Lithos

September 2020

UD18-050

Functional Servicing and Stormwater Management Report



Project: 2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road

Core FSC Lakeshore GP Inc. and

Core FSC Lakeshore Limited

Lithos Group Inc.
150 Bermondsey Road
North York, ON M1A-1Y1
Tel: (416) 750-7769
Email: info@LithosGroup.ca

PREPARED BY:



John Pasalidis, P.E., M.A.Sc.,

Project Designer

REVIEWED BY:



Angelos Andreadis, P.E., M.A.Sc.,

Project Design Manager

AUTHORIZED FOR ISSUE BY:

LITHOS GROUP INC.



Nick Moutzouris, P.Eng., M.A.Sc.

Principal

Issues and Revisions Registry

Identification	Date	Description of issued and/or revision
FSR/SWM Report	08/22/2019	Issued for Zoning Application
FSR/SWM Report	09/30/2020	Re-Issued for Zoning 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 Burlington 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.

Neither possession of the Work, nor a copy of it, carries the right of publication. All copyright in the Work is reserved to Lithos Group Inc. The Work shall not be disclosed, produced or reproduced, quoted from, or referred to, in whole or in part, or published in any manner, without the express written consent of Lithos Group Inc. and the Owner.

Executive Summary

Lithos Group Inc. (Lithos) was retained by Core FSC Lakeshore GP Inc. and Core FSC Lakeshore Limited (the "Owners") to prepare a Functional Servicing and Stormwater Management (FSR-SWM) Report in support of a Zoning Application resubmission for a proposed mixed-use development at 2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road (L7R 4Z4), in the City of Burlington (the "City"). The following is a summary of our conclusions:

Storm Drainage

A more detailed Stormwater Management report will be prepared at the Site Plan Application. The property's existing drainage pattern is separated into two drainage areas (one flowing north towards Lakeshore Road and one flowing south towards Old Lakeshore Road). Following that fact, our analysis assumes that the drainage pattern is maintained under Post-development conditions. Therefore, the site stormwater discharge will be controlled to the 2-year pre-development flows as specified by the City of Burlington comments provided in the pre-consultation meeting held on January 16, 2019. Proposed storm laterals will be connected to the existing 450 mm diameter storm sewer on Old Lakeshore Road and to the existing 850 mm diameter storm sewer on Lakeshore Road.

Furthermore, given that the underground construction will be partially submerged into the existing groundwater table, long-term groundwater discharge, along with the installation of a permanent dewatering system, will be installed. In addition, a treatment facility will be required prior to discharging into the City's storm sewer network due to the fact that groundwater exceeds the City's storm sewer discharge criteria.

In order to attain the target flows and meet the City's Wet Weather Flow Management Guidelines (WWFMG), quantity controls will be utilized and up to 61.0 m^3 and 19.4 m^3 of underground storages will be required for both areas flowing towards Old Lakeshore Road and Lakeshore Road, respectively.

The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of the Environment, Conservation and Parks (MECP). During Site Plan Application, a detailed analysis will be provided to assess the water quality on site and determine additional measures in order to achieve a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

The development will be connected to a proposed manhole discharging into the 200mm sanitary sewer on Old Lakeshore Road. The additional net discharge flow from the proposed development (sanitary and groundwater), is anticipated at approximately 8.01 L/s.

Water Supply

Water supply for the site will be from the existing 300 mm diameter watermain on Lakeshore Road. It is anticipated that a total design flow of 71.31 L/s will be required to support the proposed development. The results of the hydrant flow test, prepared by Cole Engineering, dated November 28, 2018, 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 be gravity driven to the adjacent right-of-way's (ROW)).

