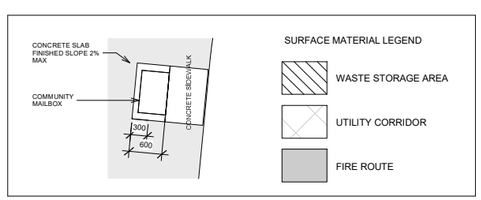
FILE: 02-77A
CAD FILE: CAWTHRA-SRPR-TOPO



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 (SLINGTON), ON M9B 4W7
5. ANY GRADE ELEVATIONS ARE SHOWN FOR REFERENCE ONLY, REFER TO GRADING AND SITE SERVICING PLAN FOR GRADING AND U/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
12. I HEREBY CERTIFY THAT THIS DRAWING CONFIRMS IN ALL RESPECTS TO THE SITE DEVELOPMENT PLANS ARCHITECT OR ENGINEER'S SIGNATURE (IF APPLICABLE) AND PROFESSIONAL SEAL THE CITY OF MISSISSAUGA REQUIRES THAT ALL WORKING DRAWINGS SUBMITTED TO THE BUILDING DIVISION AS PART OF AN APPLICATION FOR THE ISSUANCE OF A BUILDING PERMIT SHALL BE CERTIFIED BY THE ARCHITECT OR ENGINEER AS BEING IN CONFORMITY WITH THE SITE DEVELOPMENT PLAN AS APPROVED BY THE CITY OF MISSISSAUGA
13. ALL EXTERIOR LIGHTING WILL BE DIRECTED ONTO THE SITE AND WILL NOT INFRINGE UPON THE ADJACENT PROPERTIES
14. ALL ROOFTOP MECHANICAL UNITS SHALL BE SCREENED FROM VIEW BY THE APPLICANT
15. PARKING SPACES RESERVED FOR PEOPLE WITH DISABILITIES MUST BE IDENTIFIED BY A SIGN, INSTALLED AT THE APPLICANT'S EXPENSE, IN ACCORDANCE WITH THE BY-LAW REQUIREMENTS AND BUILDING CODE REQUIREMENTS
16. THE APPLICANT WILL BE RESPONSIBLE FOR ENSURING THAT ALL PLANS CONFIRM TO TRANSPORT CANADA'S RESTRICTIONS
17. GRADES WILL BE MET WITH A 33% MAXIMUM SLOPE AT THE PROPERTY LINES AND WITHIN THE SITE
18. ALL DAMAGED AREAS ARE TO BE REINSTATED WITH TOPSOIL AND SOD PRIOR TO THE RELEASE OF SECURITIES
19. SIGNAGE SHOWN ON THE SITE DEVELOPMENT PLANS IS FOR INFORMATION PURPOSES ONLY. ALL SIGNS WILL BE SUBJECT TO THE PROVISIONS OF SIGN BY-LAW 0054-2002, AS AMENDED, AND A SEPARATE SIGN APPLICATION WILL BE REQUIRED THROUGH THE BUILDING DIVISION
20. ANY FENCING ADJACENT TO MUNICIPAL LANDS IS TO BE LOCATED 15 CM (6.0 IN.) INSIDE THE PROPERTY LINE
21. ONLY "SHIELDED" LIGHTING FIXTURES ARE PERMITTED FOR ALL DEVELOPMENT, EXCEPT FOR DETACHED AND SEMI-DETACHED DWELLINGS WITHIN 60 M (196.8 FT.) OF A RESIDENTIALLY ZONED PROPERTY AND MUST CONFIRM TO THE ENGINEER CERTIFIED LIGHTING PLAN
22. THE ENGINEER CERTIFIED LIGHTING PLAN MUST BE SIGNED BY THE CONSULTING ENGINEER
23. THE OWNER COVENANTS AND AGREES TO CONSTRUCT AND INSTALL "SHIELDED" LIGHTING FIXTURES ON THE SUBJECT LANDS, IN CONFORMITY WITH THE SITE PLAN AND ENGINEER CERTIFIED LIGHTING PLAN TO THE SATISFACTION OF THE CITY OF MISSISSAUGA
24. THE APPLICANT WILL BE RESPONSIBLE FOR ENSURING THAT ALL PLANS CONFIRM TO TRANSPORT CANADA'S RESTRICTIONS
25. WHERE PLANTING IS TO BE LOCATED IN LANDSCAPED AREAS ON TOP OF AN UNDERGROUND PARKING STRUCTURE, IT IS THE RESPONSIBILITY OF THE APPLICANT TO ARRANGE THE COORDINATION OF THE DESIGN OF THE UNDERGROUND PARKING STRUCTURE WITH THE LANDSCAPE ARCHITECT AND THE CONSULTING ENGINEERING. UNDERGROUND PARKING STRUCTURES WITH LANDSCAPING AREA TO BE CAPABLE OF SUPPORTING THE FOLLOWING LOADS:
   - 15 CM OF DRAINAGE GRAVEL PLUS 40 CM TOPSOIL FOR SOD
   - 15 CM OF DRAINAGE GRAVEL PLUS 60 CM TOPSOIL FOR SHRUBS
   - 15 CM OF DRAINAGE GRAVEL PLUS 90 CM FOR TREES
   OR
   - PREFABRICATED SHEET DRAIN SYSTEM* WITH A COMPRESSIVE STRENGTH OF 1003 KPA PLUS 40 CM TOPSOIL FOR SOD
   - PREFABRICATED SHEET DRAIN SYSTEM* WITH A COMPRESSIVE STRENGTH OF 1003 KPA PLUS 60 CM TOPSOIL FOR SHRUBS
   - PREFABRICATED SHEET DRAIN SYSTEM* WITH A COMPRESSIVE STRENGTH OF 1003 KPA PLUS 90 CM TOPSOIL FOR TREES
   * TERRADRAIN 900 OR APPROVED EQUAL
26. THE STRUCTURAL DESIGN OF ANY RETAINING WALL OVER 0.6 M IN HEIGHT OR ANY RETAINING WALL LOCATED ON A PROPERTY LINE IS TO BE SHOWN ON THE SITE GRADING PLAN FOR THIS PROJECT AND IS TO BE APPROVED BY THE CONSULTING ENGINEER FOR THE PROJECT
27. CONTINUOUS 15 CM HIGH BARRIER TYPE POURED CONCRETE CURBING WILL BE PROVIDED BETWEEN ALL ASPHALT AND LANDSCAPED AREAS THROUGHOUT THE SITE
28. ALL UTILITY COMPANIES WILL BE NOTIFIED FOR LOCATES PRIOR TO THE INSTALLATION OF THE HOARDING THAT LIES WITHIN THE SITE AND WITHIN THE LIMITED OF THE CITY BOULEVARD AREA

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	2018.09.28
3	Issued for Review	2019.08.13

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

1444-1458
CAWTHRA

KFA ARCHITECTS + PLANNERS

Date: 22-Apr-2020

Development Statistics

Site Area (a)			
m^2	sq.ft	ha	acre
5362.9	57727.9	0.54	1.33
5209.4*		Units/Ha	Units/Acre
		30	12

*Site Area per new ROW Conveyance

General Development Statisitics Table	
Total Number of Units	16.0
Average Unit Size Construction Area (m^2)	290.4
Average Unit Size Construction Area (SF)	3126
Gross Construction Area (m^2)	4646.4

Zoning By-law 0225-2007	
FSI*	0.62
Total GFA (m^2): Residential ZBL Definition*	3304

*Calculated excluding basement and garage

Gross Floor Area (GFA) - Residential - means the sum of the areas of each storey of a building measured from the exterior of outside walls but shall not include any part of the building used for motor vehicle parking.

Gross Floor Area (GFA) - Infill Residential - means the sum of the areas of each storey of a building above average grade, measured from the exterior of outside walls, including an attached garage and any part of the building, above and below grade, used for motor vehicle parking.

Official Planning Designation: Residential Low Density II

Zoning By-law 0225-2007: R3-1

Site Area Breakdown Table (m2)	Area	
Paving	1300.4	25.0%
Soft Landscaping Area	2260.0	43.4%
Hard Landscape Area	184.8	3.5%
Building Area (Lot Coverage)	1464.2	28.1%

Building Heights & Setbacks (m)					
Building A	Height:	9.50	Detached Lot 1	Height:	9.00
Property Line setback:	North	7.50	Property Line setback:	North	2.44
	East	8.34		East	6.00
	South	6.00		South	2.44
	West	1.00		West	7.53
Building B	Height:	9.50	Detached Lot 2	Height:	9.00
Property Line setback:	North	6.00	Property Line setback:	North	2.44
	East	8.22		East	6.00
	South	7.45		South	2.44
	West	1.20		West	7.53
			Detached Lot 3	Height:	9.00
			Property Line setback:	North	2.44
				East	6.00
				South	2.44
				West	7.53
			Detached Lot 4	Height:	9.00
			Property Line setback:	North	2.44
				East	6.00
				South	2.44
				West	7.53

Note: Building height measured from established grade.

Residential Area Calculations by Building and Lot Number		Gross Construction Area (m2)	Garage	Basement	Gross Floor Area (m2)*	Gross Floor Area (sq ft)*	Unit Mix Breakdown							
							1	1+Den	2	2+Den	3	3+Den	4	4+Den
Detached Homes														
Lot 1	Unit 1	346.7	38.0	89.0	219.7	2364.8								1
Lot 2	Unit 2	346.7	38.0	89.0	219.7	2364.8								1
Lot 3	Unit 3	346.7	38.0	89.0	219.7	2364.8								1
Lot 4	Unit 4	346.7	38.0	89.0	219.7	2364.8								1
Total		1386.8			878.8	9459.1	0	0	0	0	0	0	0	4
Building A														
Lot 5	Unit 5	271.4	20.0	48.9	202.4	2179				1				
Lot 6	Unit 6	271.4	20.0	48.9	202.4	2179				1				
Lot 7	Unit 7	271.4	20.0	48.9	202.4	2179				1				
Lot 8	Unit 8	271.4	20.0	48.9	202.4	2179				1				
Lot 9	Unit 9	271.4	20.0	48.9	202.4	2179				1				
Lot 10	Unit 10	273.0	21.6	50.7	200.7	2161				1				
Total		1629.8			1212.8	13054.6	0	0	0	6	0	0	0	0
Building B														
Lot 11	Unit 11	271.4	20.0	48.9	202.4	2179				1				
Lot 12	Unit 12	271.4	20.0	48.9	202.4	2179				1				
Lot 13	Unit 13	271.4	20.0	48.9	202.4	2179				1				
Lot 14	Unit 14	271.4	20.0	48.9	202.4	2179				1				
Lot 15	Unit 15	271.4	20.0	48.9	202.4	2179				1				
Lot 16	Unit 16	273.0	21.6	50.7	200.7	2161				1				
Total		1629.8			1212.8	13054.6	0	0	0	6	0	0	0	0
Combined Total		**4646.4**			**3304.4**	**35568.4**	**0.0**	**0.0**	**0.0**	**12.0**	**0.0**	**0.0**	**0.0**	**4.0**

