

## Functional Servicing and Stormwater Management Report (Phase I)



Project: 1444-1458 Cawthra Road

2530173 Ontario Corporation

**PREPARED BY:**



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**REVIEWED BY:**



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Principal

**LITHOS GROUP INC.**

**Issues and Revisions Registry**

Identification	Date	Description of issued and/or revision
Functional Servicing and Stormwater Management Report (Phase I)	September 28 <sup>th</sup> , 2018	Issued for Rezoning Application

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## Executive Summary

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

### Storm Drainage

More details for the Stormwater Management (SWM) Section of this report will be prepared at the Site Plan Application stage (Phase II). The site stormwater discharge will be controlled to the 2-year pre-development flow and will be connected to the existing 1050 mm diameter storm sewer on Cawthra Road. In order to achieve the target flows and meet the City’s Storm Water Quantity Control requirements, quantity controls will be utilized and up to 110.9 m<sup>3</sup> of storage will be required. The stormwater management (SWM) system will be designed to provide enhanced level (Level 3) protection as specified by the Ministry of Environment and Climate Change (MOECC). During Site Plan Application, a detailed analysis will be provided to assess the water quality on site and determine additional measures in order to achieve a minimum total suspended solids (TSS) removal of 80%.

### Sanitary Sewers

Sixteen (16) separate ownerships will comprise the proposed development, one for each townhouse unit and one for each detached dwelling. In order to provide separate connection for each residential dwelling and townhouse development, an easement will be incorporated during the detailed design stage. The proposed development, will connect to the existing 250 mm sanitary sewer on Cawthra Road, via a 150mm diameter sanitary lateral. The additional net discharge flow from the proposed buildings, is anticipated at approximately 0.70 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 I), in support of Rezoning Application for a proposed residential development, located at 1444-1458 Cawthra Road in the City of Mississauga (City).

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

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

- Plan and profile drawings of Cawthra Road, Drainage and Utilities, drawing No.
  - 8313 – D, dated May 1985;
  - 8315 – D, dated May 1985;
  - 8325 – D, dated May 1985;
  - C – 5966, dated March 1963;
- Site Plan and Statistics prepared by KFA Architects and Planners Inc., dated September 28, 2018; and,
- Topographical Survey prepared by Tom A. Senkus, dated March 30, 2017.

## 2.0 Site Description

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

## 3.0 Site Proposal

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

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

## 4.0 Terms of Reference and Methodology

### 4.1. Terms of Reference

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

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

### 4.2. Methodology: Stormwater Drainage and Management

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

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

- Post-development peak flow for the 100-year from the site should be controlled to the two (2)-year target flow according to the Credit Valley Conservation (CVC);
- 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 Family = 50 people / ha

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

#### 4.4. Methodology: Water Usage

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

**Table 4.2 – Water Usage**

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

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

## 5.0 Stormwater Management and Drainage

### 5.1. Existing Conditions

According to available records, there is an existing 1050 mm diameter storm sewer along Cawthra Road running south-east. The existing site drains partially uncontrolled towards the adjacent Cawthra Road and partially towards the rear yards, south-west of the existing dwellings.

The existing site is primarily undeveloped with a run-off coefficient estimated at 0.40. **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	0.506	0.40	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	33.7	45.3	55.8	79.1

As shown in **Table 5.2**, the post-development flows will need to be controlled to the target flow of 33.7 L/s.

### 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, retained on-site, and eventually discharged into the existing 1050 mm diameter storm sewer in Cawthra Road.
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	0.455	0.61	0.76	15
A2 Post	0.051	0.30	0.37	15

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

### 5.2.1. Stormwater Runoff Volume Reduction

As required by the City's guidelines, a rainfall depth of 5 mm must be retained over the entire parcel area. A 5 mm rainfall over the entire site equates to a required water balance volume of 25.31 m<sup>3</sup>. In order to achieve this, the following low impact development (LID) techniques will may be implemented.

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

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

### 5.2.2. Quantity Controls

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**

Drainage Areas	Storm Event	Target Flow (L/s)	Required Storage Tank Volume (m <sup>3</sup> )
A1 Post (Controlled)	2-year	33.7	18.1
	5-year		32.4
	10-year		45.6
	100-year		110.9

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

As shown in **Table 5.4**, in order to control post-development flows to 2-year pre-development conditions, a target flow of 33.7 L/s is to be satisfied. The minimum required on-site storage is 110.9 m<sup>3</sup>. This can be achieved through the design and installation of stormwater holding tanks, flow control devices and/or parking ponding, underground chambers and infiltration trenches. Details will be provided through the detailed design stage of Site Plan Application (Phase II).

### 5.2.3. Quality Controls

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

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

## 5.3. Proposed Storm Connection

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

## 6.0 Sanitary Drainage System

### 6.1. Existing Sanitary Drainage System

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

## 6.2. Existing and Proposed Sanitary Flows

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

Using the design criteria outlined in **Section 4.3** and existing site information, the sanitary discharge flow from the existing residential dwellings is estimated at 0.14 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 0.84 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 0.70 L/s, which represents less than 1% of the full flow capacity of the existing 250mm diameter sanitary sewer along Cawthra Road, therefore it is considered negligible. Following that fact, the existing infrastructure can support the proposed development.

## 6.3. Proposed Sanitary Connection

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

## 7.0 Water Supply System

### 7.1. Existing System

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

The results of the test indicate the existing static pressure is 441 KPa (64 psi) and 123.0 L/sec (1950 USGPM) 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 we 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<sup>2</sup>/townhouse unit, according to the OBC requirements which translates to an equal separation of 200m<sup>2</sup>/floor for the three storey townhouse units. **Table 7.1** illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 83.13 L/s (1,317 USGPM) will be required. Refer to detailed calculations found in **Appendix E**.

**Table 7.1 – Fire Flow Input Parameters**

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

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

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

### 7.3. Proposed Watermain Connection

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

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

## 8.0 Site Grading

### 8.1. Existing Grades

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

## 8.2. Proposed Grades

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

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

## 9.0 Conclusions and Recommendations

Based on our investigations, we conclude the following:

### Storm Drainage

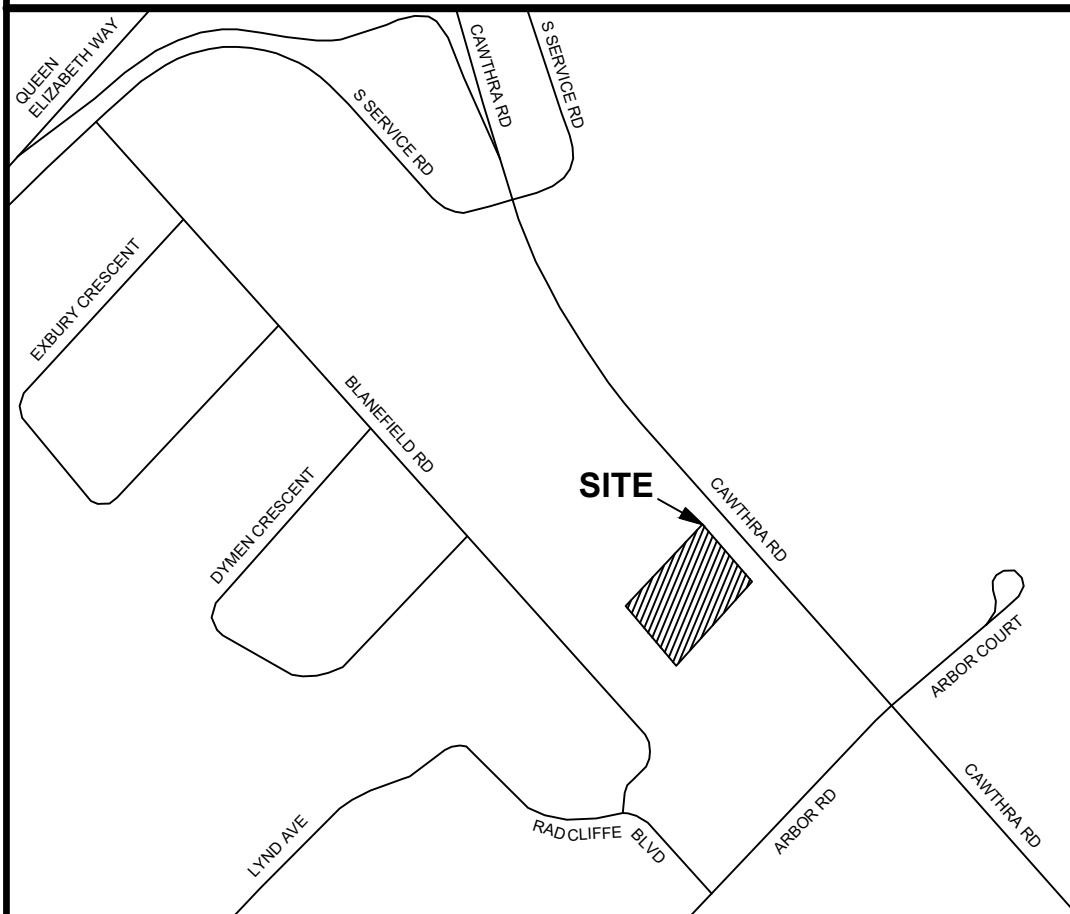
More details for the Stormwater Management (SWM) Section of this report will be prepared at the Site Plan Application stage (Phase II). The site stormwater discharge will be controlled to the 2-year pre-development flow and will be connected to the existing 1050 mm diameter storm sewer on Cawthra Road. In order to achieve the target flows and meet the City's Storm Water Quantity Control requirements, quantity controls will be utilized and up to 110.9 m<sup>3</sup> of storage will be required. The stormwater management (SWM) system will be designed to provide enhanced level (Level 3) protection as specified by the Ministry of Environment and Climate Change (MOECC). During Site Plan Application, a detailed analysis will be provided to assess the water quality on site and determine additional measures in order to achieve a minimum total suspended solids (TSS) removal of 80%.

### Sanitary Sewers

Sixteen (16) separate ownerships will comprise the proposed development, one for each townhouse unit and one for each detached dwelling. In order to provide separate connection for each residential dwelling and townhouse development, an easement will be incorporated during the detailed design stage. The proposed development, will connect to the existing 250 mm sanitary sewer on Cawthra Road, via a 150mm diameter sanitary lateral. The additional net discharge flow from the proposed buildings, is anticipated at approximately 0.70 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

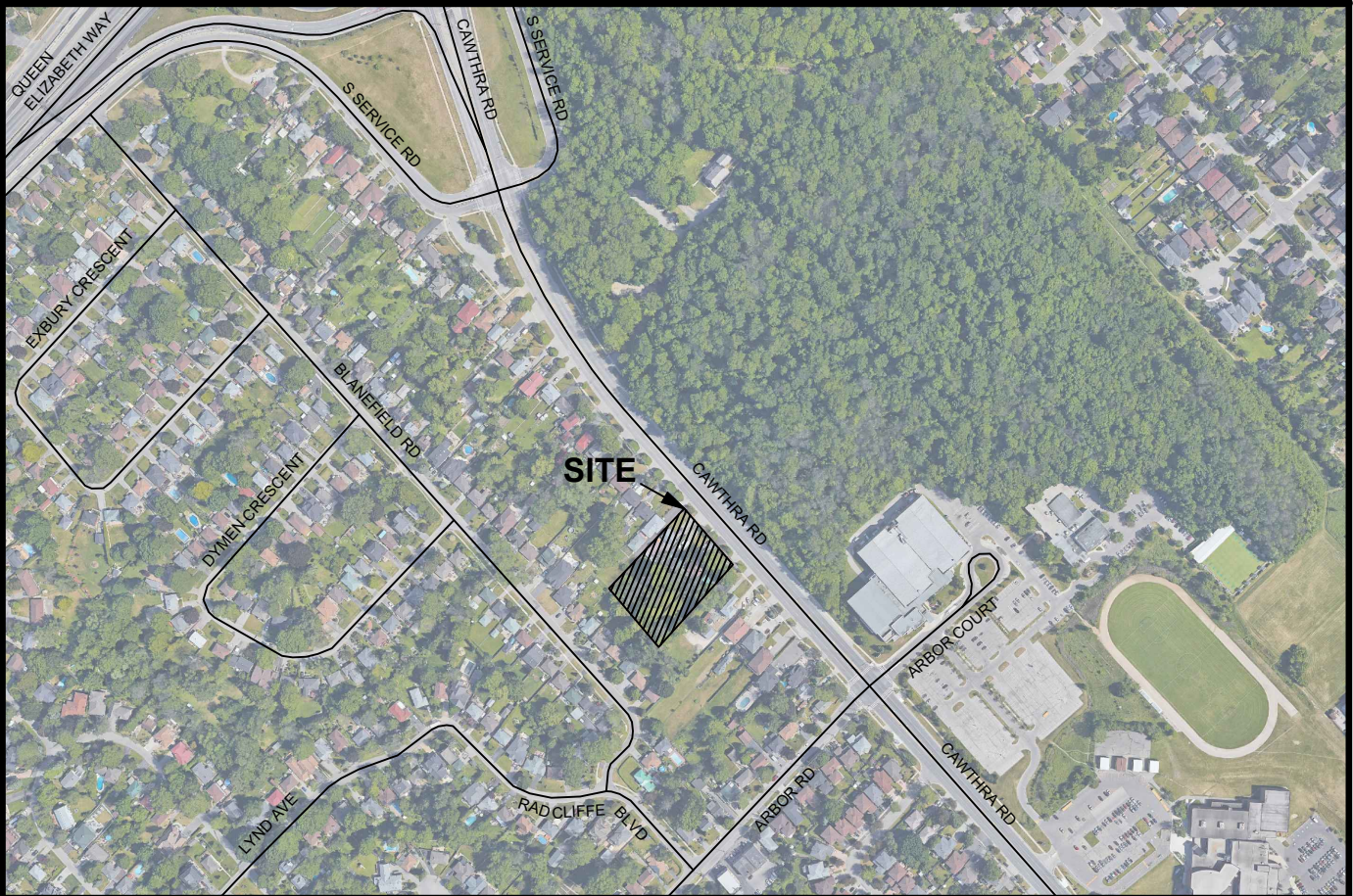
The proposed development will be comprised by sixteen (16) separate ownerships. Similarly to sanitary connections, each ownership will connect to the proposed water service which will be located within the proposed easement. The proposed water service will connect to the existing 300 mm diameter watermain 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.