Table of Contents

1.0 Introduction 1
2.0 Site Description 1
3.0 Site Proposal 1
4.0 Terms of Reference and Methodology 2
4.1. Terms of Reference 2
4.2. Methodology: Stormwater Drainage and Management 2
4.3. Methodology: Sanitary Discharge 2
4.4. Methodology: Water Usage 3
5.0 Groundwater Conditions 3
5.1. Long-Term Dewatering 3
5.2. Short-Term Dewatering 3
6.0 Stormwater Management and Drainage 4
6.2. Stormwater Management 5
6.2.1. Quantity Controls 6
6.2.2. Quality Controls 7
6.3. Proposed Storm Connection 8
7.0 Sanitary Drainage System 8
7.1. Existing Sanitary Drainage System 8
7.2. Existing Flows 8
7.3. Proposed Sanitary Flows 8
7.4. Proposed Sanitary Connection 8
8.0 Water Supply System 9
8.1. Existing System 9
8.2. Proposed Water Supply Requirements 9
8.3. Proposed Watermain Connection 10
9.0 Erosion and Sediment Control during construction 10
10.0 Site Grading 10
10.1. Existing Grades 10
10.2. Proposed Grades 10
11.0 Conclusions and Recommendations 11

LIST OF FIGURES

Figure 1 - Location Plan
Figure 2 - Aerial Plan

LIST OF TABLES

Table 4-1 – Sanitary Flows 2
Table 4-2 – Water Usage 3
Table 6-1 – Input Parameters 4
Table 6-2 – Target Peak Flows 5
Table 6-3 – Post-development Input Parameters 5
Table 6-4 – Post-development Quantity Control towards Old Lakeshore Road as per City Requirements 6
Table 6-5 – Post-development Quantity Control towards Lakeshore Road as per City Requirements 7
Table 8-1 – Fire Flow Input Parameter 9

APPENDICES

Appendix A – Site Photographs
Appendix B – Background Information
Appendix C – Storm Analysis
Appendix D – Sanitary Data Analysis
Appendix E – Water Data Analysis

1.0 Introduction

Lithos Group Inc. (Lithos) was retained by Core FSC Lakeshore GP Inc. and Core FSC Lakeshore Limited (the "Owners") to prepare a Functional Servicing and Stormwater Management (FSR-SWM) Report in support of Zoning Application resubmission for a proposed mixed-use development at 2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road (L7R 4Z4), in the City of Burlington (the "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 the outline of the storm drainage pattern, sanitary discharge and water supply.

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

- Plan and Profile drawings of Pearl Street, drawing No. B-5213, dated January 1984 and drawing No. N 38-9, dated November 1971;
- Plan and Profile drawings of Gore/Junction Street, drawing No. B-7327, dated June 1985 and drawing No. N 38-8, "as constructed" on October 1976;
- Plan and Profile drawings of Lakeshore Road, drawing No N 38-2, dated December 19
- Plan and Profile drawings of Old Lakeshore Road, drawing No N 38-3, dated December 1971;
- Site Statistics prepared by Studio JCI, drawing No. A0.00, dated September 24, 2020;
- Conceptual Site Plan prepared by Studio JCI, drawing No. A1.00, dated September 24, 2020;
- Topographic Survey prepared by Aksan Piller Corporation LTD, dated October 4, 2017; and
- Hydrogeological Investigation prepared by Fisher Environmental LTD, dated September 18, 2020.

2.0 Site Description

The existing site is approximately 0.336 hectares and is currently occupied by two (2) two-storey commercial buildings, one (1) two and a half-storey commercial building, one (1) two-storey residential dwelling and outdoor parking area, as indicated in the topographic survey in **Appendix B**. The site is bound by Old Lakeshore Road to the south, Lakeshore Road to the north and parking lots to the 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 be a single 27-storey mixed-use building, with an additional mechanical penthouse. The building will consist of 310 residential units and will be serviced by five (5) levels of underground parking. There will also be an existing heritage building that will be maintained in its present form. The development will include a total 22,587.8 m^2 of Gross Floor Area (GFA). In addition, an area of approximately 0.011 ha, along Lakeshore Road, will be dedicated to the City. Therefore, the future site area will be approximately 0.325 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 was based on the Region of Halton Water and Wastewater Linear Design Manual (Halton Region, July 2017), the Ministry of Environment, Conversation and Parks (MECP) 2003, the TRCA /CVC Low Impact Development Stormwater Management Planning and Design Guide and local engineering standards provided by the City of Burlington.