1444-1458 CAWTHRA ROAD, MISSISSAUGA

KFA ARCHITECTS + PLANNERS — Date: February 19, 2020

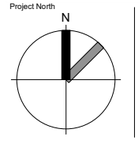
ZONING TABLE

Zone Regulations	RM 6 Requirded	Proposed Draft ZBL (Exception)	RM6 - Townhouses												RM6 - Detached Homes			
			Building D			Building B			Building C			Building A						
			Lot 5	Lot 6	Lot 7	Lot 8	Lot 9	Lot 10	Lot 11	Lot 12	Lot 13	Lot 14	Lot 15	Lot 16	Lot 1	Lot 2	Lot 3	Lot 4
PERMITTED USES																		
Townhouses on a CLC - road	Townhouses	Townhouses & Detached homes	Townhouses												Detached Homes			
MINIMUM LOT AREA																		
Interior lot	115 sq.m.	-	-	158.61	158.61	158.61	158.61	-	-	158.56	158.56	158.56	158.56	-	406.75	407.04	406.39	406.61
CLC - Corner Lot	190 sq.m.	185 sq.m.	187.72	-				158.61	203.43	-				158.56	-			
MINIMUM LOT FRONTAGE																		
Interior Lot	5.0 m	-		6.2 m	6.2 m	6.2 m	6.2 m	6.2 m		6.2 m	6.2 m	6.2 m	6.2 m	6.2 m	15.20	15.18	15.18	15.43
CLC - Corner Lot	8.3 m	6.0 m	8.3 m	-					7.4 m	-					-			
MINIMUM FRONT YARD																		
Interior Lot/CLC - Corner Lot	4.5 m	-	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	4.5 m	3.5 m	3.5 m	3.5 m	3.5 m
Minimum setback from a garage face to a street, CCC - road or CCC - sidewalk	6.0 m	-	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.0 m	6.00 m	6.00 m	6.00 m	6.00 m
MINIMUM EXTERIOR SIDE YARD																		
lot with an exterior side lot line that is a street line of a designated right-of-way 20.0m or greater	7.5 m	-	-															
lot with an exterior side lot line abutting a CCC – private road	4.5 m	1.3 m	1 m	-					1.2 m	-								
MINIMUM INTERIOR SIDE YARD																		
Unattached side	1.5 m	0.9 m	-	-	-	-	-	-	-	-	-	-	-	-	2.44 m	2.44 m	2.44 m	2.44 m
MAXIMUM HEIGHT	10.7 m and 3 storeys	9.5 m and 3 storeys	9.5 m and 3 storeys															
ENCROACHMENTS, PROJECTIONS AND SETBACKS																		
Maximum encroachment of a **porch or deck inclusive of stairs** located at and accessible from the first storey or below the first storey into the required **front yard and exterios side yards**	1.5 m	2.0 m	1.5 m	2.12 m	2.12 m	2.12 m	2.12 m	2.12 m	1.5 m	2.12 m	2.12 m	2.12 m	2.12 m	2.12 m	3.14 m	3.14 m	3.14 m	3.14 m
Maximum encroachment of an **awning, window, chimney, pilaster or corbel, window well, and stairs with a maximum of three risers,** into the required **front and exteior side yards**	0.6 m	1.75 m	-	-	-	-	-	-	-	-	-	-	-	1.64 m	0.93 m	-	-	0.93 m
Minimum setback of a townhouse dwelling to a CLC – visitor parking space	3.3 m	2.0 m	2.69 m	-	-	-	-	-	-	-	-	-	-	-				
ATTACHED GARAGE, PARKING AND DRIVEWAY																		
Maximum driveway width	3.0 m	6.0 m	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	6.0 m	6.0 m	6.0 m	6.0 m

1444 - 1458

1444-1458 CAWTHRA ROAD
MISSISSAUGA, ON

Project North



KFA architects + planners inc.

Project No:	16071
Scale:	
Date:	2017/04/05
Drawn by:	Author

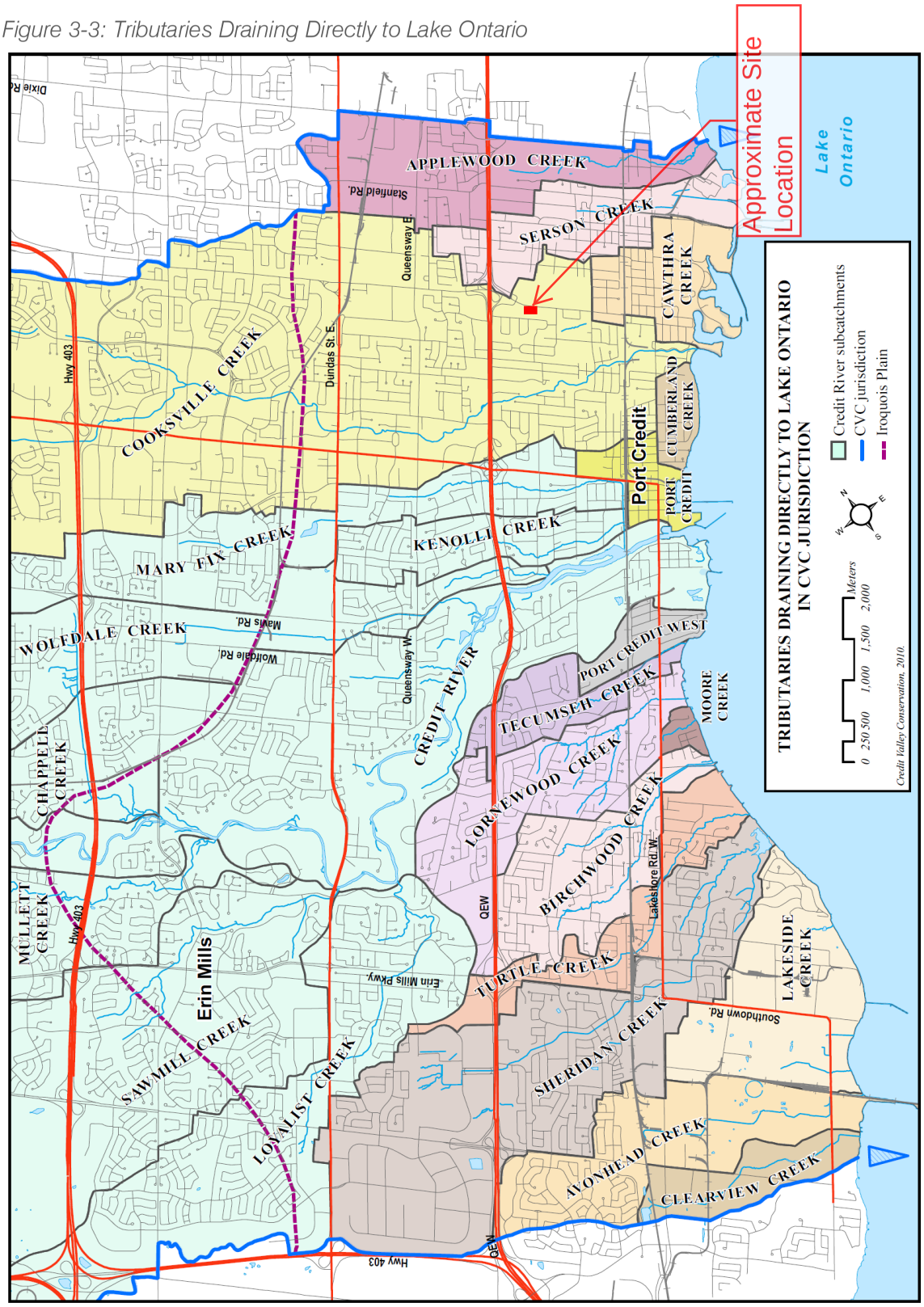
Drawing Title

Development Statistics & Zoning Table

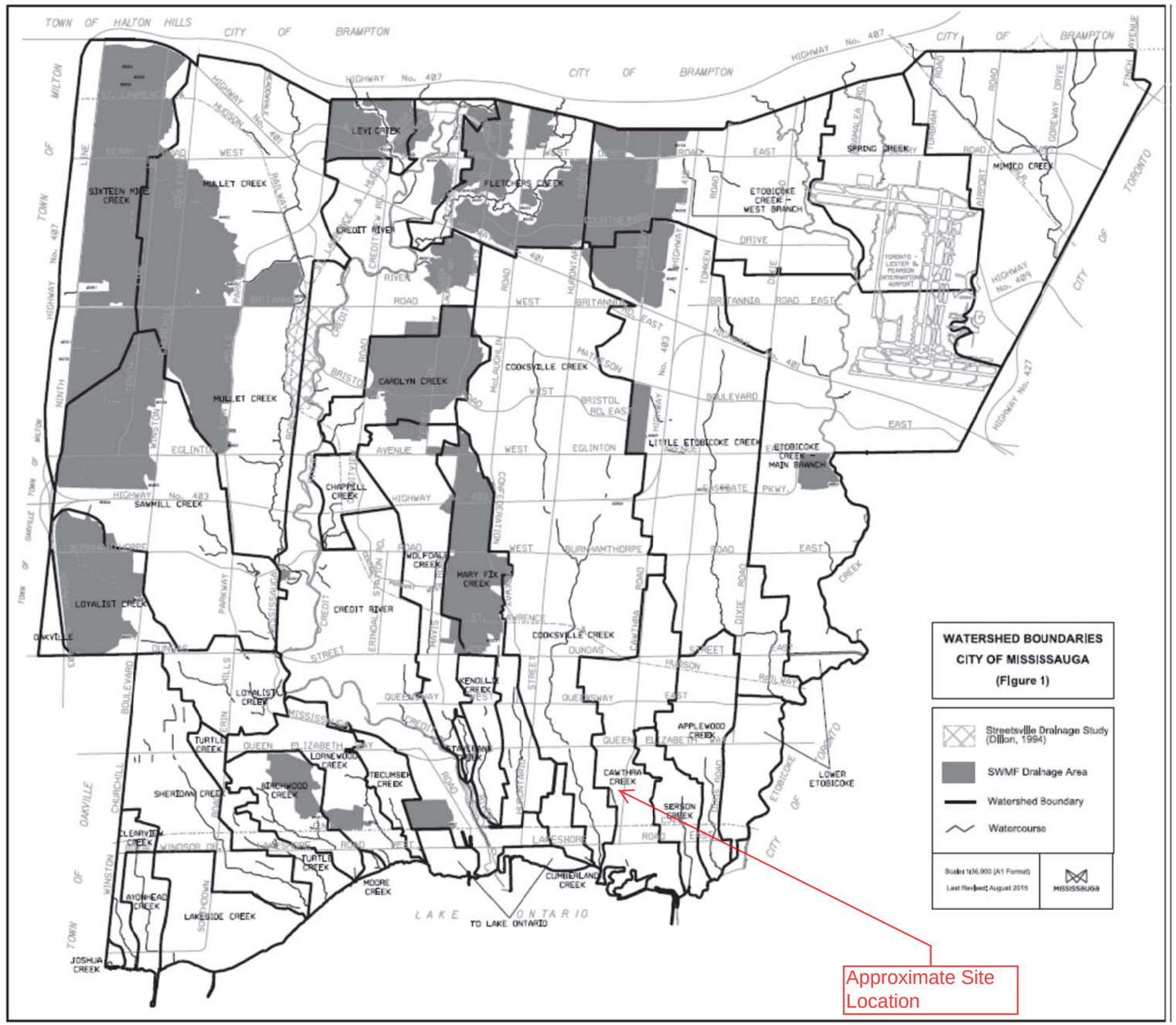
Drawing Number

A004

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.