150 Bermonsdey Road, North York, Ontario M4A 1Y1

**LOCATION PLAN**  
 RESIDENTIAL USE DEVELOPMENT  
 1444-1458 CAWTHRA ROAD  
 MISSISSAUGA, ONTARIO

DATE:	SEP 2018	PROJECT No:	UD17-094
SCALE:	N.T.S.	FIGURE No:	FIG 1



150 Bermonsdey Road, North York, Ontario M4A 1Y1

**AERIAL PLAN**  
RESIDENTIAL USE DEVELOPMENT  
1444-1458 CAWTHRA ROAD  
MISSISSAUGA, ONTARIO

DATE: SEP 2018

SCALE: N.T.S.

PROJECT No: UD17-094

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 MUNICIPALITY OF PEEL  
SCALE 1:250  
5m 0m 5m 10m 15m  
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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 MONUMENTS 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
  - SB DENOTES SURVEY MONUMENT FOUND
  - SB DENOTES STANDARD IRON BAR
  - SB DENOTES IRON BAR
  - WT DENOTES WITNESS
  - OU DENOTES ORIGIN UNKNOWN
  - RBC DENOTES R.B. CODE, O.L.S. (MAY 21, 1948)
  - BC DENOTES BROWN, GAVELL, O.L.S. (NOV. 27, 1953)
  - PK DENOTES PAUL, KIDDO, O.L.S. (OCT. 20, 1999)
  - SW DENOTES SPEIGHT & VAN NOSTRAND, O.L.S. (JAN. 29, 1987)
  - JW DENOTES JAMES & WANDERL, O.L.S. (NOV. 28, 1956)
  - PL DENOTES REGISTERED PLAN B-19
  - PL DENOTES REGISTERED PLAN 460
  - CL DENOTES CENTRE LINE
  - DIA DENOTES DIAMETER
  - CS DENOTES CATCH BASIN
  - TCZ DENOTES TOM CZERNIANSKI, O.L.S. (NOV. 3, 1987)
  - TM DENOTES TARASICK, McMillan, O.L.S. (NOV. 4, 1996)
  - 950 DENOTES CUNNINGHAM, McCONNELL, O.L.S.
  - D DENOTES INST. No. V613504
  - IT DENOTES IRON TUBE
  - CBX DENOTES CONCRETE BLOCK
  - FDN DENOTES FOUNDATION
  - F4 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.

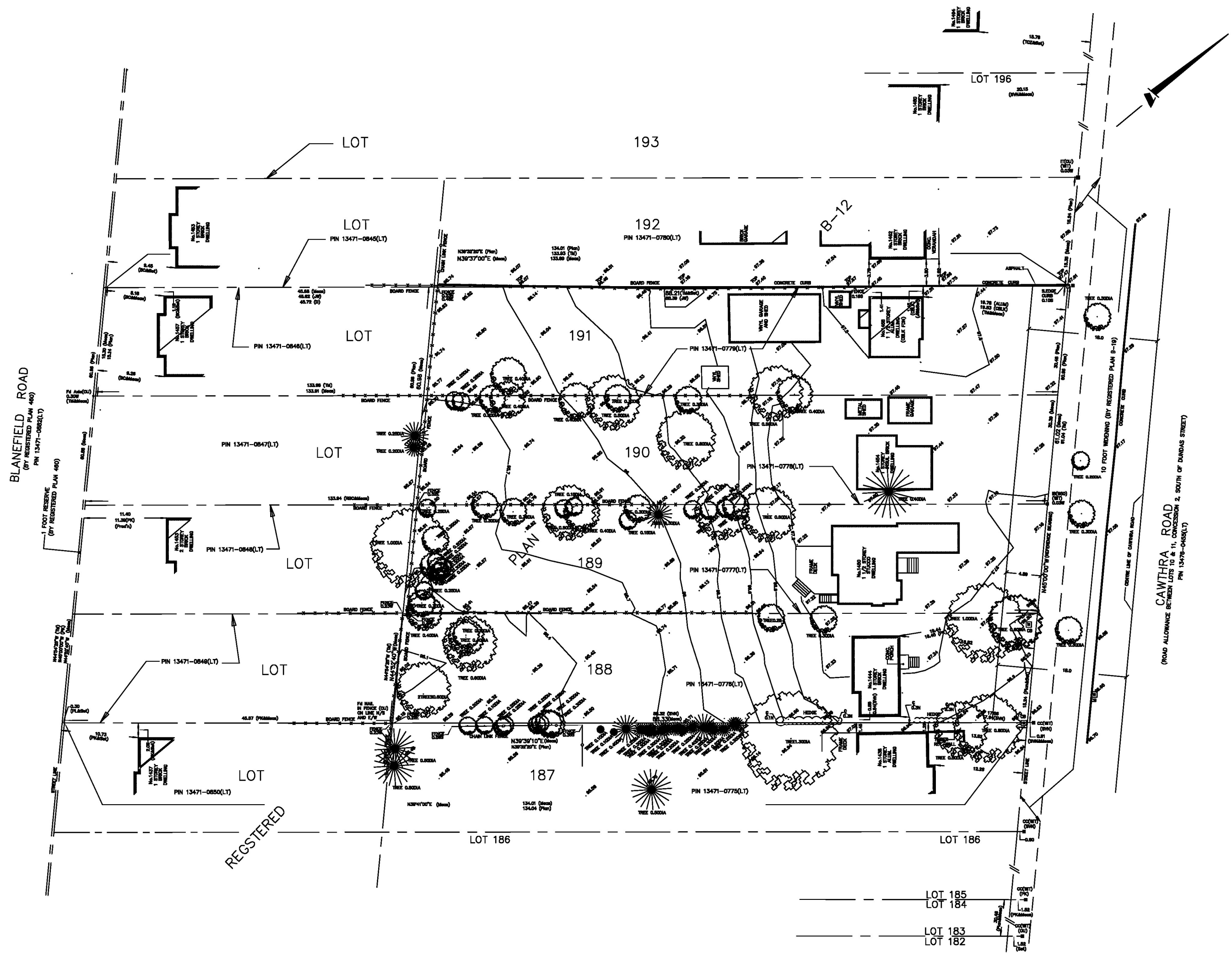
ELEVATION NOTE  
ELEVATIONS ARE REFERRED TO CITY OF MISSISSAUGA  
BENCHMARK No. 75 ELEVATION 98.308 METRES .  
(NON GEODETIC)

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) 237-1895  
E-MAIL: tomsenkus@rogers.com  
mapcad@rogers.com  
FILE: 02-77A  
CAD FILE: CAWTHRA-SHPR-TOPO







1444  
1458

1444-1458 CAWTHRA ROAD  
MISSISSAUGA, ON

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be checked on site by the contractor, Drawings are not to be  
scaled, and any discrepancies are to be reported to the Architect  
before proceeding with the work.

1	Issue to Consultants	2018,06,12
2	Issue for OPRZ	2018,08,28

1 Context Plan  
1: 1000

1444-1458

CAWTHRA

KFA ARCHITECTS + PLANNERS

Date: 31-Aug-2018

Official Planning Designation: Residential Low Density II

Zoning By-law 0225-2007-R3-1

Development Statistics

Site Area (a)			
m <sup>2</sup>	sq.ft	ha	acre
5362.0	54488.7	0.51	1.25
		Units/Ha	Units/Acre
		32	13

General Development Statistics Table

Total Number of Units	16.0
Average Unit Size Construction Area (m <sup>2</sup> )	252.5
Average Unit Size Construction Area (SF)	2718
Gross Construction Area (m <sup>2</sup> )	4040.0

Zoning By-law 0225-2007

FSI*	0.72
FSI**	0.63
Total GFA (m <sup>2</sup> ): Residential ZBL Definition*	3642
Total GFA (m <sup>2</sup> ): Infill Residential ZBL Definition**	3210

\*Calculated including basement but excluding garage

\*\*Calculated excluding Basement but including garage

Site Area Breakdown Table (m2)

	Area
Paving	1214 23.98% of total site area
Soft Landscaping Area	2259.0 44.63% of total site area
Hard Landscape Area	232.0 4.58% of total site area
Building Area (Combined Largest Footprints)	1357.0 26.81% of total site area

Building Heights & Setbacks (m)

Block A	Height:	9.50	Detached Lot 1	Height:	9.00
	North	4.50	Property Line setback:	North	2.44
	East	12.02		East	6.16
	South	7.89		South	2.40
West	0.90	West		8.37	
Block B	Height:	9.50	Detached Lot 1	Height:	9.00
	North	7.50	Property Line setback:	North	2.40
	East	13.70		East	6.16
	South	4.50		South	2.40
West	0.90	West		8.37	
Block C	Height:	9.50	Detached Lot 1	Height:	9.00
	North	4.50	Property Line setback:	North	2.40
	East	0.90		East	6.16
	South	7.87		South	2.40
West	1.44	West		8.37	
Block D	Height:	9.50	Detached Lot 1	Height:	9.00
	North	7.50	Property Line setback:	North	2.40
	East	0.90		East	6.16
	South	4.50		South	2.40
West	1.87	West		8.37	

Note: Building height measured from established grade.

Residential Area Calculations by Block and Lot Number

Gross Construction Area (m2)

Garage

Basement

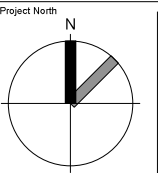
Gross Floor Area (m2)\*

Gross Floor Area (m2)\*\*

Unit Mix Breakdown

	1	1+Den	2	2+Den	3	3+Den	4	4+Den
Detached Homes								
Lot 1	341.0	38.0	89.0	303.0	252.0			1
Lot 2	341.0	38.0	89.0	303.0	252.0			1
Lot 3	341.0	38.0	89.0	303.0	252.0			1
Lot 4	341.0	38.0	89.0	303.0	252.0			1
Block A								
Lot 14 Unit Type 1	224.0	20.0	40.0	204.0	184.0		1	
Lot 15 Unit Type 1	219.0	19.0	39.0	200.0	180.0		1	
Lot 16 Unit Type 2	224.0	23.0	39.0	201.0	185.0		1	
Block A Totals	667	62	118	605	549	0	0	0
Block B								
Lot 8 Unit Type 1	224.0	20.0	40.0	204.0	184.0		1	
Lot 9 Unit Type 1	219.0	19.0	39.0	200.0	180.0		1	
Lot 10 Unit Type 2	224.0	23.0	39.0	201.0	185.0		1	
Block B Totals	667	62	118	605	549	0	0	0
Block C								
Lot 11 Unit Type 1	225.0	21.0	40.0	204.0	185.0		1	
Lot 12 Unit Type 1	221.0	20.0	39.0	201.0	182.0		1	
Lot 13 Unit Type 1	225.0	20.0	40.0	205.0	185.0		1	
Block C Totals	671	61	119	610	552	0	0	0
Block D								
Lot 5 Unit Type 1	225.0	21.0	40.0	204.0	185.0		1	
Lot 6 Unit Type 1	221.0	20.0	39.0	201.0	182.0		1	
Lot 7 Unit Type 1	225.0	20.0	40.0	205.0	185.0		1	
Block D Totals	671	61	119	610	552	0	0	0
Combined Total								
	4040.0	398.0	830.0	3642.0	3210.0	0.0	0.0	4.0

Sheet List	
Sheet Number	Sheet Name
A000	Cover Page
A001	Site Plan
A002	Concept Plan
A003	Typical Site Details
A100	Basement
A101	Level 1
A102	Level 2
A103	Level 3
A104	Roof Plan
A200	Block A/B Elevations
A201	Block C/D Elevations
A202	Detached Dwelling Elevations



Project No: 16071

Scale: As indicated

Date: 2017/04/05

Drawn by: RWW

Drawing Title

Cover Page

Drawing  
Number

A000



Area Schedule (Gross Building) By...