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 more detailed Stormwater Management (SWM) report will be prepared at the site plan application stage.

The proposed development will be designed to meet the City's Design Criteria and the standards of the Province of Ontario as set out in the Ministry of Environment, Conservation and Parks (MECP) 2003 Stormwater Management Planning and Design Manual (SWMPD). The following design criteria will be reviewed:

- Post-development peak flows for the 100-year storm event for both drainage areas (towards Lakeshore Road and towards Old Lakeshore Road) should be controlled to the 2-year target flows. This criteria is consistent with the City of Burlington comments provided in the pre-consultation meeting held on January 16, 2019;

- 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 the guidelines as set out in Water and Wastewater Linear Design Manual by the Region of Halton. 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 (Apartment over 6 stories)	285	persons/ ha	0.275 (m^3 per capita per day)
Commercial	90		78.375 (m^3 per hectare per day)

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
Apartments (over 6 stories high)	275	Litres / capita
Commercial		

Pressure and flow tests have been conducted on the existing hydrants located near the site along Lakeshore Road, to obtain existing flows, residual and static pressure.

5.0 Groundwater Conditions

According to the Hydrogeological Investigation prepared by Fisher Environmental LTD., dated September, 2020, water table ranges from 75.52 to 80.39m asl.. In addition, the proposed development will be serviced by five (5) basement levels and the proposed building's footing will be approximately at 66.20m asl, therefore, long-term and short-term groundwater discharge will be required.

The results of groundwater sampling on site reveal that groundwater exceeds the City's limits for discharging into the storm sewer network and discharging groundwater into the regional sanitary sewer network is not allowed. Therefore, a treatment facility will be required prior to discharging into the City's infrastructure both for short-term and long-term dewatering of the site. The results of the Hydrogeological Site Assessment can be found in **Appendix B**.

5.1. Long-Term Dewatering

Given that the underground construction will be partially submerged into the existing groundwater table, long-term groundwater discharge, along with the installation of a permanent dewatering system, will be required. A groundwater flow rate of 90,250 L/day is estimated to be discharged on a permanent basis. Assuming that the pump will run for approximately 4.5 hours per day, long-term peak groundwater rate will be at 5.7 L/sec (groundwater peak flow rate). As mentioned above, groundwater is not in compliance with the City of Burlington storm sewer limits, therefore, after being collected by the building's sub-drain system, it will be first treated and then pumped into the City's storm sewer network, along Old Lakeshore Road. More specifically, groundwater flow will be pumped into the proposed underground storm storage tank-1, before finally being conveyed into the City's 450mm diameter storm sewer along Old Lakeshore Road. Groundwater will have a sampling access point for the City's access and inspection. Details and section for the groundwater sampling access point will be provided during Site Plan Application Stage.

5.2. Short-Term Dewatering

Short-term groundwater discharge (during construction) is estimated at 119,340 L/day. Assuming that the temporary groundwater pump will run for approximately 5 hours per day, peak groundwater discharge rate will be at 5.7 L/s. Groundwater will be treated before being discharged into the City's 450mm diameter storm sewer along Old Lakeshore.

6.0 Stormwater Management and Drainage

6.1. Existing Conditions

The subject lands are located in the Burlington's Urban Creeks drainage shed.

The existing site is approximately 0.336 hectares and is currently occupied by two (2) two-storey commercial buildings, one (1) two and a half-storey commercial building, one (1) two-storey residential dwelling and outdoor parking area. The site drains partially towards Old Lakeshore Road and partially towards Lakeshore Road. As mentioned in **Section 3**, an area of approximately 0.011 ha, along Lakeshore Road, will be dedicated to the City, therefore, the future site area will be 0.325 ha. Moreover, no external areas drain towards subject property.

According to available records, there are three (3) storm sewers abutting the subject property. More specifically:

- A 760mm diameter storm sewer on Lakeshore Road flowing north;
- A 850mm diameter storm sewer on Lakeshore Road flowing east; and
- A 450mm diameter storm sewer on Old Lakeshore Road flowing west.