WEST — ℄ CAWTHRA RD (EXISTING) — EAST

℄ CONSTRUCTION

FINAL GROUND (WATERMAIN)

EXISTING GROUND

CLAY TILL

45° BEND STA. 0+975.4
45° BEND STA. 0+973.7
150 mm G.V. M.J. & BOX STA. 0+982
2 - 300 mm X 150 mm TEES STA. 0+988.6
45° BEND STA. 0+995.4
45° BEND STA. 0+998.5
45° BEND STA. 1+001.5
45° BEND STA. 1+002.5
45° BEND STA. 1+018.2
150 mm G.V. M.J. & BOX STA. 1+015.6
45° BEND STA. 1+021.2

(NOTE 2) EX. SAN. SEWER
POLYSTYRENE B.M. 75mm CLEAR GAP
NEW 1350 mm ST.M. SEWER
EX. W.M. (NOTE 1)
SAN
STM

EXIST. W.M. (NOTE 1)
NEW ST. SEWER
℄ ATWATER AVENUE (NOTE 1)
EXIST. SAN.
EXIST. WM BELL
GAS

EXISTING GROUND (℄ CAWTHRA ROAD)

FINAL GROUND (℄ WATERMAIN)

CLAYEY SAND TILL

SANDY CLAY TILL

CLAY TILL

1.70 mm

EXIST. 250 mm SAN.

FUTURE TOP OF PAVEMENT

300mm X 300mm TEE MJ AND PLUG STA 10+728.6

VERTICAL DEFLECTION

DIRECTION OF LAYING

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

45° BEND STA 10+761.5

45° BEND STA 10+764.4

45° BEND STA 10+770

45° BEND STA 10+767.8

86.32 86.22 86.42

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

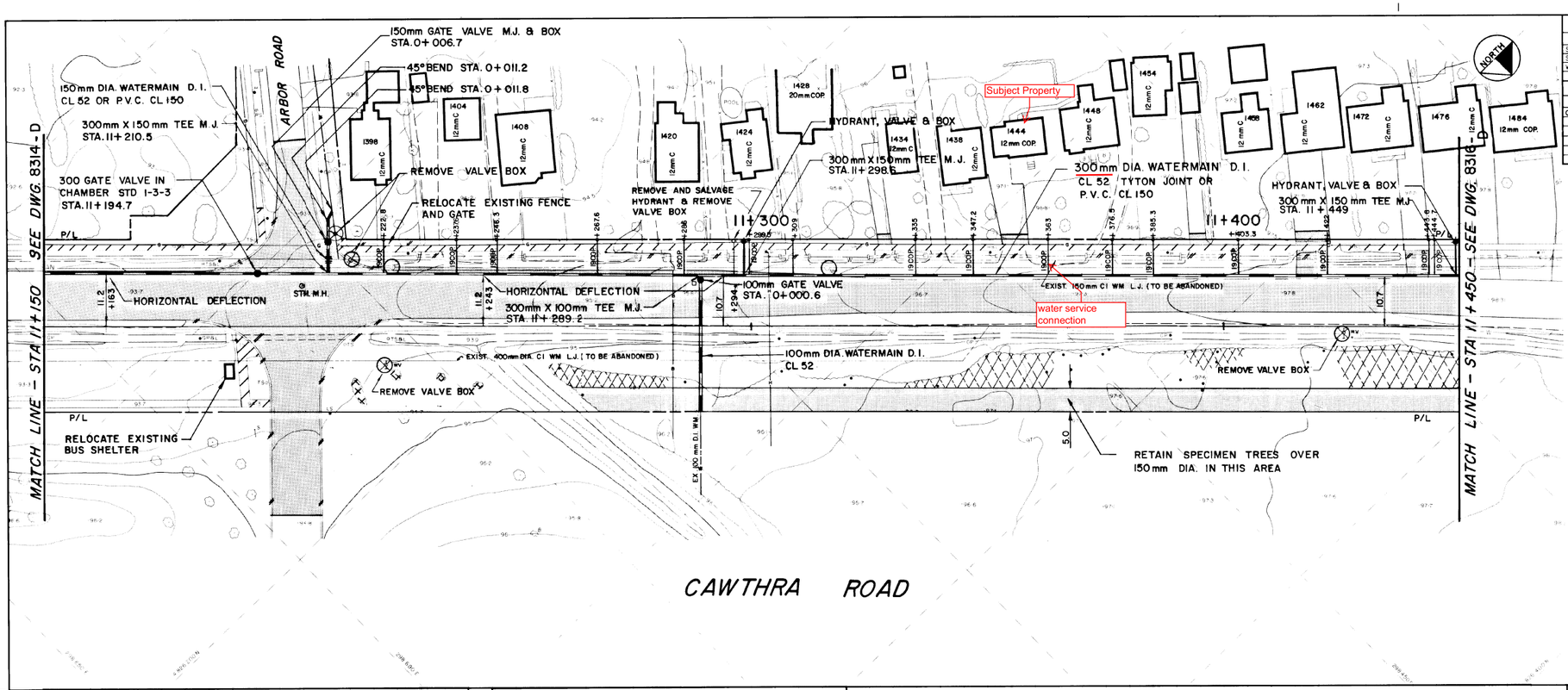
Sta. To Sta. 10+900

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	-

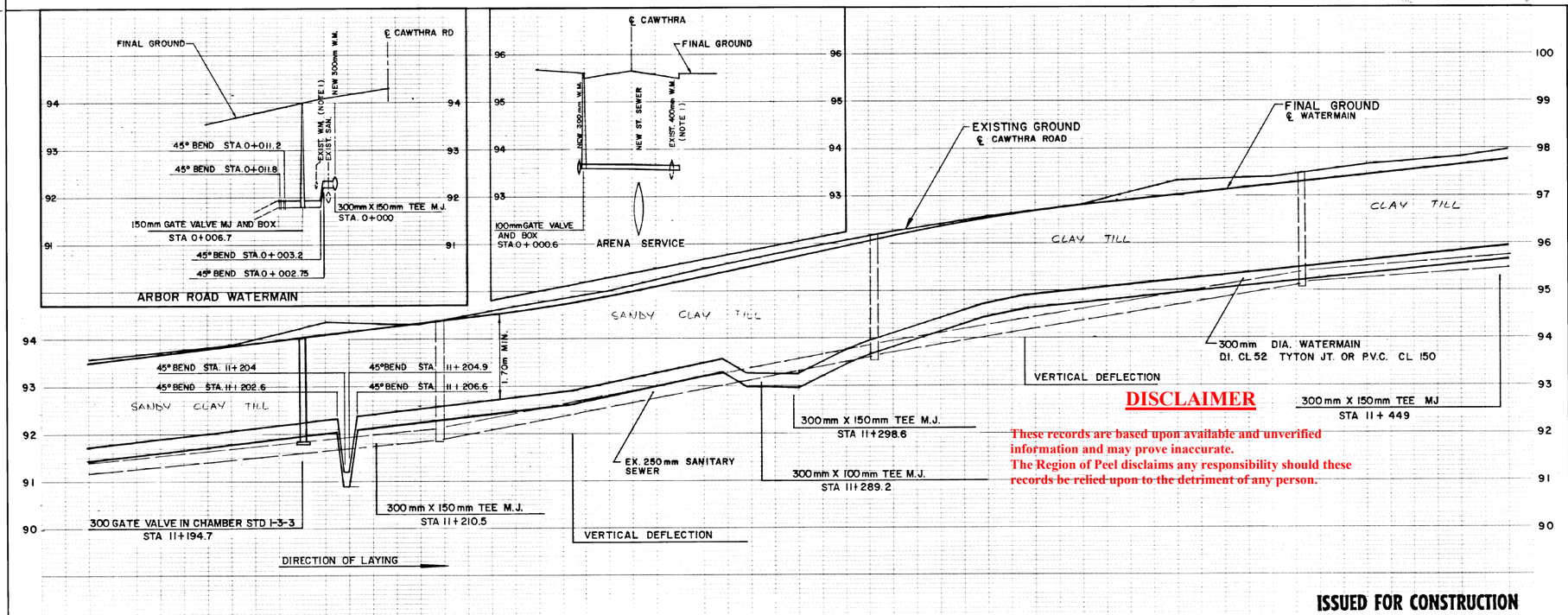


SERVICE DATA

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.