RVT Link: Name	Name	Area
-------------------	------	------

Block A	Garage	23 m <sup>2</sup>
Block A	Type 2	197 m <sup>2</sup>
Block A	Garage	19 m <sup>2</sup>
Block A	Type 1	200 m <sup>2</sup>
Block A	Garage	20 m <sup>2</sup>
Block A	Type 1	204 m <sup>2</sup>
Block A: 15		663 m <sup>2</sup>

Block B	Garage	23 m <sup>2</sup>
Block B	Type 2	197 m <sup>2</sup>
Block B	Garage	19 m <sup>2</sup>
Block B	Type 1	200 m <sup>2</sup>
Block B	Garage	20 m <sup>2</sup>
Block B	Type 1	204 m <sup>2</sup>
Block B: 15		663 m <sup>2</sup>

Block C	Garage	20 m <sup>2</sup>
Block C	Type 1	205 m <sup>2</sup>
Block C	Garage	20 m <sup>2</sup>
Block C	Type 1	200 m <sup>2</sup>
Block C	Garage	21 m <sup>2</sup>
Block C	Type 1	205 m <sup>2</sup>
Block C: 15		671 m <sup>2</sup>

Block D	Garage	20 m <sup>2</sup>
Block D	Type 1	205 m <sup>2</sup>
Block D	Garage	20 m <sup>2</sup>
Block D	Type 1	200 m <sup>2</sup>
Block D	Garage	21 m <sup>2</sup>
Block D	Type 1	205 m <sup>2</sup>
Block D: 15		671 m <sup>2</sup>

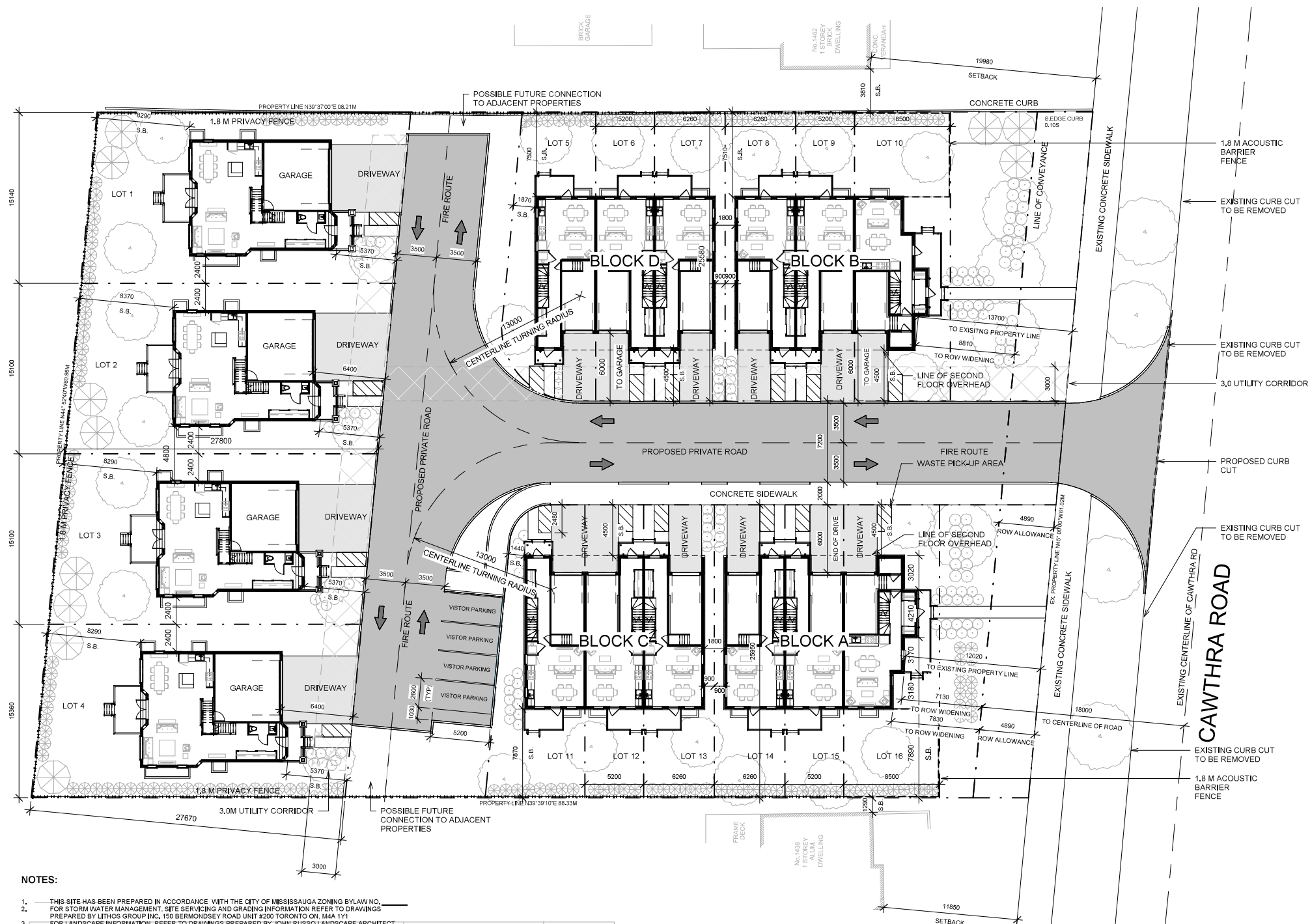
Detached 1	Basement	89 m²
Detached 1	Level 1	88 m²
Detached 1	Level 2	126 m²
Detached 1	Garage	38 m²
Detached 1: 4		341 m²

Detached 2	Basement	89 m <sup>2</sup>
Detached 2	Level 1	88 m <sup>2</sup>
Detached 2	Level 2	126 m <sup>2</sup>
Detached 2	Garage	38 m <sup>2</sup>
Detached 2: 4		341 m <sup>2</sup>

Detached 3	Basement	89 m <sup>2</sup>
Detached 3	Level 1	88 m <sup>2</sup>
Detached 3	Level 2	126 m <sup>2</sup>
Detached 3	Garage	38 m <sup>2</sup>
Detached 3: 4		341 m <sup>2</sup>

Detached 4	Basement	89 m <sup>2</sup>
Detached 4	Level 1	88 m <sup>2</sup>
Detached 4	Level 2	126 m <sup>2</sup>
Detached 4	Garage	38 m <sup>2</sup>
Detached 4: 4		341 m <sup>2</sup>

Area Schedule Total		
		4032 m <sup>2</sup>



NOTES:

1. THIS SITE HAS BEEN PREPARED IN ACCORDANCE WITH THE CITY OF MISSISSAUGA ZONING BYLAW NO. 22, FOR STORM WATER MANAGEMENT, SITE SERVING AND GRADING INFORMATION REFER TO DRAWINGS PREPARED BY THORNS GROUP INC, 150 BERMINGSDAY ROAD UNIT #200 TORONTO, ONTARIO, CANADA M1Y 1Y1 FOR LANDSCAPE INFORMATION, REFER TO DRAWINGS PREPARED BY JOHN RUSSELL LANDSCAPE ARCHITECT SERVICE CREDIT
2. INFORMATION TAKEN FROM PLAN OF PART OF LOT 188, 189, 190 & 191 REGISTERED PLAN B-19, CITY OF MISSISSAUGA
3. PREPARED BY: TOM A. SENKUS (ONTARIO) LAND SURVEYOR, 40 BURROWS AVENUE TORONTO (SILNGTON), ONTARIO M5T 1A7
4. ANY GRADE ELEVATIONS ARE SHOWN FOR REFERENCE ONLY, REFER TO GRADING AND SITE SERVING PLAN FOR GRADING AND UG SERVICES
5. ALL SETBACKS ARE TO BE DIRECTED DOWNWARD AND DEFECTED AWAY FROM ADJACENT LOTS ROADS AND STREETS
6. ALL CURBING AND DRIVEWAY ENTRANCES TO BE DESIGNED IN ACCORDANCE WITH THE CITY'S MATERIALS SPECIFICATIONS AND STANDARD DETAILS
7. GUARD RAILS IN ACCORDANCE TO THE OBC 2012 SHALL BE PROVIDED WHENEVER GRADE DIFFERENCE EXCEEDS 600MM DETAILS TO BE SUBMITTED AND BUILDING PERMIT STAGE.
8. THE BUILDER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS TO THE SATISFACTION OF THE CHIEF ENGINEER, EXECUTIVE DIRECTOR OF ENGINEERING AND CONSTRUCTION SERVICES
9. EXISTING WATER SERVICE TO BE DISCONNECTED BY THE CITY OF MISSISSAUGA
10. SNOOW OFF SITE
- 11.

**SITE SERVICES DISCLAIMER**

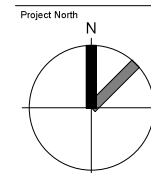
BE ADVISED THAT SHOULD ANY PARTY INCLUDING THE APPLICANT OR ANY SUBSEQUENT OWNER, APPLY FOR MORE THAN ONE CONDOMINIUM CORPORATION ENCOMPASSING ANY OR ALL OF THIS DEVELOPMENT OR MAKE AN APPLICATION THAT RESULTS IN A LAND DIVISION, STAFF MAY REQUIRE LEGAL ASSURANCES, INCLUDING BUT NOT LIMITED TO EASEMENTS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

$$\begin{array}{r} 1444 \\ - 1458 \\ \hline \end{array}$$

1444-1458 CAWTHRA ROAD  
MISSISSAUGA, ON

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1	Issue to Consultants	2018.09.12
2	Issue for OP/RZ	2018.09.28



Project No: 16071

Scale: As indicated

Date: 2017/04/05

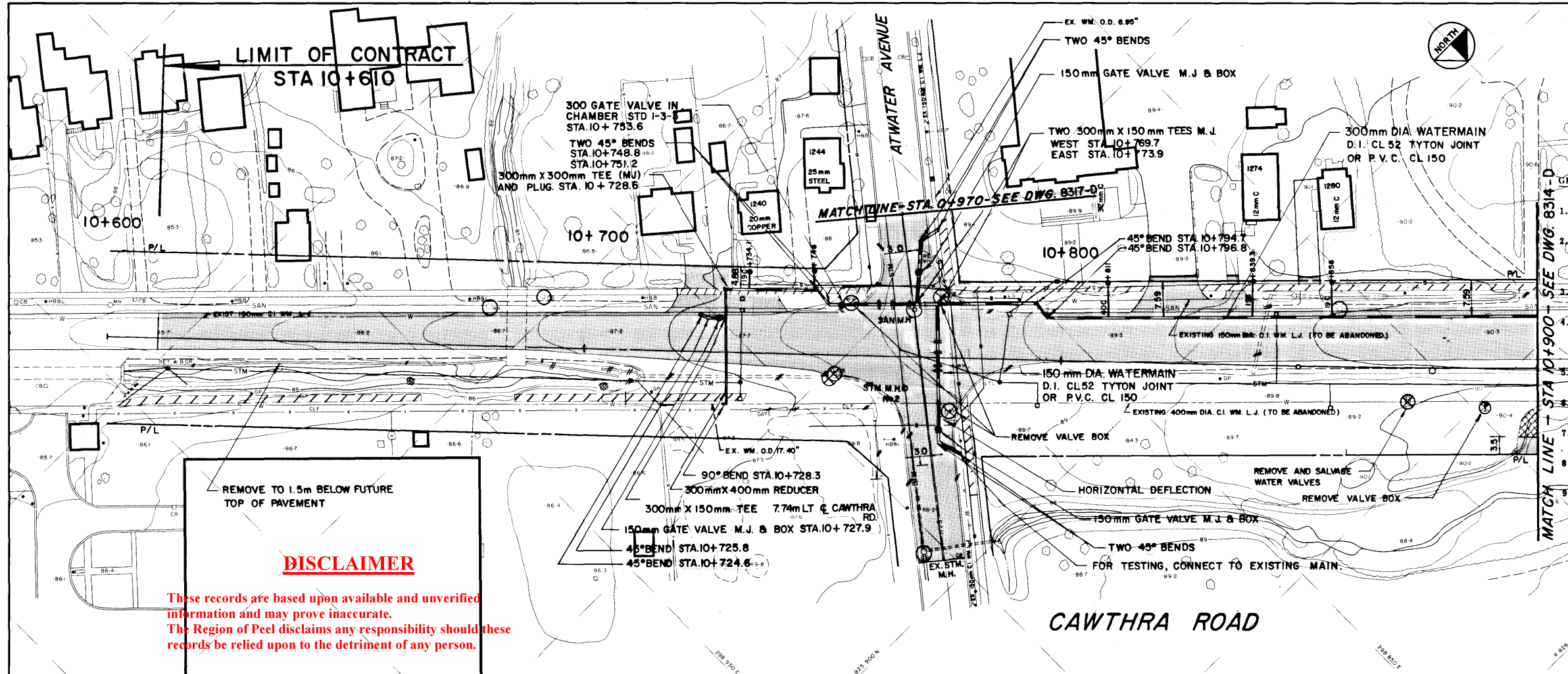
Drawn by: R.V.W.