Two (2) internal drainage areas were identified in the existing site:

1. A1 Pre – Storm runoff from the south portion of the site, which incorporates the runoff from the outdoor parking areas, the driveway and the existing buildings' rooftops, being discharged into the City's storm network along Old Lakeshore Road;
2. A2 Pre – Storm runoff from the north portion of the site, which incorporates the runoff from the outdoor parking areas, the driveway and existing buildings' rooftops, discharged into the City's storm network along Lakeshore Road. For details, please refer to **STM-1** in **Appendix C.**

The existing site is primarily covered by impermeable areas, thus, there is no significant infiltration onsite. Although the existing run-off coefficients for the areas draining towards Old Lakeshore Road and Lakeshore Road are estimated at 0.82 and 0.80, respectively, the WWFMG requires target flow calculations based on a run-off coefficient of 0.50. The input parameters are summarized in **Table 6-1** and are illustrated on **Figure STM1**, located in **Appendix C**.

Table 6-1 – Input Parameters

Catchment	Drainage Area (ha)	Actual "C"	Design "C"	Tc (min.)
A1 Pre – Draining Towards Old Lakeshore Road	0.200	0.82	0.50	10
A2 Pre (Old Lakeshore Road)	0.125	0.80	0.50	10

Peak flows calculated for the existing conditions are shown in **Table 6-2** below. Detailed calculations are in **Appendix C**.

Table 6-2 – Target Peak Flows

Catchment	Peak Flow Rational Method (L/s)		
	2-year	5-year	100-year
A1 Pre (Old Lakeshore Road)	18.9	24.5	39.4
A2 Pre (Lakeshore Road)	11.9	15.3	24.7

As shown in **Table 6-2**, the post-development flows will need to be controlled to the target flow of 18.9 L/s and 11.9 L/s for the areas draining towards Old Lakeshore Road and Lakeshore Road, respectively.

6.2. Stormwater Management

In order to meet the WWFMG criteria, the development flow rates for the areas draining towards Old Lakeshore Road and Lakeshore Road are to be controlled to the two (2) year target flows established in **Section 5.1**.

The site consists of four (4) internal drainage areas:

1. A1 Post – Storm runoff from rooftops, terraces and the south outdoor amenity space, controlled in the underground storage tank-1;

2. A2 Post – Uncontrolled runoff, draining towards Old Lakeshore Road;

3. A3 Post – Storm runoff from the north outdoor amenity space and driveway area, controlled in the underground storage tank-2; and,

4. A4 Post – Uncontrolled runoff, draining towards Lakeshore Road.

The pre and post-development drainage areas and runoff coefficients are summarized in **Table 6-3** below.

Table 6-3 – Post-development Input Parameters

Drainage Area	Drainage Area (ha)	"C"	Tc (min.)
A1 Post (Roofs / Terraces / South Amenity Area – Controlled in tank-1)	0.215	0.90	10
A2 Post (Uncontrolled – Towards Old Lakeshore Road)	0.002	0.90	10
A3 Post (North Amenity space/Driveway Area – Controlled in tank-2)	0.102	0.90	10
A4 Post (Uncontrolled - – Towards Old Lakeshore Road)	0.006	0.90	10

The pre and post-development drainage areas and runoff coefficients are indicated on **Figure STM1**, located in **Appendix C**.

6.2.1. 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 and 100-year storm events are provided in **Table 6-4** below. The detailed post-development quantity control calculations are provided in **Appendix C.**

6.2.1.1 Area draining towards Old Lakeshore Road

Table 6-4 – Post-development Quantity Control towards Old Lakeshore Road as per City Requirements

Storm Event	Target Flow (L/s)	Required Storage Tank -1 Volume (m^3)	Controlled Release Rate (L/S)	Uncontrolled Release Rate (L/S)	Total Site Release Rate (L/s)
2-year	18.9	29.7	9.6	0.5	10.1
5-year		37.4	10.8	0.6	11.4
100-year		61.0	13.8	1.0	14.7

As shown in **Table 6-4,** in order to control post-development flows to the 2-year pre-development conditions, a target flow of 18.9 L/s is to be satisfied. The required on-site storage is accommodated by the underground storage tank-1 located at P1 Level.