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

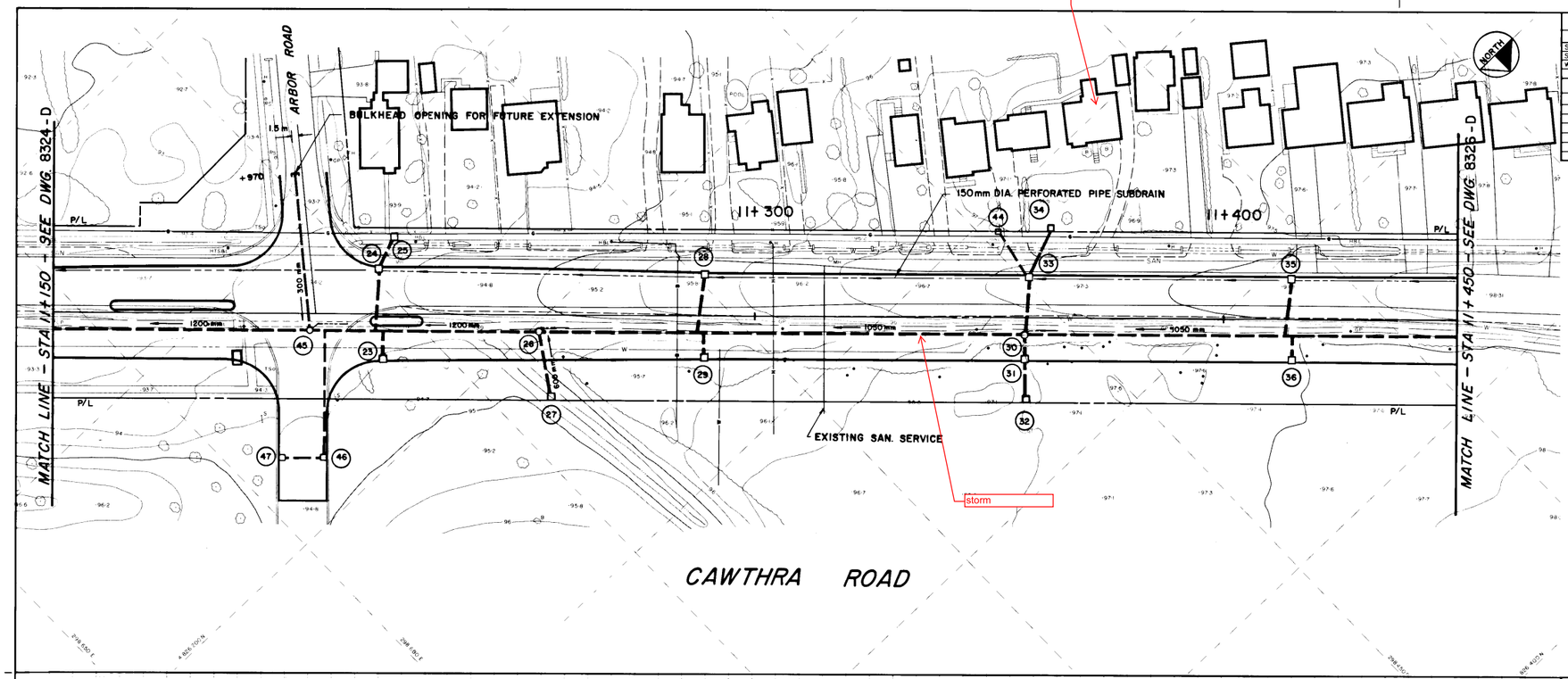
300mm DIA. WATERMAIN & REMOVALS

Sta. 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



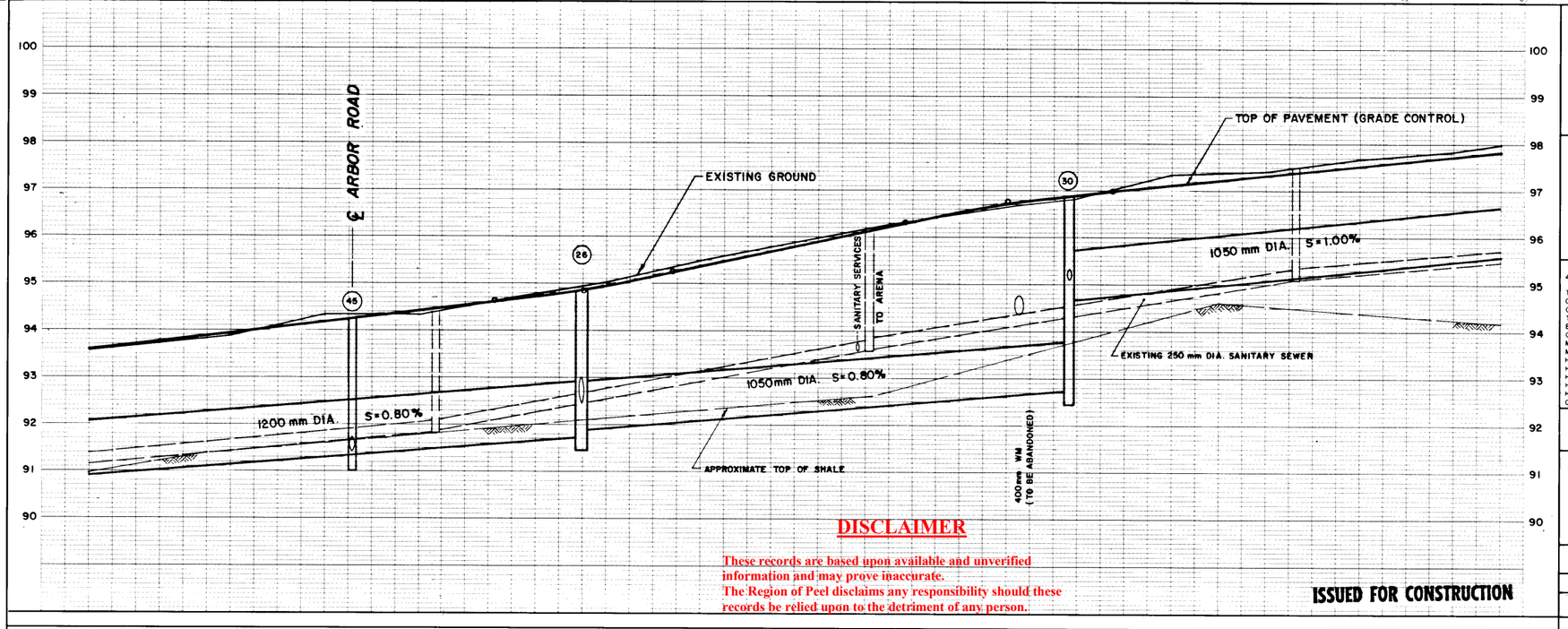
Storm

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

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
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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

+ 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

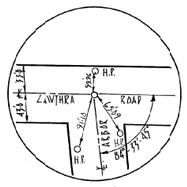
DISCLAIMER

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.

ISSUED FOR CONSTRUCTION

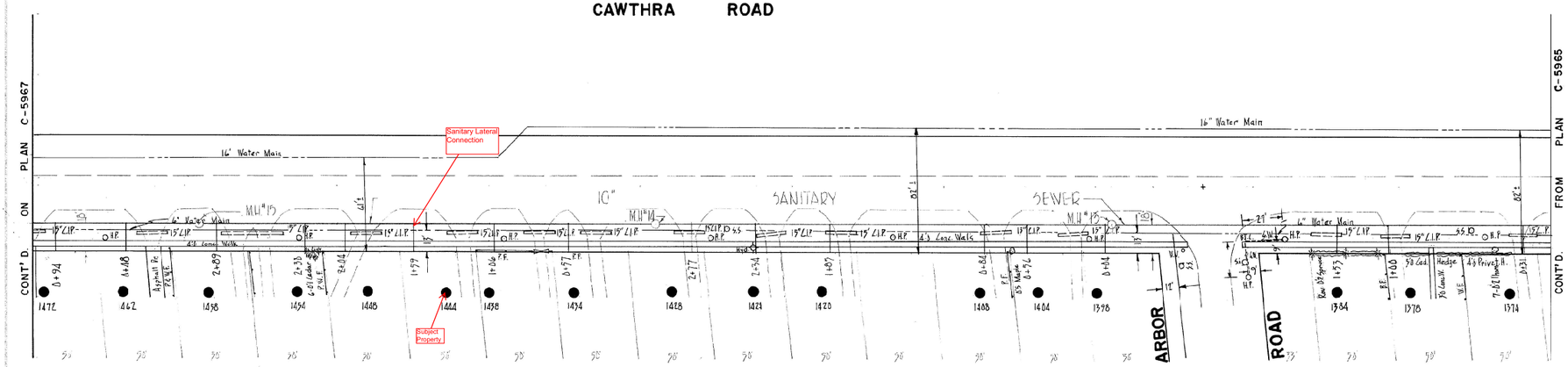
SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS	[illegible]	K.Y.	B/S MAINS	MAY 15/63	K.Y.
STORM SEWERS	[illegible]	K.Y.	BELL U/G CABLE	MAY 15/63	K.Y.
WATERMAINS	AUG 30/63	K.Y.	HYDRO U/G CABLE	SEPT 2/63	K.Y.

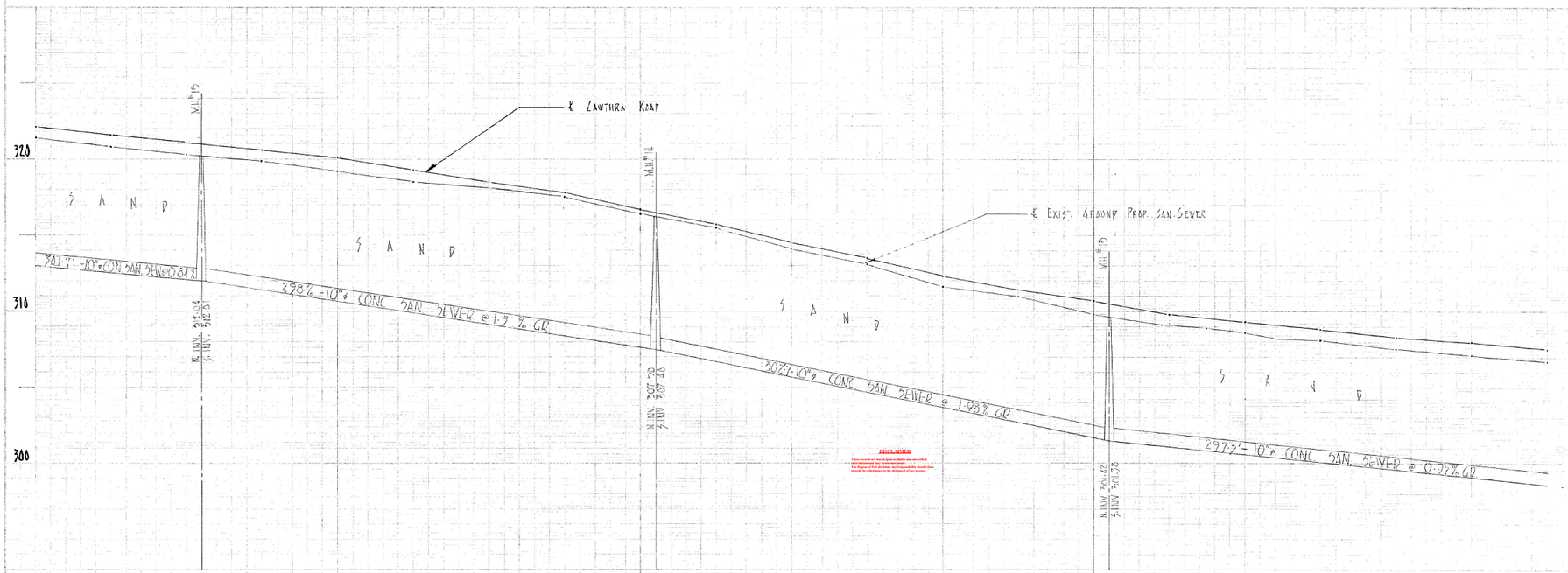
REVISIONS		
DATE	DETAILS	INIT.
APR. 9/1963	SANITARY SEWERS	K.Y.
OCT. 28/1963	AS CONSTRUCTED 1964	K.Y.