Drawing Title

## Site Plan

Drawing  
Number

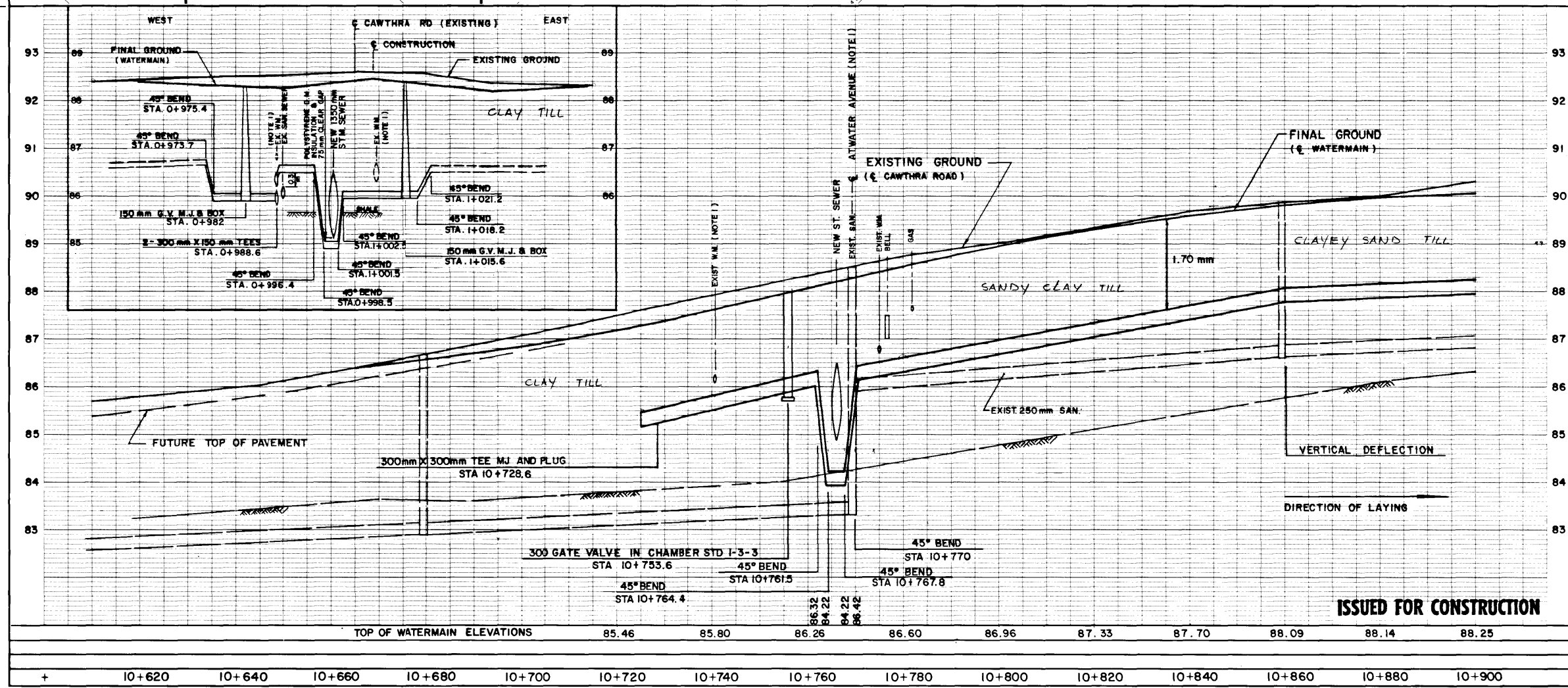
A001



SERVICE DATA				
SERVICE	DATE	INIT.	SERVICE	DATE
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
- Elevation and location of existing watermain and services are to be verified in the field.
  - 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.
  - Connect 32 mm and 19 mm copper services to the proposed watermain.
  - 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.
  - The Contractor shall provide temporary caps, plugs and blow offs for testing where required by the Engineer.
  - Stations for bends, tees, etc., refer to centre of construction.
  - All salvaged valves and hydrants shall be returned to 3190 Mavis Road, Mississauga.
  - All open ends of abandoned watermain shall be sealed with concrete.
- 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.



**General Notes**

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

B.M. No. Elev.

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

Designed by chd. 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

**Department of Public Works**

**CAWTHRA ROAD**

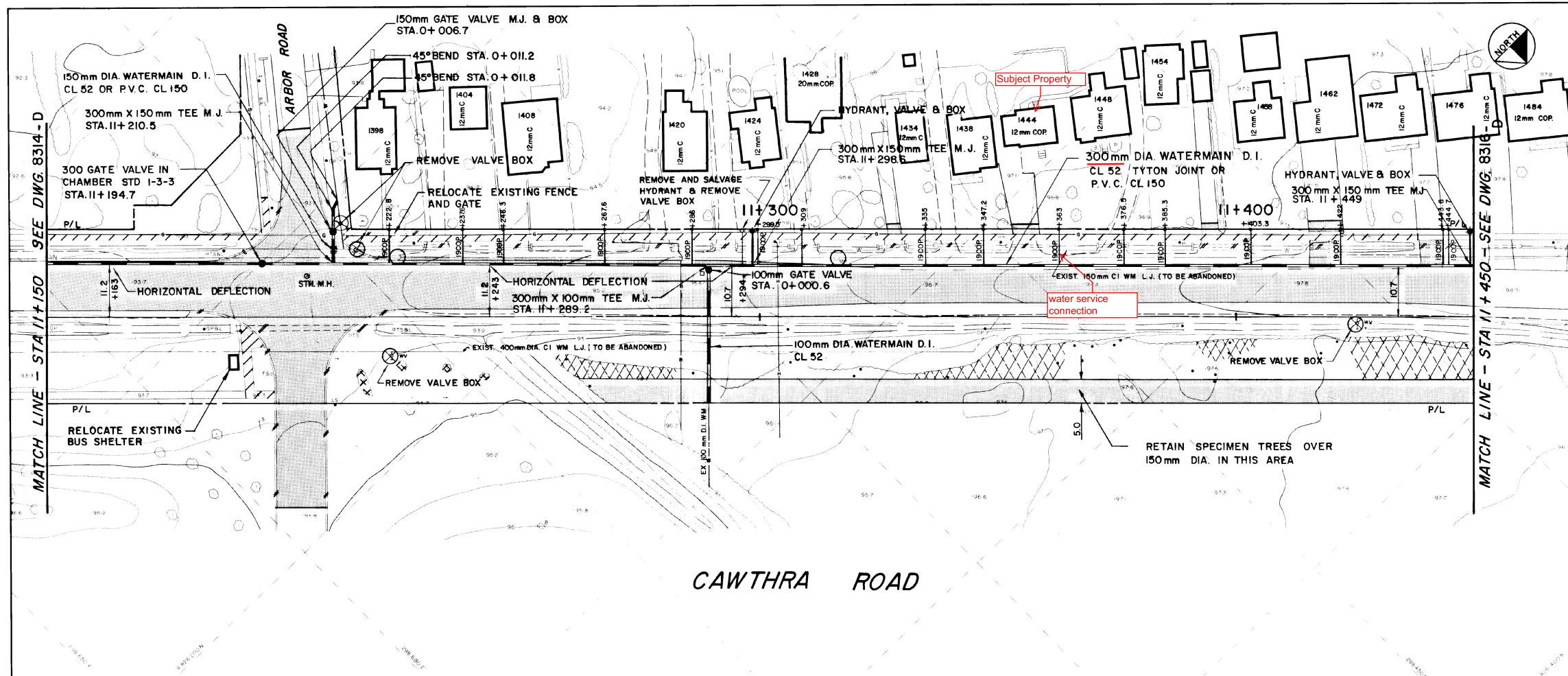
ATWATER AVENUE TO SOUTH SERVICE ROAD

300mm DIA. WATERMAIN & REMOVALS

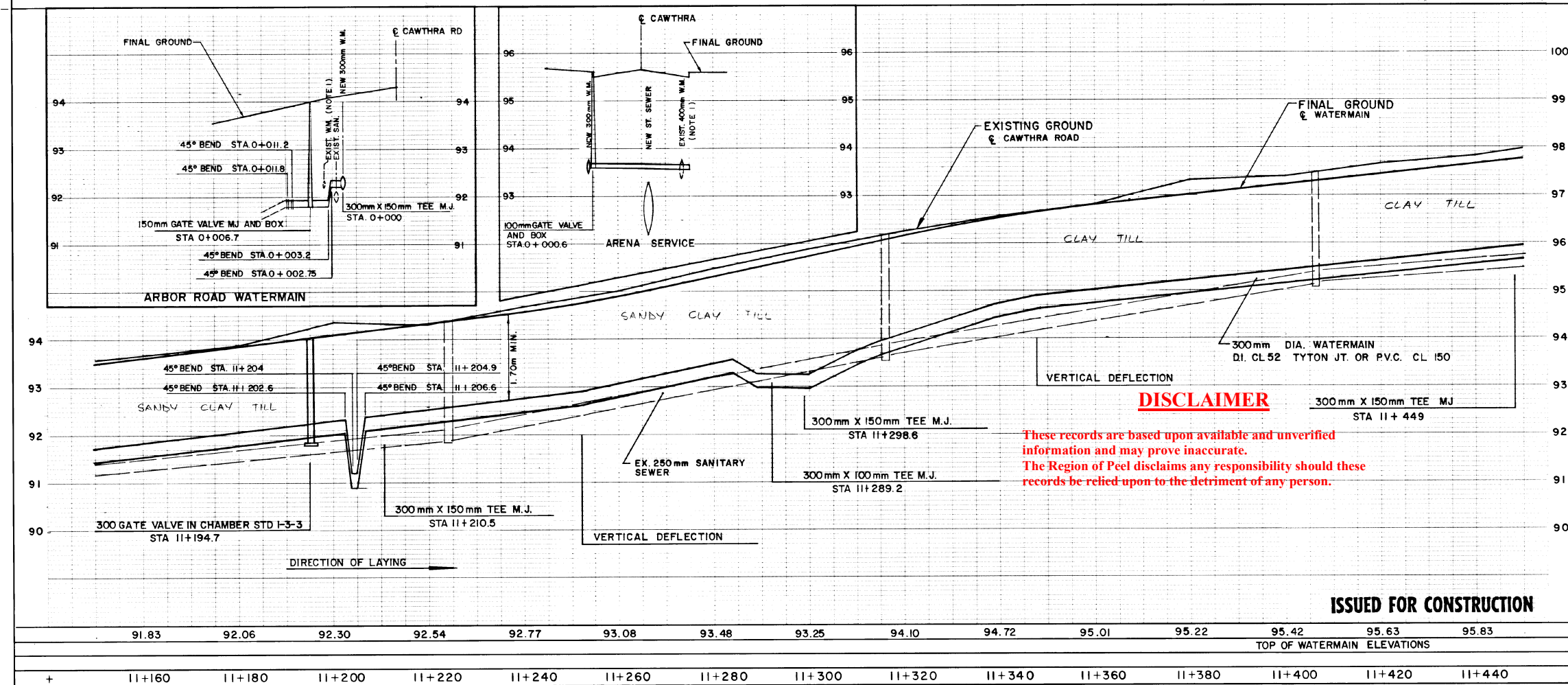
Sta.	To Sta.	10+900
10+620	10+640	10+660
10+680	10+700	10+720
10+760	10+780	10+800
10+840	10+860	10+880
10+900		

Lot's	Area 2-7	Project No. 88-1310
Scale 1:200	Drawn by B.J.H.	Checked by R.I.R.
Date MAY 1986	Sheet 3 of 27	Plan No. 8313-D





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.
- Located Accurately In Field.
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