The stormwater flow from the rooftops / terraces and the south portion of amenity space, located at the south side of the property (Drainage Area A1 Post), will be gravity driven into the proposed underground storage tank-1. Furthermore, as mentioned in **Section 5.1**, groundwater, after being collected by the building's sub-drain system, it will be treated and then will be pumped into the underground tank-1, with a peak flow rate of 5.7 L/s.

Storm runoff from the underground storage tank-1 will be controlled by a 75 mm diameter orifice tube with a maximum release rate of 13.8 L/s achieved and will be ultimately directed through gravity towards the existing 450 mm storm sewer on Old Lakeshore Road. Detailed calculations are provided in **Appendix C**.

The maximum post-development stormwater release rate from the underground storage tank-1 and the uncontrolled area during a 100-year storm event, is estimated at 14.7 L/s, which is less than the target flow of 18.9 L/s.

Consequently, the proposed SWM plan in conjunction with the proposed grading and servicing, retains enough runoff volume to reduce the post-development peak flows for each storm event to the required target flow.

6.2.1.2 Area draining towards Lakeshore Road

Table 6-5 – Post-development Quantity Control towards Lakeshore Road as per City Requirements

Storm Event	Target Flow (L/s)	Required Storage Tank - 2 Volume (m^3)	Controlled Release Rate (L/S)	Uncontrolled Release Rate (L/S)	Total Site Release Rate (L/s)
2-year	11.9	7.9	5.3	1.0	6.3
5-year		10.8	6.2	1.3	7.5
100-year		19.4	8.4	2.1	10.6

As shown in **Table 6-5** in order to control post-development flows to the 2-year pre-development conditions, a target flow of 11.9 L/s is to be satisfied. The required on-site storage is accommodated by the underground storage tank-2 located at P1 Level.

The stormwater flow from the north portion of the amenity space, as well as from the driveway area (Drainage Area A3 Post), will be gravity driven into the proposed underground storage tank-2.

Storm runoff from the underground storage tank-2 will be controlled by a 75 mm diameter orifice tube with a maximum release rate of 8.4 L/s achieved, and will be ultimately directed through gravity towards the existing 850 mm storm sewer on Lakeshore Road. Detailed calculations are provided in **Appendix C**.

The maximum post-development stormwater release rate from the underground storage tank-2 and the uncontrolled area, during a 100-year storm event, is estimated at 10.6 L/s, which is less than the target flow of 11.9 L/s.

Consequently, the proposed SWM plan in conjunction with the proposed grading and servicing, retains enough runoff volume to meet the post-development peak flow for 100-year storm event to the required target flow and reduce the post-development peak flows for 2 and 5-year storm events to the required target flow.

6.2.2. Quality Controls

Stormwater treatment must meet Enhanced Protection criteria as defined by the MECP 2003 SWMPD Manual, including the removal of at least 80% total suspended solids (TSS). Quality control and the need of additional measures is required, details of which will be discussed during Site Plan Application.

6.3. Proposed Storm Connection

The proposed development will have two (2) storm connections, towards Old Lakeshore Road and towards Lakeshore Road.

Proposed storm connection towards Old Lakeshore Road

The proposed development will connect to the existing 450mm diameter storm sewer along Old Lakeshore Road, via a 150 mm storm sewer service connection, with a minimum grade of 2.00% (or equivalent pipe design).

Proposed storm connection towards Lakeshore Road

The proposed development will connect to the existing 850 mm diameter storm sewer along Lakeshore Road, via a 150 mm storm sewer service connection, with a minimum grade of 2.00% (or equivalent pipe design).

Orifice controls for the areas draining towards Old Lakeshore Road and Lakeshore Road, will be designed to meet the allowable release rates to the municipal system and will be defined at the detailed design stage. Refer to engineering drawing "**SS-01**" (submitted separately) indicating the stormwater service connection.