P.I. STA. 39+29.00

CAWTHRA ROAD





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.P.&M. No. ELEV.
- TEMP. BENCH MARK ELEV. 307.2
- DESCRIPTION 6" SPIKE IN HY. SPR. 35E. # 633 ARBOR ROAD

NOTE: ALL BEDDING TO BE TYPE 'E'

REGISTERED PROFESSIONAL ENGINEER C. D. LEAVENS PROVINCE OF ONTARIO
DESIGNED BY CHKD

REGISTERED PROFESSIONAL ENGINEER W. J. ANDERSON PROVINCE OF ONTARIO
APPROVED BY

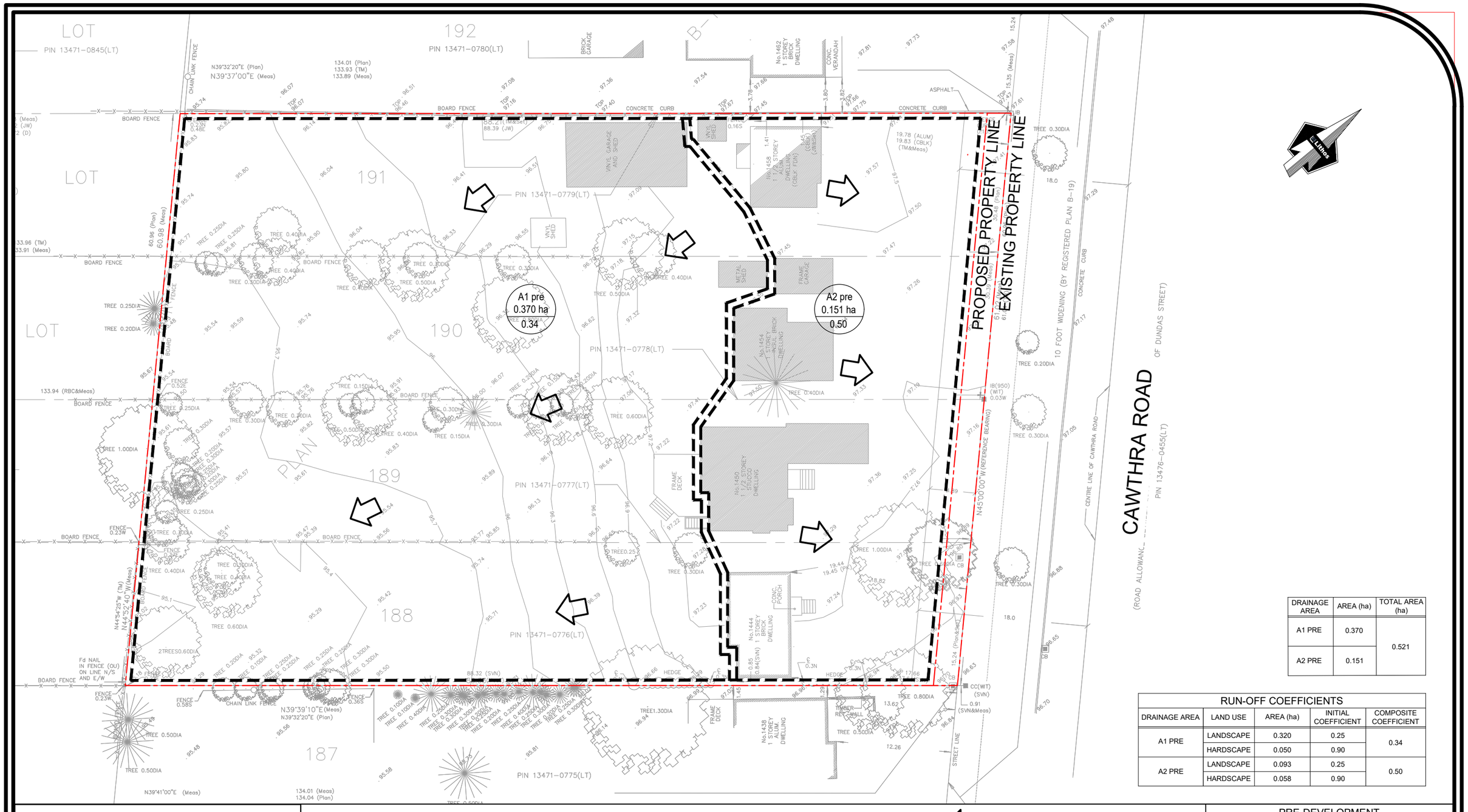
TOWNSHIP OF TORONTO
COUNTY OF PEEL
ENGINEERING DEPARTMENT

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"=50' VERT. 1"=5'	DRAWN BY R.Y.	CHECKED BY 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	0.521
A2 PRE	0.151	

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	0.093	0.25	0.50
	HARDSCAPE	0.058	0.90	

Lithos

150 Bermonsdey Road, North York, Ontario M4A 1Y1

LEGEND

- 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

PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE: MAY 2020	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: May 2020

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)	0.151	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)	0.151	0.50	0.08	15	59.9	0.013	12.6

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

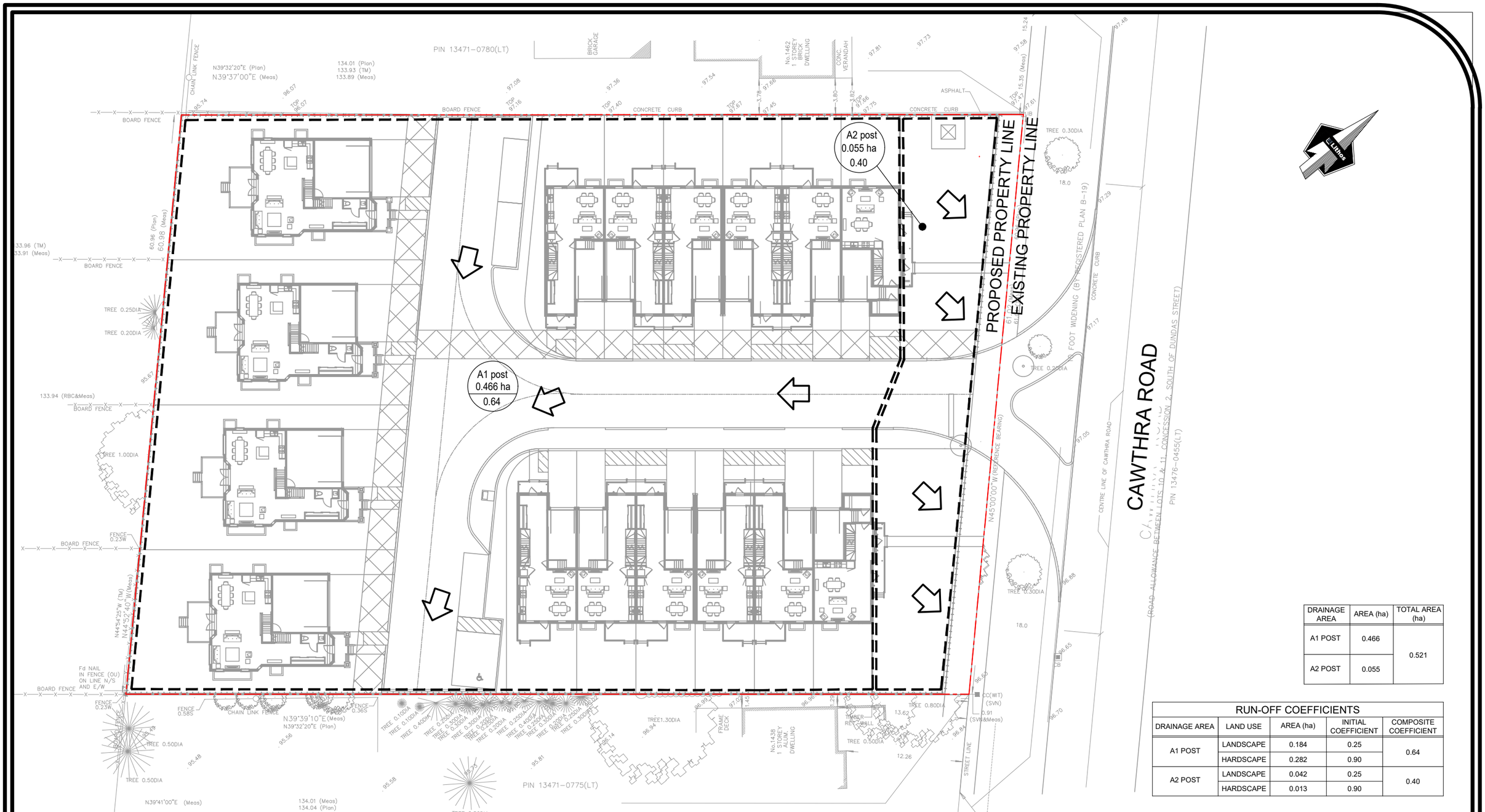
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
A1 pre (Towards South - West corner of the Site)	0.370	0.34	0.13	15	80.5	0.028	28.1
A2 pre (Towards Cawthra Road)	0.151	0.50	0.08	15	80.5	0.017	16.9

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)	0.151	0.50	0.08	15	99.2	0.021	20.8

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)	0.151	0.50	0.08	15	140.7	0.030	29.5



DRAINAGE AREA	AREA (ha)	TOTAL AREA (ha)
A1 POST	0.466	0.521
A2 POST	0.055	

RUN-OFF COEFFICIENTS

DRAINAGE AREA	LAND USE	AREA (ha)	INITIAL COEFFICIENT	COMPOSITE COEFFICIENT
A1 POST	LANDSCAPE	0.184	0.25	0.64
	HARDSCAPE	0.282	0.90	
A2 POST	LANDSCAPE	0.042	0.25	0.40
	HARDSCAPE	0.013	0.90	

LEGEND

- A1 post / 0.04 ha / 0.50 — STORM DRAINAGE AREA NUMBER; DRAINAGE AREA (ha); COMPOSITE RUNOFF COEFFICIENT
- POST-DEVELOPMENT STORM DRAINAGE AREA
- PROPERTY LINE

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

POST-DEVELOPMENT STORM DRAINAGE AREA PLAN

RESIDENTIAL USE DEVELOPMENT
1444-1458 CAWTHRA ROAD
MISSISSAUGA, ONTARIO

DATE: MAY 2020 | 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: May 2020

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) =	**0.466**	ha
"C" =	**0.64**	
AC1=	**0.30**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Min. Storage =	**93.67**	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	0.184	0.25
Hardscaped	0.282	0.90
Total Area (A1)	**0.466**	**0.64**

Infiltation Trench Design

Maximum Storm Runoff=	**49.9**	L/s
Area of Porous Granular Base =	**413.51**	m^2
Min. Storm Runoff Storage=	**93.67**	m^3
Min. Storage Granular Base Height =	**0.57**	m

(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)	**Total Runoff Volume** (m^3)	**Storage Depth of Granular Base** (m)
15.0	59.9	0.050	44.89	44.89	0.27
20.0	50.2	0.042	50.13	50.13	0.30
25.0	43.4	0.036	54.24	54.24	0.33
30.0	38.4	0.032	57.63	57.63	0.35
35.0	34.6	0.029	60.52	60.52	0.37
40.0	31.5	0.026	63.04	63.04	0.38
45.0	29.0	0.024	65.28	65.28	0.39
50.0	26.9	0.022	67.29	67.29	0.41
55.0	25.2	0.021	69.13	69.13	0.42
60.0	23.6	0.020	70.82	70.82	0.43
65.0	22.3	0.019	72.39	72.39	0.44
70.0	21.1	0.018	73.85	73.85	0.45
75.0	20.1	0.017	75.22	75.22	0.45
80.0	19.1	0.016	76.52	76.52	0.46
85.0	18.3	0.015	77.74	77.74	0.47
90.0	17.5	0.015	78.90	78.90	0.48
95.0	16.9	0.014	80.00	80.00	0.48
100.0	16.2	0.014	81.05	81.05	0.49
105.0	15.6	0.013	82.06	82.06	0.50
110.0	15.1	0.013	83.03	83.03	0.50
115.0	14.6	0.012	83.96	83.96	0.51
120.0	14.2	0.012	84.86	84.86	0.51
125.0	13.7	0.011	85.72	85.72	0.52
130.0	13.3	0.011	86.56	86.56	0.52
135.0	13.0	0.011	87.36	87.36	0.53
140.0	12.6	0.010	88.15	88.15	0.53
145.0	12.3	0.010	88.91	88.91	0.54
150.0	12.0	0.010	89.64	89.64	0.54
155.0	11.7	0.010	90.36	90.36	0.55
160.0	11.4	0.009	91.06	91.06	0.55
165.0	11.1	0.009	91.74	91.74	0.55
170.0	10.9	0.009	92.40	92.40	0.56
175.0	10.6	0.009	93.04	93.04	0.56
180.0	10.4	0.009	93.67	93.67	0.57