REGISTERED PROFESSIONAL ENGINEER

R. I. ROOK

PROVINCE OF ONTARIO

Designed by: \_\_\_\_\_

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

**Department of Public Works**

**CAWTHRA ROAD**

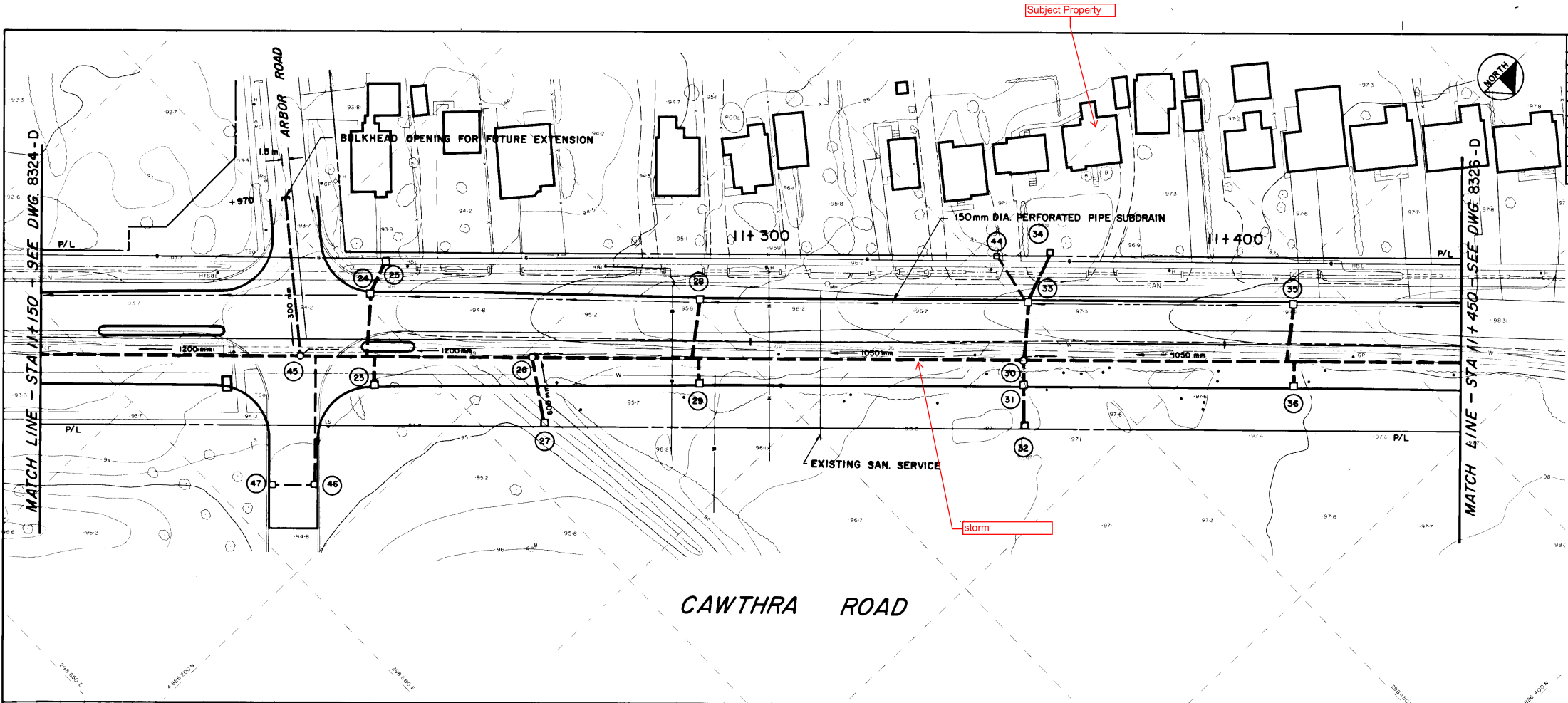
ATWATER AVENUE TO SOUTH SERVICE ROAD

300mm DIA. WATERMAIN & REMOVALS

Sta. 11+150 To Sta. 11+450

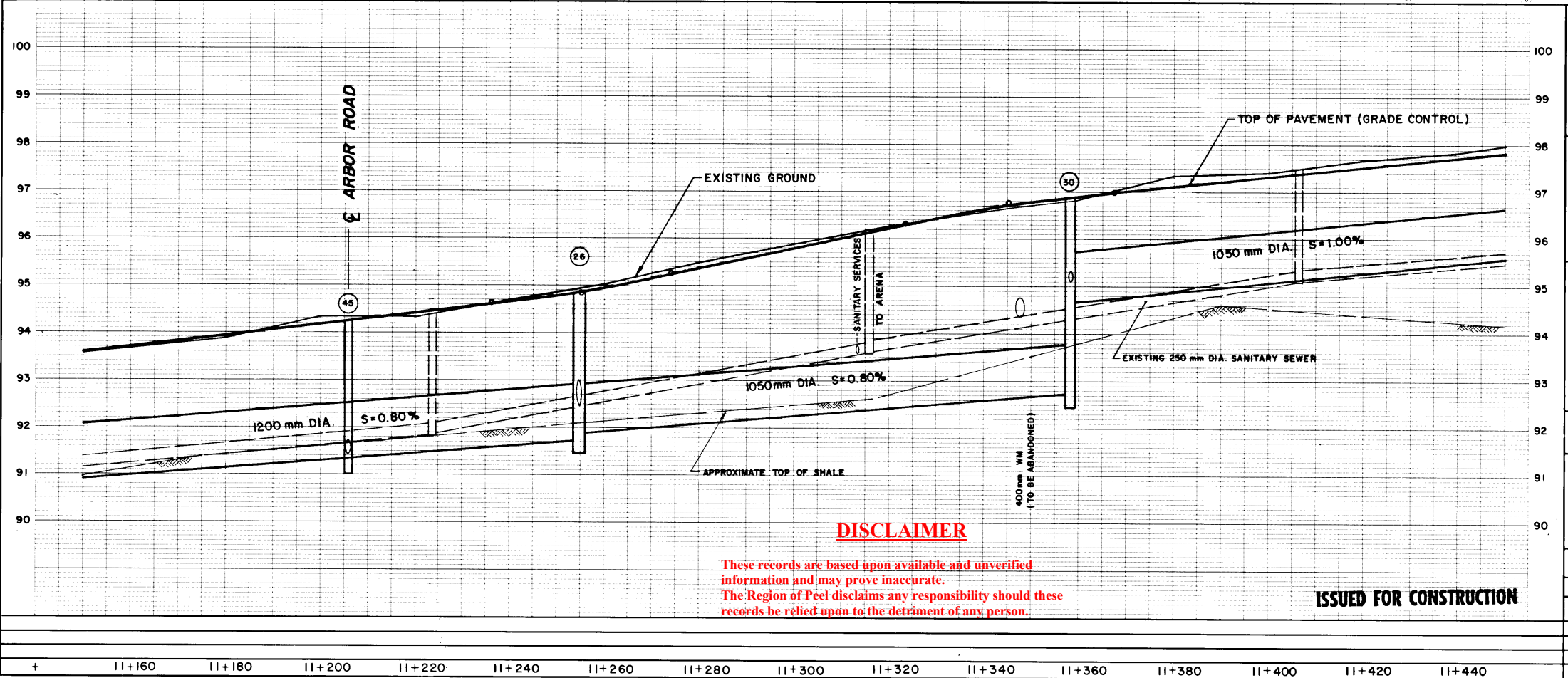
Lots	Area Z-7	Project No. 85-1310
Scale	Hor. 1:500	Drawn by B.J.H.
Date	May 1985	Sheet 5 of 27
		Checked by R.I.R.
		Plan No. 8315-D

01



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL. W/O. CABLE		
WATERMAINS			HYDRO. W/O. 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 Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. N° 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 chd. 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

**Department of Public Works**

**CAWTHRA ROAD**  
ATWATER AVENUE TO SOUTH SERVICE ROAD

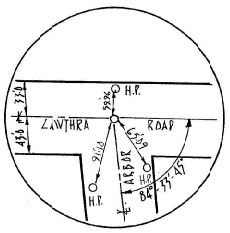
**STORM SEWERS**  
Sta. 11+150 To Sta. 11+450

Lots	Area	Project No.
Scale 1"=100'	Drawn by B. J. H.	Checked by R. I. R.
Date MAY 1985	Sheet 15 of 27	Plan No. 8325-D

8325-D

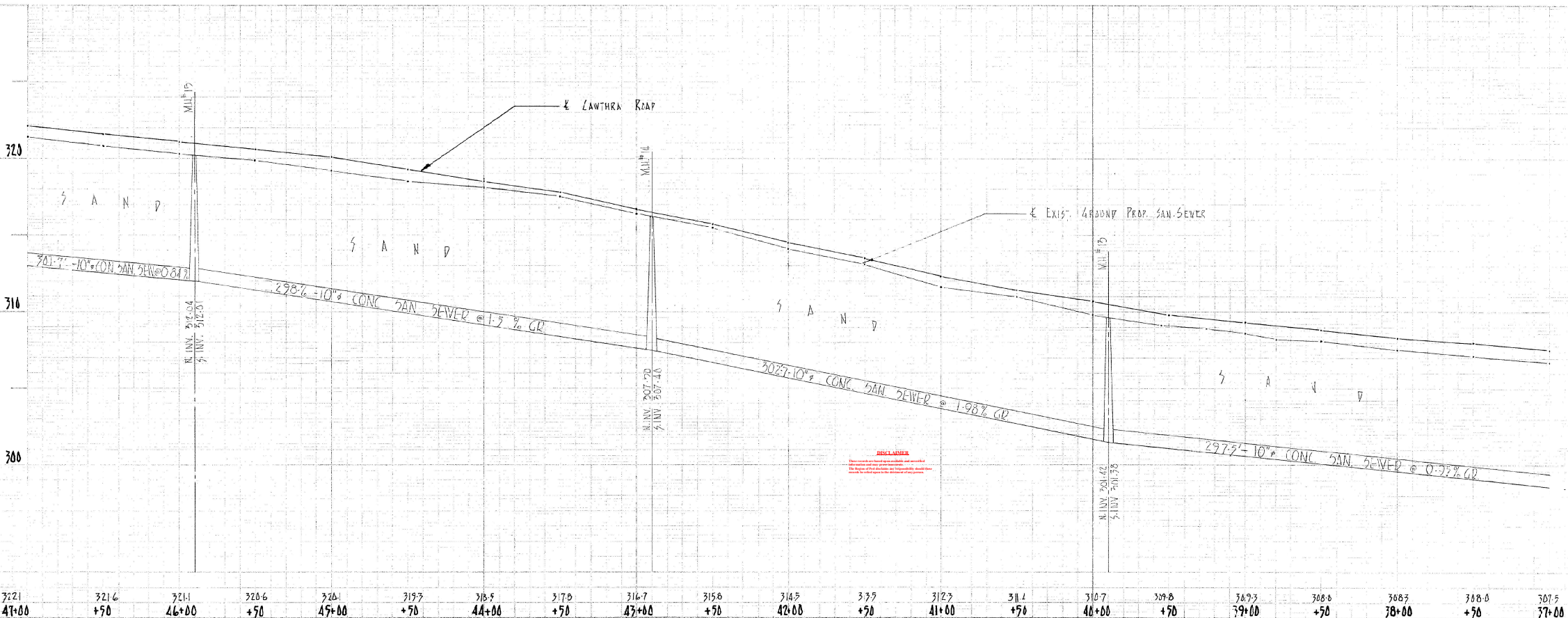
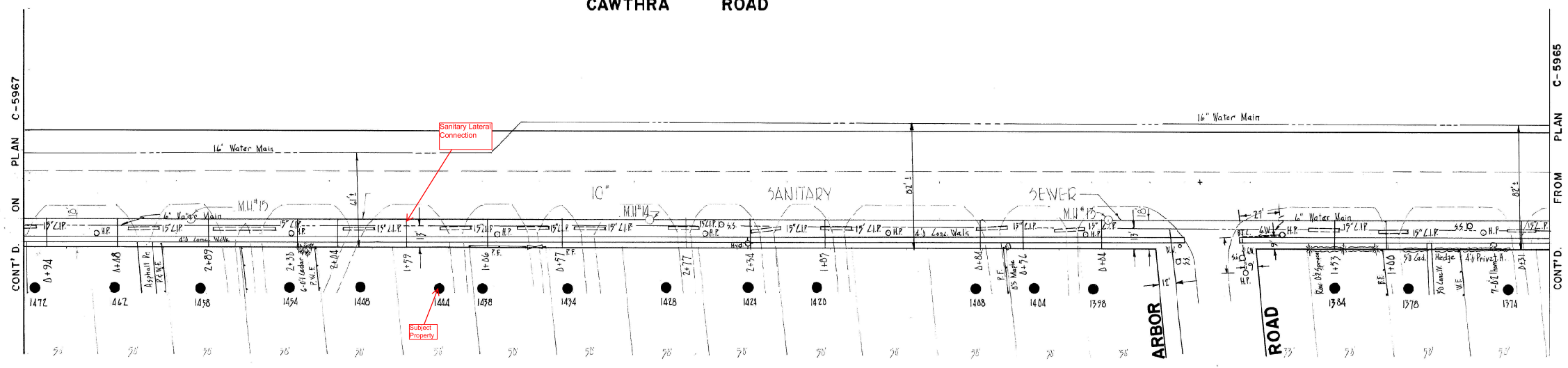


SERVICE DATA					
SAN SEWERS	DATE	INIT.	SAN SEWERS	DATE	INIT.
STORM SEWERS	DATE	INIT.	BELL W/O CABLE	DATE	INIT.
WATERMANS	DATE	INIT.	HYDRO W/O CABLE	DATE	INIT.
REVISIONS					
DATE	DESCRIPTION	INIT.	DATE	DESCRIPTION	INIT.
MAR 15 1965	REVISION	W.J.			
APR 28 1965	AS CONSTRUCTED	R.Y.			
FEB 1964					



P. 1 311.39+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.
- TEMP. BENCH MARK ELEV. 309.21
- DESCRIPTION 6' STRIKE IN H.C. 378.35E. # 633 ARBOR ROAD

NOTE: ALL BEDDING TO BE TYPE "E"

REGISTERED PROFESSIONAL ENGINEER  
C. D. LEAVENS  
PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER  
W. J. ANDERSON  
PROVINCE OF ONTARIO