Lithos

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

1444-1458 Cawthra Road
File No. UD17-094
Date: May 2020

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) =	**0.466**	ha
"C" =	**0.64**	
AC1=	**0.30**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Min. Storage =	**125.92**	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	0.184	0.25
Hardscaped	0.282	0.90
Total Area (A1)	**0.466**	**0.64**

Infiltation Trench Design

Maximum Storm Runoff=	**67.0**	L/s
Area of Porous Granular Base =	**413.51**	m^2
Min. Storm Runoff Storage=	**125.92**	m^3
Min. Storage Granular Base Height =	**0.76**	m

(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)	**Total Runoff Volume** (m^3)	**Storage Depth of Granular Base** (m)
15.0	80.5	0.067	60.34	60.34	0.36
20.0	67.4	0.056	67.39	67.39	0.41
25.0	58.4	0.049	72.92	72.92	0.44
30.0	51.7	0.043	77.47	77.47	0.47
35.0	46.5	0.039	81.35	81.35	0.49
40.0	42.4	0.035	84.74	84.74	0.51
45.0	39.0	0.032	87.75	87.75	0.53
50.0	36.2	0.030	90.46	90.46	0.55
55.0	33.8	0.028	92.93	92.93	0.56
60.0	31.8	0.026	95.21	95.21	0.58
65.0	30.0	0.025	97.31	97.31	0.59
70.0	28.4	0.024	99.28	99.28	0.60
75.0	27.0	0.022	101.12	101.12	0.61
80.0	25.7	0.021	102.86	102.86	0.62
85.0	24.6	0.020	104.50	104.50	0.63
90.0	23.6	0.020	106.06	106.06	0.64
95.0	22.7	0.019	107.54	107.54	0.65
100.0	21.8	0.018	108.96	108.96	0.66
105.0	21.0	0.018	110.31	110.31	0.67
110.0	20.3	0.017	111.62	111.62	0.67
115.0	19.6	0.016	112.87	112.87	0.68
120.0	19.0	0.016	114.07	114.07	0.69
125.0	18.4	0.015	115.23	115.23	0.70
130.0	17.9	0.015	116.35	116.35	0.70
135.0	17.4	0.014	117.44	117.44	0.71
140.0	16.9	0.014	118.49	118.49	0.72
145.0	16.5	0.014	119.51	119.51	0.72
150.0	16.1	0.013	120.50	120.50	0.73
155.0	15.7	0.013	121.47	121.47	0.73
160.0	15.3	0.013	122.40	122.40	0.74
165.0	15.0	0.012	123.32	123.32	0.75
170.0	14.6	0.012	124.21	124.21	0.75
175.0	14.3	0.012	125.08	125.08	0.76
180.0	14.0	0.012	125.92	125.92	0.76

Lithos

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

1444-1458 Cawthra Road
File No. UD17-094
Date: May 2020

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) =	**0.466**	ha
"C" =	**0.64**	
AC1=	**0.30**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Min. Storage =	**155.10**	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	0.184	0.25
Hardscaped	0.282	0.90
Total Area (A1)	**0.466**	**0.64**

Infiltation Trench Design

Maximum Storm Runoff=	**82.6**	L/s
Area of Porous Granular Base =	**413.51**	m^2
Min. Storm Runoff Storage=	**155.10**	m^3
Min. Storage Granular Base Height =	**0.94**	m

(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)	**Total Runoff Volume** (m^3)	**Storage Depth of Granular Base** (m)
15.0	99.2	0.083	74.32	74.32	0.45
20.0	83.1	0.069	83.00	83.00	0.50
25.0	71.9	0.060	89.81	89.81	0.54
30.0	63.7	0.053	95.42	95.42	0.58
35.0	57.3	0.048	100.20	100.20	0.61
40.0	52.2	0.043	104.37	104.37	0.63
45.0	48.1	0.040	108.08	108.08	0.65
50.0	44.6	0.037	111.42	111.42	0.67
55.0	41.7	0.035	114.46	114.46	0.69
60.0	39.1	0.033	117.27	117.27	0.71
65.0	36.9	0.031	119.86	119.86	0.72
70.0	35.0	0.029	122.28	122.28	0.74
75.0	33.2	0.028	124.55	124.55	0.75
80.0	31.7	0.026	126.69	126.69	0.77
85.0	30.3	0.025	128.71	128.71	0.78
90.0	29.0	0.024	130.63	130.63	0.79
95.0	27.9	0.023	132.46	132.46	0.80
100.0	26.9	0.022	134.20	134.20	0.81
105.0	25.9	0.022	135.87	135.87	0.82
110.0	25.0	0.021	137.48	137.48	0.83
115.0	24.2	0.020	139.02	139.02	0.84
120.0	23.4	0.020	140.50	140.50	0.85
125.0	22.7	0.019	141.93	141.93	0.86
130.0	22.1	0.018	143.31	143.31	0.87
135.0	21.4	0.018	144.65	144.65	0.87
140.0	20.9	0.017	145.95	145.95	0.88
145.0	20.3	0.017	147.21	147.21	0.89
150.0	19.8	0.016	148.43	148.43	0.90
155.0	19.3	0.016	149.61	149.61	0.90
160.0	18.9	0.016	150.77	150.77	0.91
165.0	18.4	0.015	151.89	151.89	0.92
170.0	18.0	0.015	152.99	152.99	0.92
175.0	17.6	0.015	154.06	154.06	0.93
180.0	17.2	0.014	155.10	155.10	0.94

Lithos

Modified Rational Method - Hundred Year Storm
Site Flow and Storage Summary
1444-1458 Cawthra Road
File No. UD17-094
Date: May 2020

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

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

Controlled - A1 Post

Drainage Areas	**A1 Post**	
Area (A1) =	**0.466**	ha
"C" =	**0.80**	
AC1=	**0.37**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Min. Storage =	**277.98**	**m^3**

Type	Area (ha)	"C"
Landscaped	0.184	0.25
Hardscaped	0.282	0.90
Total Area (A1)	**0.466**	**0.64**

Adjustment Factor = C(100) =1.25 *C

Infiltation Trench Design

Maximum Storm Runoff=	**146.5**	L/s
Area of Porous Granular Base =	**413.51**	m^2
Min. Storm Runoff Storage=	**277.98**	m^3
Min. Storage Granular Base Height =	**1.68**	m

(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)	**Total Runoff Volume** (m^3)	**Storage Depth of Granular Base** (m)
15.0	140.7	0.146	131.81	131.81	0.80
20.0	118.1	0.123	147.55	147.55	0.89
25.0	102.4	0.107	159.91	159.91	0.97
30.0	90.8	0.094	170.09	170.09	1.03
35.0	81.8	0.085	178.76	178.76	1.08
40.0	74.6	0.078	186.32	186.32	1.13
45.0	68.7	0.071	193.04	193.04	1.17
50.0	63.8	0.066	199.10	199.10	1.20
55.0	59.6	0.062	204.61	204.61	1.24
60.0	56.0	0.058	209.68	209.68	1.27
65.0	52.8	0.055	214.38	214.38	1.30
70.0	50.0	0.052	218.76	218.76	1.32
75.0	47.6	0.050	222.86	222.86	1.35
80.0	45.4	0.047	226.73	226.73	1.37
85.0	43.4	0.045	230.38	230.38	1.39
90.0	41.6	0.043	233.85	233.85	1.41
95.0	40.0	0.042	237.15	237.15	1.43
100.0	38.5	0.040	240.30	240.30	1.45
105.0	37.1	0.039	243.32	243.32	1.47
110.0	35.8	0.037	246.21	246.21	1.49
115.0	34.7	0.036	248.99	248.99	1.51
120.0	33.6	0.035	251.66	251.66	1.52
125.0	32.6	0.034	254.25	254.25	1.54
130.0	31.6	0.033	256.74	256.74	1.55
135.0	30.7	0.032	259.15	259.15	1.57
140.0	29.9	0.031	261.49	261.49	1.58
145.0	29.1	0.030	263.76	263.76	1.59
150.0	28.4	0.030	265.96	265.96	1.61
155.0	27.7	0.029	268.09	268.09	1.62
160.0	27.0	0.028	270.18	270.18	1.63
165.0	26.4	0.027	272.20	272.20	1.65
170.0	25.8	0.027	274.18	274.18	1.66
175.0	25.3	0.026	276.10	276.10	1.67
180.0	24.7	0.026	277.98	277.98	1.68

Lithos

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) =	**0.055**	ha
"C" =	**0.40**	
AC2=	**0.022**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**3.7**	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	0.042	0.25
Hardscaped	0.013	0.90
Total Area (A2 Post)	**0.055**	**0.40**

2-yr Pre-Development Site Release Rate towards Cawthra Road (A2-pre)= 12.6 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 3.7 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	0.004	3.32
20.0	50.2	0.003	3.71
25.0	43.4	0.003	4.02
30.0	38.4	0.002	4.27
35.0	34.6	0.002	4.48
40.0	31.5	0.002	4.67
45.0	29.0	0.002	4.83
50.0	26.9	0.002	4.98
55.0	25.2	0.002	5.12
60.0	23.6	0.001	5.24
65.0	22.3	0.001	5.36
70.0	21.1	0.001	5.47
75.0	20.1	0.001	5.57
80.0	19.1	0.001	5.67
85.0	18.3	0.001	5.76
90.0	17.5	0.001	5.84
95.0	16.9	0.001	5.92
100.0	16.2	0.001	6.00
105.0	15.6	0.001	6.08
110.0	15.1	0.001	6.15
115.0	14.6	0.001	6.22
120.0	14.2	0.001	6.28
125.0	13.7	0.001	6.35
130.0	13.3	0.001	6.41
135.0	13.0	0.001	6.47
140.0	12.6	0.001	6.53
145.0	12.3	0.001	6.58
150.0	12.0	0.001	6.64
155.0	11.7	0.001	6.69
160.0	11.4	0.001	6.74
165.0	11.1	0.001	6.79
170.0	10.9	0.001	6.84
175.0	10.6	0.001	6.89
180.0	10.4	0.001	6.94

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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) =	**0.055**	ha
"C" =	**0.40**	
AC2=	**0.022**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**5.0**	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	0.042	0.25
Hardscaped	0.013	0.90
Total Area (A2 Post)	**0.055**	**0.40**