DESIGNED BY  
C. D. Leavens

APPROVED BY  
W. J. Anderson

TOWNSHIP OF TORONTO  
COUNTY OF PEELE  
ENGINEERING DEPARTMENT

**CAWTHRA ROAD**  
FROM C.N.R. NORTH TO S. SERVICE RD.  
STN. 37+00 TO STN. 47+00

LOT/S  
SCALE  
DATE

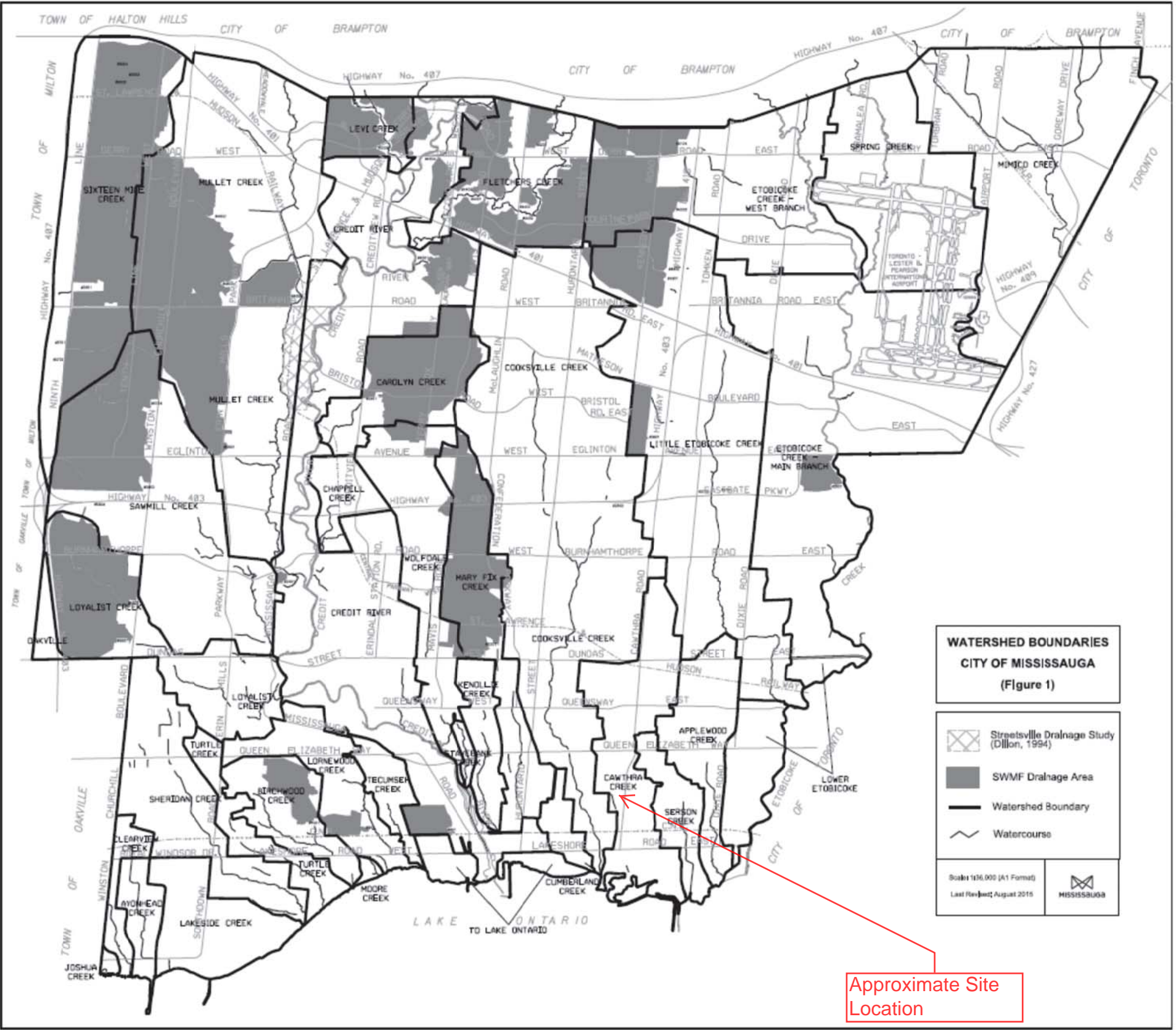
CON. / RANGE  
DRAWN BY  
SHEET

25.0 S.  
R. Y.  
4 OF 6

PROJECT NO. 28 63 A  
CHECKED BY  
PLAN NO. 5966

5966

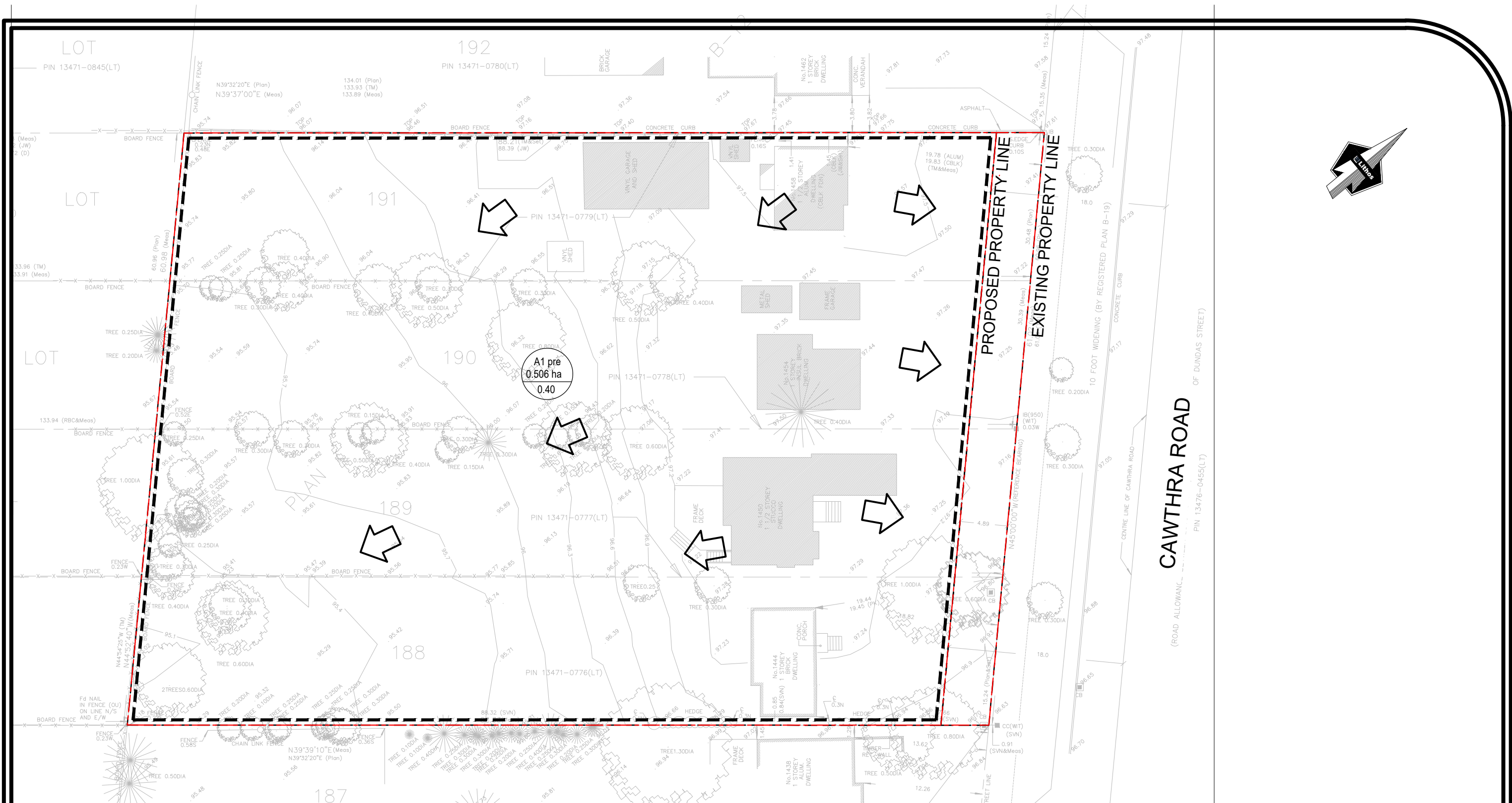
A-1 - Watershed Boundaries



## **APPENDIX C**

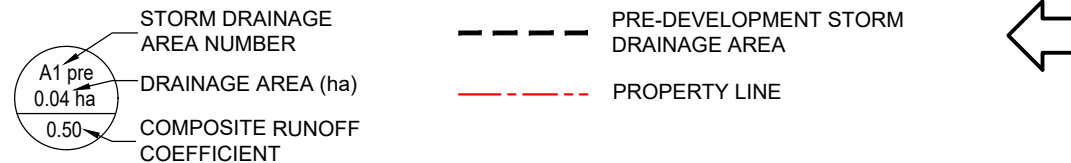
### **Storm Analysis**





150 Bermonsdey Road, North York, Ontario M4A 1Y1

## LEGEND



Drainage Direction -  
Both Manor and Major  
Drainage Patterns

PRE-DEVELOPMENT  
DRAINAGE AREA PLAN  
RESIDENTIAL USE DEVELOPMENT  
1444-1458 CAWTHRA ROAD  
MISSISSAUGA, ONTARIO

DATE: SEP 2018

PROJECT No: UD17-094

SCALE: N.T.S.

FIGURE No: DAP1



Prepared by: Angelos Andreadis, 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: September 2018

### Input Parameters

Area Number	Area (ha)	C	Tc (min.)
A1 pre	0.506	0.40	15

$$Q = 0.0028 C I A$$

### Rational Method Calculation

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

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m³/s)	Q (L/s)
A1 pre	0.506	0.40	0.20	15	59.9	0.034	33.7

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

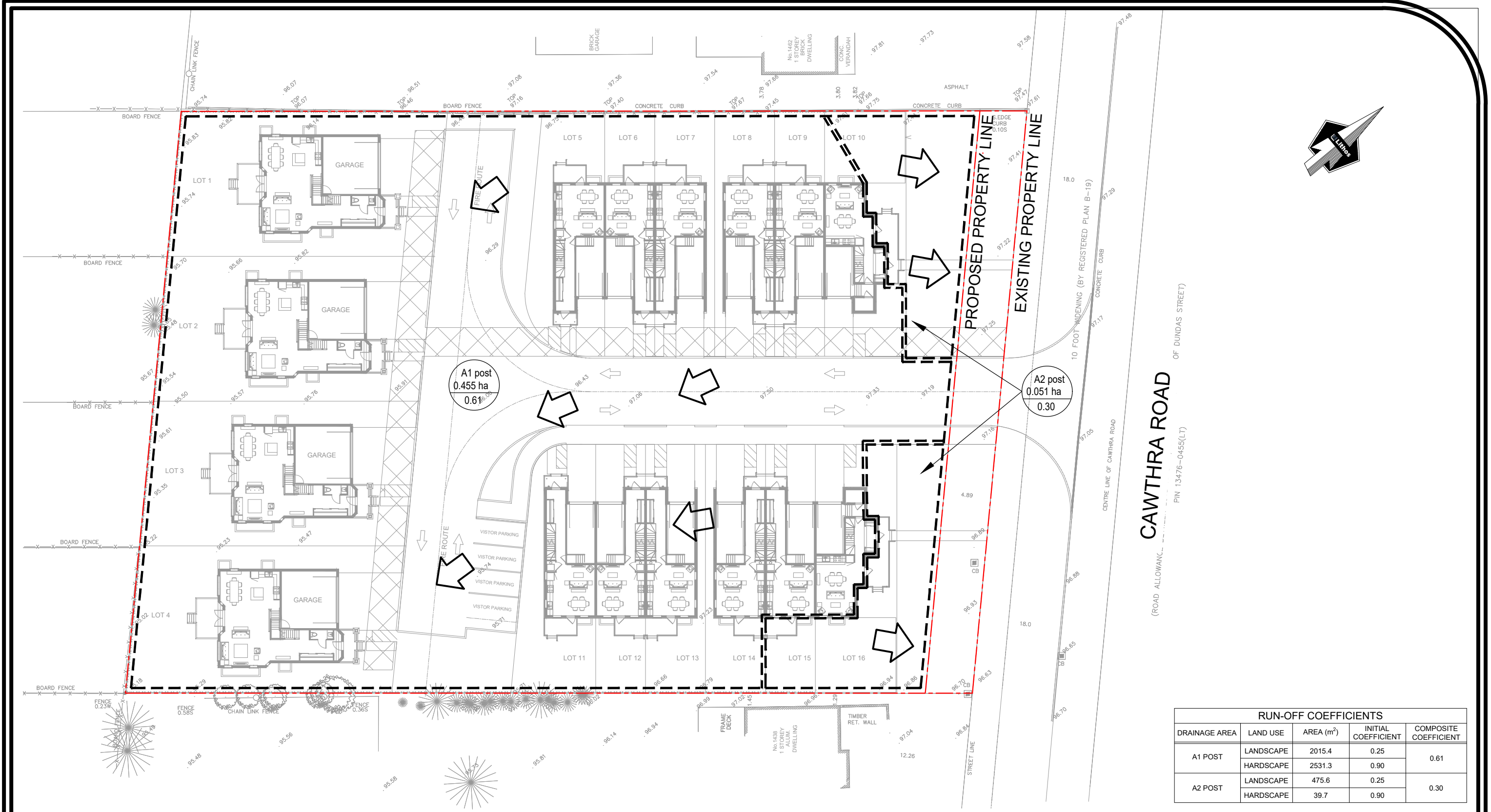
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m³/s)	Q (L/s)
A1 pre	0.506	0.40	0.20	15	80.5	0.045	45.3