2-yr Pre-Development Site Release Rate towards Cawthra Road (A2-pre)= 12.6 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 5.0 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	0.005	4.47
20.0	67.4	0.004	4.99
25.0	58.4	0.004	5.40
30.0	51.7	0.003	5.74
35.0	46.5	0.003	6.02
40.0	42.4	0.003	6.27
45.0	39.0	0.002	6.50
50.0	36.2	0.002	6.70
55.0	33.8	0.002	6.88
60.0	31.8	0.002	7.05
65.0	30.0	0.002	7.21
70.0	28.4	0.002	7.35
75.0	27.0	0.002	7.49
80.0	25.7	0.002	7.62
85.0	24.6	0.002	7.74
90.0	23.6	0.001	7.85
95.0	22.7	0.001	7.96
100.0	21.8	0.001	8.07
105.0	21.0	0.001	8.17
110.0	20.3	0.001	8.27
115.0	19.6	0.001	8.36
120.0	19.0	0.001	8.45
125.0	18.4	0.001	8.53
130.0	17.9	0.001	8.62
135.0	17.4	0.001	8.70
140.0	16.9	0.001	8.77
145.0	16.5	0.001	8.85
150.0	16.1	0.001	8.92
155.0	15.7	0.001	8.99
160.0	15.3	0.001	9.06
165.0	15.0	0.001	9.13
170.0	14.6	0.001	9.20
175.0	14.3	0.001	9.26
180.0	14.0	0.001	9.32

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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) =	**0.055**	ha
"C" =	**0.40**	
AC2=	**0.022**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**6.1**	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	0.042	0.25
Hardscaped	0.013	0.90
Total Area (A2 Post)	**0.055**	**0.40**

2-yr Pre-Development Site Release Rate towards Cawthra Road (A2-pre)= 12.6 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 6.1 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	0.006	5.50
20.0	83.1	0.005	6.15
25.0	71.9	0.004	6.65
30.0	63.7	0.004	7.07
35.0	57.3	0.004	7.42
40.0	52.2	0.003	7.73
45.0	48.1	0.003	8.00
50.0	44.6	0.003	8.25
55.0	41.7	0.003	8.48
60.0	39.1	0.002	8.68
65.0	36.9	0.002	8.88
70.0	35.0	0.002	9.05
75.0	33.2	0.002	9.22
80.0	31.7	0.002	9.38
85.0	30.3	0.002	9.53
90.0	29.0	0.002	9.67
95.0	27.9	0.002	9.81
100.0	26.9	0.002	9.94
105.0	25.9	0.002	10.06
110.0	25.0	0.002	10.18
115.0	24.2	0.001	10.29
120.0	23.4	0.001	10.40
125.0	22.7	0.001	10.51
130.0	22.1	0.001	10.61
135.0	21.4	0.001	10.71
140.0	20.9	0.001	10.81
145.0	20.3	0.001	10.90
150.0	19.8	0.001	10.99
155.0	19.3	0.001	11.08
160.0	18.9	0.001	11.16
165.0	18.4	0.001	11.25
170.0	18.0	0.001	11.33
175.0	17.6	0.001	11.41
180.0	17.2	0.001	11.49

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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) =	**0.055**	ha
"C" =	**0.50**	
AC2=	**0.028**	
Tc =	**15.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**10.8**	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	0.042	0.25
Hardscaped	0.013	0.90
Total Area (A2 Post)	**0.055**	**0.40**
Adjustment Factor = C(100) =1.25 *C		

2-yr Pre-Development Site

Release Rate towards Cawthra Road (A2-pre)= 12.6 L/s

Site Release Rate towards Cawthra Road (A2 Post)= 10.8 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	0.011	9.76
20.0	118.1	0.009	10.93
25.0	102.4	0.008	11.84
30.0	90.8	0.007	12.59
35.0	81.8	0.006	13.24
40.0	74.6	0.006	13.80
45.0	68.7	0.005	14.29
50.0	63.8	0.005	14.74
55.0	59.6	0.005	15.15
60.0	56.0	0.004	15.53
65.0	52.8	0.004	15.87
70.0	50.0	0.004	16.20
75.0	47.6	0.004	16.50
80.0	45.4	0.003	16.79
85.0	43.4	0.003	17.06
90.0	41.6	0.003	17.32
95.0	40.0	0.003	17.56
100.0	38.5	0.003	17.79
105.0	37.1	0.003	18.02
110.0	35.8	0.003	18.23
115.0	34.7	0.003	18.44
120.0	33.6	0.003	18.64
125.0	32.6	0.003	18.83
130.0	31.6	0.002	19.01
135.0	30.7	0.002	19.19
140.0	29.9	0.002	19.36
145.0	29.1	0.002	19.53
150.0	28.4	0.002	19.69
155.0	27.7	0.002	19.85
160.0	27.0	0.002	20.01
165.0	26.4	0.002	20.16
170.0	25.8	0.002	20.30
175.0	25.3	0.002	20.45
180.0	24.7	0.002	20.58

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Water Balance Calculation

1444-1458 Cawthra Road

File No. UD17-094

Date: May 2020

Prepared By: John Pasalidis, P.E., M.A.Sc.

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

Contributing Drainage Area	5209.4	m^2
Rainfall depth to be retained	5.0	mm
Total rainfall volume required at 5mm	**26.05**	m^3

Initial Abstraction Calculations

Surface	Area (ha)	IA (mm)	Volume (m^3)	
Landscaping	2260.0	5.0	11.30	m^3
Impervious Surfaces	2949.4	1.0	2.95	m^3
Total	**5209.4**		**14.25**	m^3

Additional Water Balance Required to be Stored **11.80** **m^3**

Lithos

Water Quality Calculations

1444-1458 Cawthra Road
File No. UD17-094
Date: May 2020
Prepared By: John Pasalidis, P.E., M.A.Sc.
Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Surface	Method	Effective TSS Removal	Area (ha)	% Area of Controlled Site	Overall TSS Removal
Rooftop/Terraces/Landscape	Inherent	80%	0.176	38%	30%
Driveway Area	Stormseptor EF04	80%	0.290	62%	50%
Total			0.466	100%	80%

Note: Uncontrolled water does not account in the above calculations

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

ESTIMATED NET ANNNUAL SEDIMENT (TSS) LOAD REDUCTION STORMCEPTOR®

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO CENTRAL
NCDC Rainfall Station Id:	0100
Years of Rainfall Data:	18
Site Name:	1444-1458 Cawthra Rd.
Drainage Area (ha):	0.29
Runoff Coefficient 'c':	0.78
Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.0
Require Hydrocarbon Spill Capture?	Yes
Upstream Flow Control?	No
Estimated Water Quality Flow Rate (L/s):	3.55
Peak Conveyance (maximum) Flow Rate (L/s):	

Project Name:	1444-1458 Cawthra Rd.
Project Number:	-
Designer Name:	Brandon O'Leary
Designer Company:	Forterra
Designer Email/Phone:	brandon.oleary@forterrabp.com
Designer Email/Phone:	(905) 630-0359
EOR Name:	John Pasalidis
EOR Company:	Lithos Group Inc.
EOR Email/Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	88
EFO6	91
EFO8	92
EFO10	93
EFO12	93

Recommended Stormceptor EFO Model: **EFO4**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **88**

Water Quality Runoff Volume Capture (%): **> 90**

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

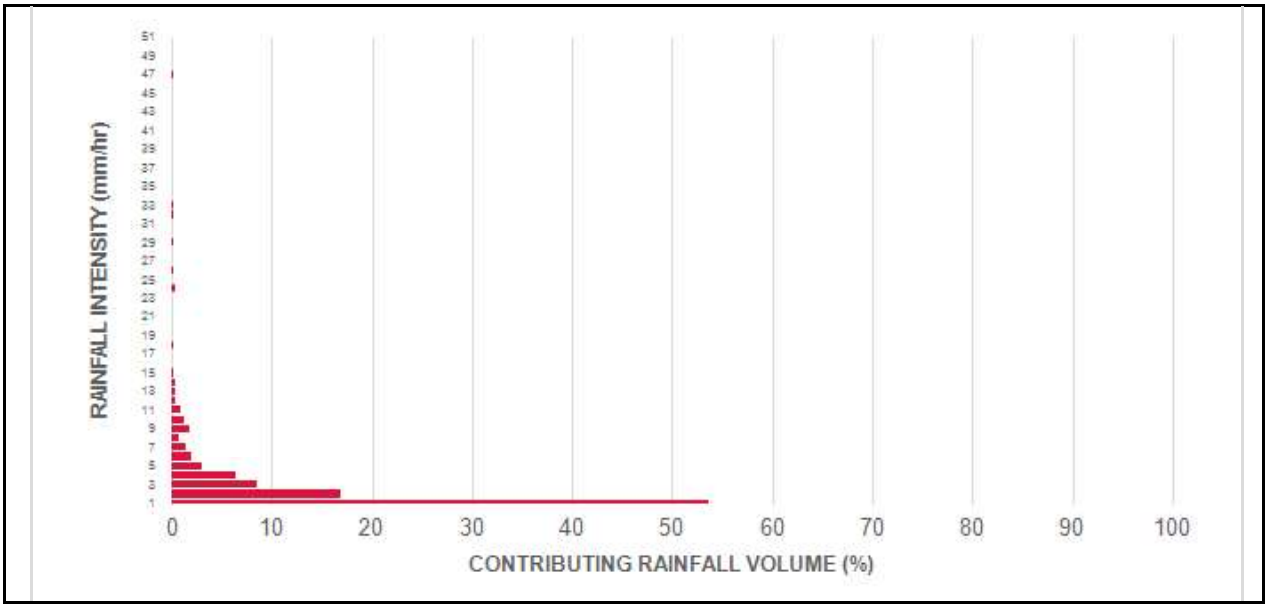
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a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

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

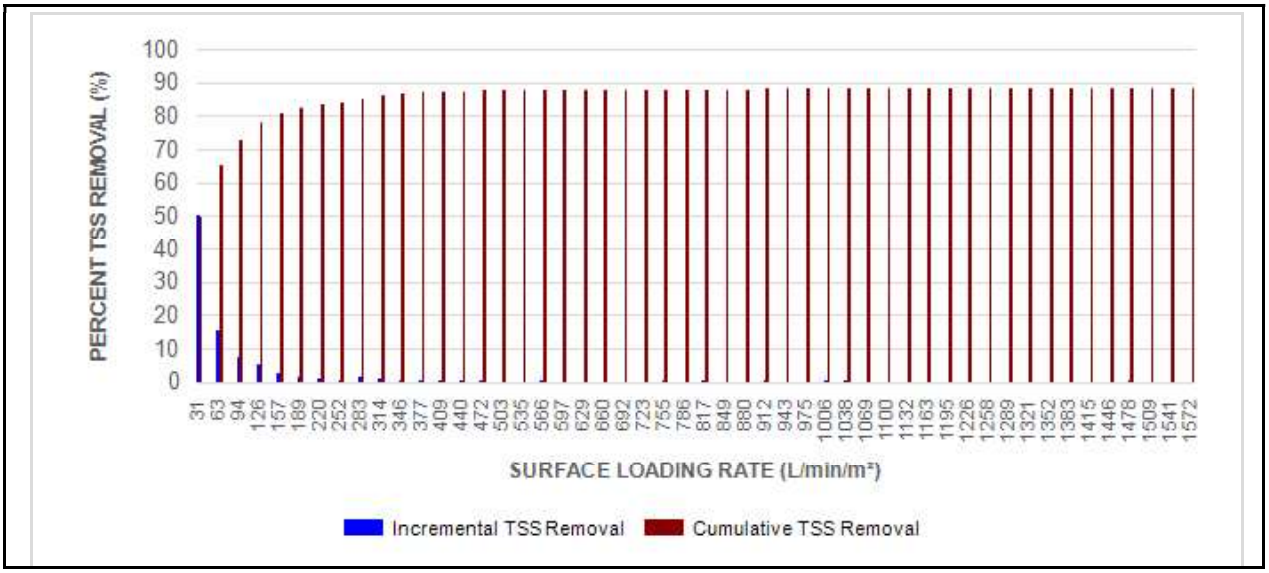
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	53.7	53.7	0.63	38.0	31.0	93	49.9	49.9
2	16.9	70.6	1.26	75.0	63.0	91	15.4	65.3
3	8.6	79.2	1.89	113.0	94.0	88	7.6	72.9
4	6.4	85.6	2.52	151.0	126.0	85	5.4	78.3
5	3.1	88.7	3.14	189.0	157.0	81	2.5	80.8
6	2.0	90.7	3.77	226.0	189.0	78	1.6	82.4
7	1.5	92.2	4.40	264.0	220.0	74	1.1	83.5
8	0.7	92.9	5.03	302.0	252.0	72	0.5	84.0
9	1.8	94.7	5.66	340.0	283.0	69	1.2	85.2
10	1.3	96.0	6.29	377.0	314.0	66	0.9	86.1
11	0.9	96.9	6.92	415.0	346.0	63	0.6	86.7
12	0.4	97.3	7.55	453.0	377.0	61	0.2	86.9
13	0.4	97.7	8.17	490.0	409.0	58	0.2	87.1
14	0.4	98.1	8.80	528.0	440.0	57	0.2	87.4
15	0.2	98.3	9.43	566.0	472.0	56	0.1	87.5
16	0.0	98.3	10.06	604.0	503.0	55	0.0	87.5
17	0.0	98.3	10.69	641.0	535.0	54	0.0	87.5
18	0.2	98.5	11.32	679.0	566.0	53	0.1	87.6
19	0.0	98.5	11.95	717.0	597.0	52	0.0	87.6
20	0.0	98.5	12.58	755.0	629.0	52	0.0	87.6
21	0.0	98.5	13.21	792.0	660.0	52	0.0	87.6
22	0.0	98.5	13.83	830.0	692.0	52	0.0	87.6
23	0.0	98.5	14.46	868.0	723.0	51	0.0	87.6
24	0.4	98.9	15.09	906.0	755.0	51	0.2	87.8
25	0.0	98.9	15.72	943.0	786.0	51	0.0	87.8

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.2	99.1	16.35	981.0	817.0	51	0.1	87.9
27	0.0	99.1	16.98	1019.0	849.0	51	0.0	87.9
28	0.0	99.1	17.61	1056.0	880.0	51	0.0	87.9
29	0.2	99.3	18.24	1094.0	912.0	50	0.1	88.0
30	0.0	99.3	18.87	1132.0	943.0	50	0.0	88.0
31	0.0	99.3	19.49	1170.0	975.0	50	0.0	88.0
32	0.2	99.5	20.12	1207.0	1006.0	50	0.1	88.1
33	0.2	99.7	20.75	1245.0	1038.0	50	0.1	88.2
34	0.0	99.7	21.38	1283.0	1069.0	49	0.0	88.2
35	0.0	99.7	22.01	1321.0	1100.0	49	0.0	88.2
36	0.0	99.7	22.64	1358.0	1132.0	49	0.0	88.2
37	0.0	99.7	23.27	1396.0	1163.0	48	0.0	88.2
38	0.0	99.7	23.90	1434.0	1195.0	48	0.0	88.2
39	0.0	99.7	24.52	1471.0	1226.0	48	0.0	88.2
40	0.0	99.7	25.15	1509.0	1258.0	48	0.0	88.2
41	0.0	99.7	25.78	1547.0	1289.0	47	0.0	88.2
42	0.0	99.7	26.41	1585.0	1321.0	47	0.0	88.2
43	0.0	99.7	27.04	1622.0	1352.0	47	0.0	88.2
44	0.0	99.7	27.67	1660.0	1383.0	46	0.0	88.2
45	0.0	99.7	28.30	1698.0	1415.0	46	0.0	88.2
46	0.0	99.7	28.93	1736.0	1446.0	45	0.0	88.2
47	0.2	99.9	29.56	1773.0	1478.0	44	0.1	88.3
48	0.0	99.9	30.18	1811.0	1509.0	43	0.0	88.3
49	0.0	99.9	30.81	1849.0	1541.0	42	0.0	88.3
50	0.0	99.9	31.44	1887.0	1572.0	41	0.0	88.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**88 %**

RAINFALL DATA FROM TORONTO CENTRAL RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

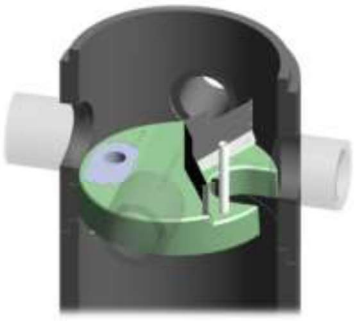
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

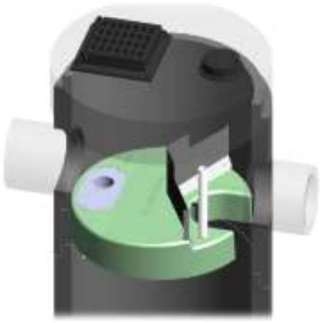
DESIGN FLEXIBILITY

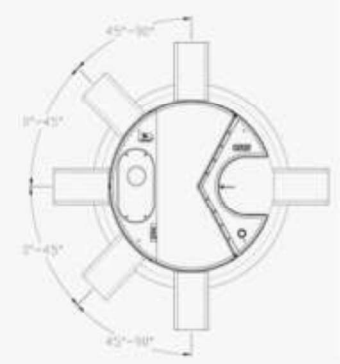
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	197	52	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	348	92	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	545	144	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	874	231	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	1219	322	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

imbrium

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34
60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

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	0.521	4	0	17	0.00	0	17	0.06	4.39	0.255	0.00	0.521	0.104	**0.36**					
Proposed Condition																			
Residential-Use Development	0.521	4	12	59	0.00	0	59	0.21	4.30	0.88	0.00	0.521	0.104	**0.99**					
												Total Net Flow		**0.63**					

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: May 2020

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

Sheet 1 OF 1

APPENDIX E
Water Data Analysis

Lithos

WATER DEMAND

1444-1458 Cawthra Road
File No: PUD17-094
Date: May 2020
Prepared by: John Pasalidis, 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

WATER DEMAND

1444-1458 Cawthra Road

File No: PUD17-094

Date: May 2020

Prepared by: John Pasalidis, 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

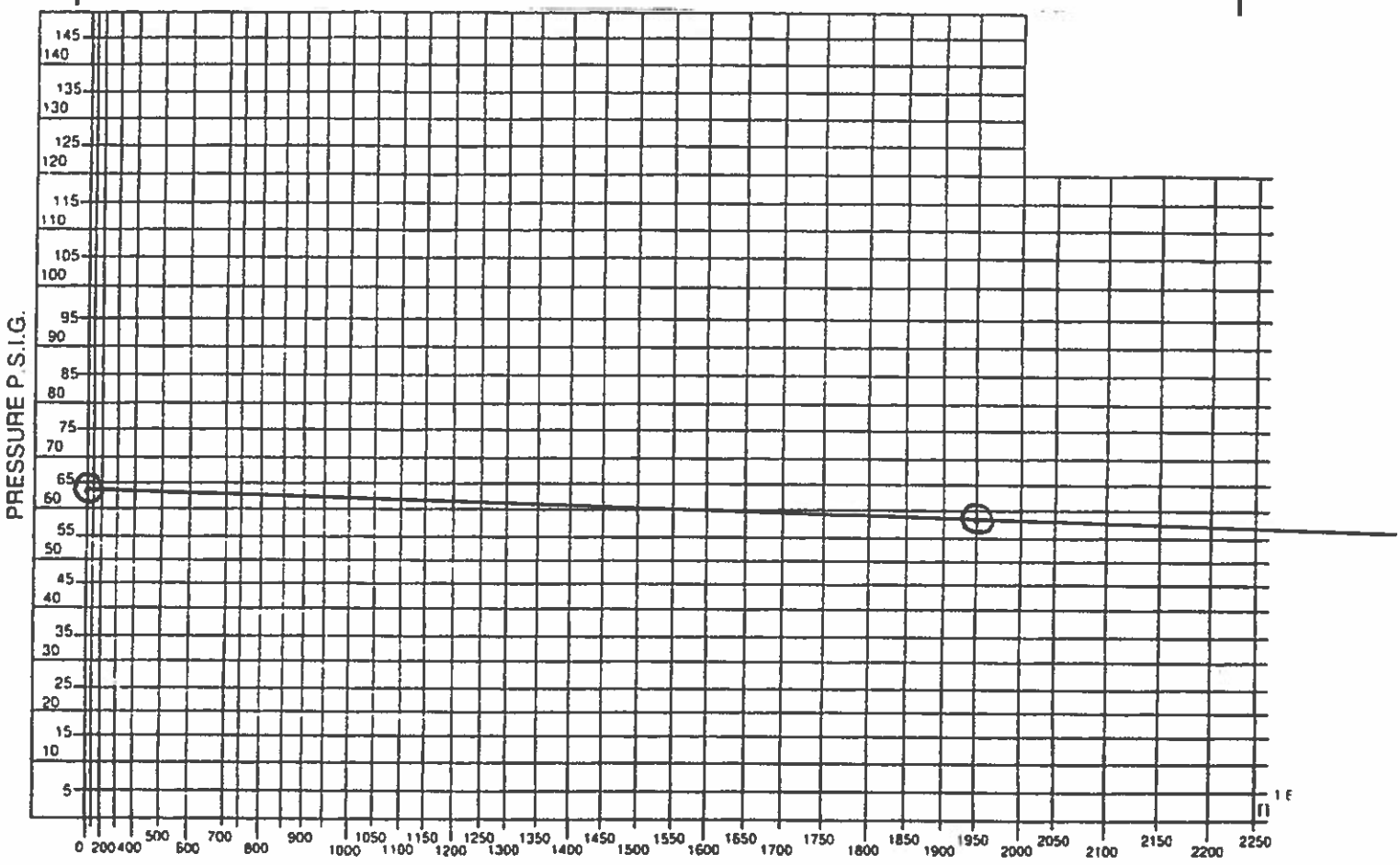
$Q_T = 2(29.83)(0.9)(2.5")^2\sqrt{34}$

$= 1956.79$

$Q_T = \sim 1950$ 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