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

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m³/s)	Q (L/s)
Area Number	0.506	0.40	0.20	15	99.2	0.056	55.8

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

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m³/s)	Q (L/s)
A1 pre	0.506	0.40	0.20	15	140.7	0.079	79.1



RUN-OFF COEFFICIENTS				
DRAINAGE AREA	LAND USE	AREA (m <sup>2</sup> )	INITIAL COEFFICIENT	COMPOSITE COEFFICIENT
A1 POST	LANDSCAPE	2015.4	0.25	0.61
	HARDSCAPE	2531.3	0.90	
A2 POST	LANDSCAPE	475.6	0.25	0.30
	HARDSCAPE	39.7	0.90	



150 Bermonsday Road, North York, Ontario M4A 1Y1

LEGEND

- A1 post

0.455 ha

0.61

STORM DRAINAGE AREA NUMBER

DRAINAGE AREA (ha)

COMPOSITE RUNOFF COEFFICIENT
- ---

POST-DEVELOPMENT STORM DRAINAGE AREA

PROPERTY LINE

POST-DEVELOPMENT DRAINAGE AREA PLAN RESIDENTIAL USE DEVELOPMENT 1444-1458 CAWTHRA ROAD MISSISSAUGA, ONTARIO	
DATE: SEP 2018	PROJECT No: UD17-094
SCALE: N.T.S.	FIGURE No: DAP1



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

1444-1458 Cawthra Road

File No. UD17-094

Date: September 2018

Prepared By: Angelos Andreadis, P.Eng., M.A.Sc.

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

		Controlled - A1 Post				Drainage Area A2 Post				
		<div>Drainage Areas</div> <div>Area (A1) = 0.455 ha</div> <div>"C" = 0.61</div> <div>AC1= 0.28</div> <div>Tc = 15.0 min</div> <div>Time Increment = 5.0 min</div> <div>Controlled Release Rate = 26.2 L/s</div> <div>Min. Storage = 18.1 m³</div>				Uncontrolled				
						Area (A2) = 0.051 ha				
						"C" = 0.30				
						AC2= 0.02				
			Tc = 15.0 min							
			Max. Release Rate = 2.6 L/s							
2-Year Design Storm										
a=	610.00	Type	Area (ha)	"C"				Type	Area (ha)	"C"
b=	4.60	Landscaped	0.202	0.25				Landscaped	0.048	0.25
c=	0.78	Hardscaped	0.253	0.90				Hardscaped	0.004	0.90
l =	a (b + t) <sup>c</sup>	Total Area (A1)	0.455	0.61				Total Area (A2)	0.051	0.30
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)		
Time	Rainfall	Storm	Runoff	Target	Total	Storm		Runoff		
	Intensity	Runoff	Volume	Released	Storage	Runoff		Volume		
(min)	(mm/hr)	(A1 post)	(A1 post)	(A1 post)	(A1 post)	(A2 post)		(A2 Post)		
		(m³/s)	(m³)	(m³)	(m³)	(m³/s)		(m³)		
15.0	59.9	0.046	41.66	23.55	18.11	0.003		2.31		
20.0	50.2	0.039	46.52	31.40	15.12	0.002		2.58		
25.0	43.4	0.034	50.34	39.25	11.09	0.002		2.79		
30.0	38.4	0.030	53.48	47.09	6.38	0.002		2.96		
35.0	34.6	0.027	56.16	54.94	1.21	0.001		3.11		
40.0	31.5	0.024	58.49	62.79	0.00	0.001		3.24		
45.0	29.0	0.022	60.57	70.64	0.00	0.001		3.35		
50.0	26.9	0.021	62.45	78.49	0.00	0.001		3.46		
55.0	25.2	0.019	64.15	86.34	0.00	0.001		3.55		
60.0	23.6	0.018	65.72	94.19	0.00	0.001		3.64		
65.0	22.3	0.017	67.18	102.04	0.00	0.001		3.72		
70.0	21.1	0.016	68.53	109.89	0.00	0.001		3.79		
75.0	20.1	0.016	69.81	117.74	0.00	0.001		3.86		
80.0	19.1	0.015	71.00	125.59	0.00	0.001		3.93		
85.0	18.3	0.014	72.14	133.43	0.00	0.001		3.99		
90.0	17.5	0.014	73.21	141.28	0.00	0.001		4.05		
95.0	16.9	0.013	74.24	149.13	0.00	0.001		4.11		
100.0	16.2	0.013	75.21	156.98	0.00	0.001		4.16		
105.0	15.6	0.012	76.15	164.83	0.00	0.001		4.22		
110.0	15.1	0.012	77.05	172.68	0.00	0.001		4.27		
115.0	14.6	0.011	77.91	180.53	0.00	0.001		4.31		
120.0	14.2	0.011	78.74	188.38	0.00	0.001		4.36		
125.0	13.7	0.011	79.55	196.23	0.00	0.001		4.40		
130.0	13.3	0.010	80.32	204.08	0.00	0.001		4.45		
135.0	13.0	0.010	81.07	211.93	0.00	0.001		4.49		
140.0	12.6	0.010	81.80	219.78	0.00	0.001		4.53		
145.0	12.3	0.009	82.50	227.62	0.00	0.001		4.57		
150.0	12.0	0.009	83.19	235.47	0.00	0.001		4.60		
155.0	11.7	0.009	83.85	243.32	0.00	0.000		4.64		
160.0	11.4	0.009	84.50	251.17	0.00	0.000		4.68		
165.0	11.1	0.009	85.13	259.02	0.00	0.000		4.71		
170.0	10.9	0.008	85.74	266.87	0.00	0.000		4.75		



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

1444-1458 Cawthra Road

File No. UD17-094

Date: September 2018

Prepared By: Angelos Andreadis, P.Eng., M.A.Sc.

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

5-Year Design Storm		Controlled - A1 Post				Drainage Area A2 Post			
		Drainage Areas		A1 Post		Uncontrolled			
		Area (A1) =		0.455 ha		Area (A2) =		0.051 ha	
		"C" =		0.61		"C" =		0.30	
		AC1=		0.28		AC2=		0.02	
Tc =		15.0 min		Tc =		15.0 min			
Time Increment =		5.0 min							
Controlled Release Rate =		26.2 L/s				Max. Release Rate =		3.4 L/s	
Min. Storage =		32.4 m³							
5-Year Design Storm									
a=	820.00	Type	Area (ha)	"C"		Type	Area (ha)	"C"	
b=	4.60	Landscaped	0.202	0.25		Landscaped	0.048	0.25	
c=	0.78	Hardscaped	0.253	0.90		Hardscaped	0.004	0.90	
l =	a (b + t) <sup>c</sup>	Total Area (A1)	0.455	0.61		Total Area (A2)	0.051	0.30	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
Time	Rainfall	Storm	Runoff	Target	Total	Storm	Runoff		
	Intensity	Runoff	Volume	Released	Storage	Runoff	Volume		
(min)	(mm/hr)	(A1 post)	(A1 post)	Volume	(A1 post)	(A2 post)	(A2 Post)		
		(m³/s)	(m³)	(m³)	(m³)	(m³/s)	(m³)		
15.0	80.5	0.062	56.00	23.55	32.45	0.003	3.10		
20.0	67.4	0.052	62.54	31.40	31.14	0.003	3.46		
25.0	58.4	0.045	67.66	39.25	28.42	0.002	3.75		
30.0	51.7	0.040	71.89	47.09	24.79	0.002	3.98		
35.0	46.5	0.036	75.49	54.94	20.55	0.002	4.18		
40.0	42.4	0.033	78.63	62.79	15.84	0.002	4.35		
45.0	39.0	0.030	81.43	70.64	10.78	0.002	4.51		
50.0	36.2	0.028	83.94	78.49	5.45	0.002	4.65		
55.0	33.8	0.026	86.24	86.34	0.00	0.001	4.77		
60.0	31.8	0.025	88.35	94.19	0.00	0.001	4.89		
65.0	30.0	0.023	90.30	102.04	0.00	0.001	5.00		
70.0	28.4	0.022	92.13	109.89	0.00	0.001	5.10		
75.0	27.0	0.021	93.84	117.74	0.00	0.001	5.19		
80.0	25.7	0.020	95.45	125.59	0.00	0.001	5.28		
85.0	24.6	0.019	96.97	133.43	0.00	0.001	5.37		
90.0	23.6	0.018	98.42	141.28	0.00	0.001	5.45		
95.0	22.7	0.018	99.79	149.13	0.00	0.001	5.52		
100.0	21.8	0.017	101.11	156.98	0.00	0.001	5.60		
105.0	21.0	0.016	102.37	164.83	0.00	0.001	5.67		
110.0	20.3	0.016	103.57	172.68	0.00	0.001	5.73		
115.0	19.6	0.015	104.73	180.53	0.00	0.001	5.80		
120.0	19.0	0.015	105.85	188.38	0.00	0.001	5.86		
125.0	18.4	0.014	106.93	196.23	0.00	0.001	5.92		
130.0	17.9	0.014	107.97	204.08	0.00	0.001	5.98		
135.0	17.4	0.013	108.98	211.93	0.00	0.001	6.03		
140.0	16.9	0.013	109.96	219.78	0.00	0.001	6.09		
145.0	16.5	0.013	110.90	227.62	0.00	0.001	6.14		
150.0	16.1	0.012	111.82	235.47	0.00	0.001	6.19		
155.0	15.7	0.012	112.72	243.32	0.00	0.001	6.24		
160.0	15.3	0.012	113.59	251.17	0.00	0.001	6.29		
165.0	15.0	0.012	114.43	259.02	0.00	0.001	6.33		
170.0	14.6	0.011	115.26	266.87	0.00	0.001	6.38		



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

1444-1458 Cawthra Road

File No. UD17-094

Date: September 2018

Prepared By: Angelos Andreadis, P.Eng., M.A.Sc.

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

10-Year Design Storm		Controlled - A1 Post				Drainage Area A2 Post		
		Uncontrolled						
		Drainage Areas				Area (A2) =		
		A1 Post				"C" =		
		ha				0.051		
a = 1010.00		Type		Area (ha)		"C"		
b = 4.60		Landscaped		0.202		0.25		
c = 0.78		Hardscaped		0.253		0.90		
l = a (b + t) <sup>c</sup>		Total Area (A1)		0.455		0.61		
(1)		(2)		(3)		(4)		
Time		Rainfall		Storm		Runoff		
Intensity		Runoff		Volume		Volume		
(min)		(A1 post)		(A1 post)		(A1 post)		
(mm/hr)		(m³/s)		(m³)		(m³)		
15.0	99.2	0.077	68.97	23.55	45.42	0.004	3.82	
20.0	83.1	0.064	77.02	31.40	45.63	0.004	4.26	
25.0	71.9	0.056	83.34	39.25	44.10	0.003	4.61	
30.0	63.7	0.049	88.55	47.09	41.45	0.003	4.90	
35.0	57.3	0.044	92.98	54.94	38.04	0.002	5.15	
40.0	52.2	0.040	96.85	62.79	34.06	0.002	5.36	
45.0	48.1	0.037	100.29	70.64	29.65	0.002	5.55	
50.0	44.6	0.034	103.39	78.49	24.90	0.002	5.72	
55.0	41.7	0.032	106.22	86.34	19.88	0.002	5.88	
60.0	39.1	0.030	108.82	94.19	14.63	0.002	6.02	
65.0	36.9	0.029	111.23	102.04	9.19	0.002	6.16	
70.0	35.0	0.027	113.47	109.89	3.59	0.001	6.28	
75.0	33.2	0.026	115.58	117.74	0.00	0.001	6.40	
80.0	31.7	0.024	117.56	125.59	0.00	0.001	6.51	
85.0	30.3	0.023	119.44	133.43	0.00	0.001	6.61	
90.0	29.0	0.022	121.22	141.28	0.00	0.001	6.71	
95.0	27.9	0.022	122.92	149.13	0.00	0.001	6.80	
100.0	26.9	0.021	124.54	156.98	0.00	0.001	6.89	
105.0	25.9	0.020	126.09	164.83	0.00	0.001	6.98	
110.0	25.0	0.019	127.57	172.68	0.00	0.001	7.06	
115.0	24.2	0.019	129.00	180.53	0.00	0.001	7.14	
120.0	23.4	0.018	130.38	188.38	0.00	0.001	7.22	
125.0	22.7	0.018	131.71	196.23	0.00	0.001	7.29	
130.0	22.1	0.017	132.99	204.08	0.00	0.001	7.36	
135.0	21.4	0.017	134.23	211.93	0.00	0.001	7.43	
140.0	20.9	0.016	135.43	219.78	0.00	0.001	7.50	
145.0	20.3	0.016	136.60	227.62	0.00	0.001	7.56	
150.0	19.8	0.015	137.73	235.47	0.00	0.001	7.62	
155.0	19.3	0.015	138.83	243.32	0.00	0.001	7.69	
160.0	18.9	0.015	139.91	251.17	0.00	0.001	7.74	
165.0	18.4	0.014	140.95	259.02	0.00	0.001	7.80	
170.0	18.0	0.014	141.97	266.87	0.00	0.001	7.86	



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

1444-1458 Cawthra Road

File No. UD17-094

Date: September 2018

Prepared By: Angelos Andreadis, P.E

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

		Controlled - A1 Post				Drainage Area A2 Post				
		Drainage Areas		A1 Post		Uncontrolled				
		Area (A1) =		0.455	ha	Area (A2) =		0.051	ha	
		"C" =		0.76		"C" =		0.37		
		AC1=		0.35		AC2=		0.02		
		Tc =		15.0	min	Tc =		15.0	min	
		Time Increment =		5.0	min					
		Controlled Release Rate =		26.2	L/s	Max. Release Rate =			7.5	L/s
		Min. Storage =		110.9	m³					
		100-Year Design Storm								
a=	1450.00	Type	Area (ha)	"C"		Type	Area (ha)	"C"		
b=	4.90	Landscaped	0.202	0.25		Landscaped	0.048	0.25		
c=	0.78	Hardscaped	0.253	0.90		Hardscaped	0.004	0.90		
l =	a (b + t)ᶜ	Total Area (A1)	0.455	0.61		Total Area (A2)	0.051	0.30		
(1)	(2)	(3)	(4)	(5)		(6)		(7)	(8)	
Time	Rainfall	Storm	Runoff	Target	Total	Storm		Runoff		
	Intensity	Runoff	Volume	Released	Storage	Runoff		Volume		
(min)	(mm/hr)	(A1 post)	(A1 post)	Volume	(A1 post)	(A2 post)		(A2 Post)		
		(m³/s)	(m³)	(m³)	(m³)	(m³/s)		(m³)		
15.0	140.7	0.136	122.31	23.55	98.77	0.008		6.77		
20.0	118.1	0.114	136.92	31.40	105.53	0.006		7.58		
25.0	102.4	0.099	148.39	39.25	109.14	0.005		8.21		
30.0	90.8	0.088	157.84	47.09	110.74	0.005		8.74		
35.0	81.8	0.079	165.88	54.94	110.94	0.004		9.18		
40.0	74.6	0.072	172.90	62.79	110.11	0.004		9.57		
45.0	68.7	0.066	179.14	70.64	108.49	0.004		9.92		
50.0	63.8	0.062	184.75	78.49	106.26	0.003		10.23		
55.0	59.6	0.058	189.87	86.34	103.53	0.003		10.51		
60.0	56.0	0.054	194.58	94.19	100.39	0.003		10.77		
65.0	52.8	0.051	198.93	102.04	96.90	0.003		11.01		
70.0	50.0	0.048	203.00	109.89	93.11	0.003		11.24		
75.0	47.6	0.046	206.81	117.74	89.07	0.003		11.45		
80.0	45.4	0.044	210.39	125.59	84.81	0.002		11.65		
85.0	43.4	0.042	213.78	133.43	80.35	0.002		11.83		
90.0	41.6	0.040	217.00	141.28	75.72	0.002		12.01		
95.0	40.0	0.039	220.06	149.13	70.93	0.002		12.18		
100.0	38.5	0.037	222.99	156.98	66.01	0.002		12.34		
105.0	37.1	0.036	225.79	164.83	60.96	0.002		12.50		
110.0	35.8	0.035	228.47	172.68	55.79	0.002		12.65		
115.0	34.7	0.033	231.05	180.53	50.52	0.002		12.79		
120.0	33.6	0.032	233.53	188.38	45.16	0.002		12.93		
125.0	32.6	0.031	235.93	196.23	39.70	0.002		13.06		
130.0	31.6	0.031	238.24	204.08	34.17	0.002		13.19		
135.0	30.7	0.030	240.48	211.93	28.56	0.002		13.31		
140.0	29.9	0.029	242.65	219.78	22.88	0.002		13.43		
145.0	29.1	0.028	244.75	227.62	17.13	0.002		13.55		
150.0	28.4	0.027	246.80	235.47	11.32	0.002		13.66		
155.0	27.7	0.027	248.78	243.32	5.46	0.001		13.77		
160.0	27.0	0.026	250.71	251.17	0.00	0.001		13.88		
165.0	26.4	0.026	252.59	259.02	0.00	0.001		13.98		
170.0	25.8	0.025	254.43	266.87	0.00	0.001		14.08		


## **APPENDIX D**

### **Sanitary Data Analysis**





SANITARY SEWER DESIGN SHEET  
1444-1458 Cawthra Road  
CITY OF MISSISSAUGA

LOCATION	RESIDENTIAL								COMMERCIAL		FLOW							SEWER DESIGN					
	SECTION AREA							SECTION POP.	COMMERCIAL AREA	SECTION POP.	TOTAL ACCUM. POP.	AVERAGE RESIDENTIAL FLOW '@' 302.8 L/c/d	HARMON PEAKING FACTOR	RES. PEAK FLOW	AVERAGE COMMERCIAL FLOW @ 302.8 L/c/d	TOTAL ACCUM. AREA	INFILT. @ 0.2 L/s/ha.	TOTAL DESIGN FLOW	PIPE LENGTH	PIPE DIA.	SLOPE	FULL FLOW CAPACITY n = 0.013	% of DESIG CAPACITY
		Single Family ( 10m frontage)	Single Family ( 10m frontage)	Semi- Detached	Row Dwellings	Apartments	Apartments >475p/ha																
(ha.)	@ 70p/ha	@ 50p/ha	@ 70p/ha	@ 175p/ha	@ 475p/ha	@ 2.7 ppu	(persons)	(ha.)	(persons)	(persons)	(L/s)			(L/s)	(L/s)	(ha.)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/sec)	(%)
column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Existing Condition																							
Residential Dwellings	0.536	0.00	0.042	0.00	0.00	0.00	0.00	2	0.00	0	2	0.007	4.46	0.033	0.00	0.536	0.107	0.14					
Proposed Condition																							
Residential-Use Development	0.536	0.00	0.121	0.00	0.243	0.00	0.00	49	0.00	0	49	0.170	4.32	0.735	0.00	0.536	0.107	0.84					
<b>Note:</b> Worst case scenario discharge flow population according to site statistics has been accounted to determine the total net flow due to the proposed development																							
Residential/Commercial Flow Rate - 302.8 litres/capita/day																							
Infiltration - 0.2 L/ha																							
Peaking Factor = 1 + [14 / (4 + P <sup>0.5</sup> )], P=Population in thousands																							
Site Area: 0.536 ha																							
		Prepared by: Angelos Andreadis, P.E., M.A.Sc., Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc. Date: September 2018									Project: 1444-1458 Cawthra Road Project No: UD17-094 City of Mississauga								Sheet 1 OF 1				

## **APPENDIX E**

### **Water Data Analysis**

## 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 <sup>2</sup>	100%
Level 2=	200 m <sup>2</sup>	25%
Level -1=	200 m <sup>2</sup>	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: September 2018

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

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

### Pressure Losses

*Hazen-Williams Formula*

$$V = k C R_h^{0.63} S^{0.54}$$

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<sub>w</sub> for partially flow)

### *Fire Fighting and Domestic Head Loss*

Flow Requirements=	83.4 L/s
Diameter=	150 mm
Area=	1.77E-02 m <sup>2</sup>
L=	13 m
V=	4.72 m/s
S=	1.17E-01
R <sub>h</sub> =	0.04
H <sub>f</sub> =	1.52 m
=	2.17 psi

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

when: Static Pressure = 64 psi  
Residual Pressure = 58 psi

Flow = 0 GPM = 0.00 L/s  
Flow = 1950 GPM = 123.01 L/s

#### **Pressure**

<b>(psi)</b>	<b>Flow (L/s)</b>
64	0.00
58	123.01
<b>59.9</b>	<b>83.42</b>

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+H<sub>f</sub>)**

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

Project No: 2018-0046Date: Apr. 11, 2018Site Location: 1444-1458 Cawthra Rd.  
Mississauga, On.Hydrants Opened by: Peel Region WaterTested By: Gordon H. Samanthak

## 1) Required photos:

- ☒ Site Id & Date
 ☒ Condition of Flow Hydrant  
☒ Location Overview
 ☒ Condition of Residual Hydrant  
☒ Other

## 2) Test Data

Time of Test: 1300Location of Test: (Flow) In front of 1424 Cawthra Rd., South side(Residual) In front of 1476 Cawthra Rd., South sideMain Size: 300 mmStatic 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<sup>2</sup>Vp

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

$$= 1233.03$$

$$Q_1 = \sim 1250 \text{ USGPM}$$

$$Q_2 = 2(29.83)(0.9)(2.5")^2 \sqrt{34}$$

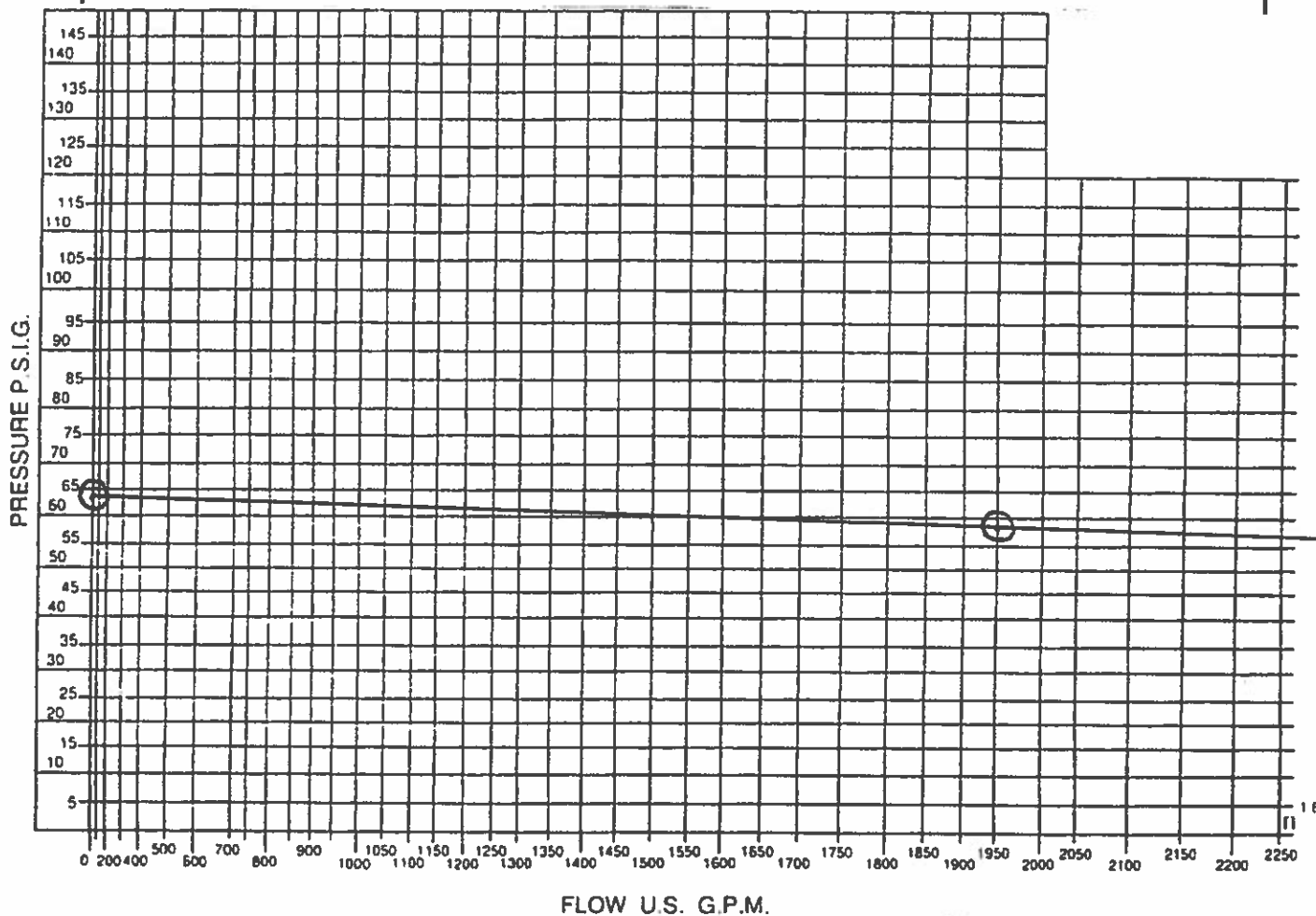
$$= 1956.79$$

$$Q_2 = \sim 1950 \text{ USGPM}$$

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

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

#### 4) Plot



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

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

$$= 5738.63$$

$$Q_{\text{avail}} \approx 5730 \text{ USGPM}$$

#### 5) Site sketch & Comments