7.0 Sanitary Drainage System

7.1. Existing Sanitary Drainage System

According to available records, there are two (2) sanitary sewers, abutting the subject property. More specifically:

- A 450mm diameter sanitary sewer along Lakeshore Road flowing east; and
- A 200mm diameter sanitary sewer along Old Lakeshore Road flowing east.

The sanitary flow generated by the proposed development at 2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road was compared to the existing flow in order to quantify the net increase in the combined sewer network.

7.2. Existing Flows

Using the design criteria outlined in **Section 4.3** and existing site information, the sanitary discharge flow from the existing building is estimated at 0.11 L/s. Detailed calculations can be found in **Appendix D**.

7.3. Proposed Sanitary Flows

Using the design criteria outlined in **Section 4.3** and proposed site statistics, the new building will discharge 8.13 L/s into the City's infrastructure.

7.4. Proposed Sanitary Connection

The proposed development will connect to a proposed manhole discharging on the existing 200mm diameter sanitary sewer on Old Lakeshore Road, via a proposed 200mm diameter lateral at a minimum grade of 2.00% (or equivalent pipe design). Refer to engineering drawing "**SS-01**" (submitted separately) for details.

8.0 Water Supply System

8.1. Existing System

According to available records, there are two (2) watermains, abutting the subject property. More specifically:

- A 300mm diameter watermain along Lakeshore Road; and
- A 300mm diameter watermain along Old Lakeshore Road.

Hydrant flow tests were carried out by Cole Engineering on November 28, 2018 along Lakeshore Road, to determine the flow and pressure in the existing 300 mm watermain.

The results of the test indicate the existing static pressure is 483 KPa (70 psi) and 94.24 L/sec (1462 USPGM) of water is available with a residual pressure of 441 KPa (64 psi). The full detailed report is included in **Appendix E**.

8.2. Proposed Water Supply Requirements

The estimated water consumption was calculated based on the occupancy rates shown on **Table 4-2**, according to the Region's watermain design criteria, revised in July 2017. It is anticipated that an average consumption of approximately 2.06 L/s (178,200 L/day), a maximum daily consumption of 4.64 L/s (400,950 L/day), a peak hourly demand for residential use of 8.25 L/s (29,700 L/hr) and a peak hourly demand for commercial use of 4.64 L/s (16,706 L/hr) will be required to service this development with domestic water. Detailed calculations are 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 calculations is normally conducted for the largest storey, by area, and for the two immediately adjacent storeys.

We have selected the equally greatest Levels 01, 02 and 03, which result to the greatest fire flow required for this development. **Table 8-1** illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 66.67 L/s (1,057 USGPM) will be required. Refer to detailed calculations found in **Appendix E**.

Table 8-1 – Fire Flow Input Parameter

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				North	East	South	West
Value according to FUS options	Fire-Resistive Construction	Combustible	Yes	Road	20.1m-30.0m	Road	Parking
Surcharge/reduction from base flow	0.6	25%	30%	0%	10%	0%	0%

In summary, the required design flow is the sum of 'the minimum fire suppression flow' and 'maximum daily demand' (66.67 + 4.64 = 71.31 L/s, 1,130 USGPM).

The results of the hydrant flow test carried out by Cole Engineering on November 28, 2018 along Lakeshore Road, indicate that 289.84 L/s (4594 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 test can be found in **Appendix E**.

8.3. Proposed Watermain Connection

The proposed development will be serviced by a 200mm diameter fire and a 100mm diameter domestic water. According to Region's standard drawing RH-409.01, the 200 mm water service will be split one (1) meter from the property line and valve and boxes will be installed on each service at the property line.

The proposed water service will be connected to the existing 300 mm diameter watermain on Lakeshore Road. Refer to engineering drawing "**SS-01**" (submitted separately) indicating the water service connection.

9.0 Erosion and Sediment Control during construction

Erosion and sediment control measures will be designed and will include sediment fencing, a construction access driveway, check dams and temporary sediment control facilities where required. These measures will be designed and constructed as per the "Erosion and Sediment Control Guideline for Urban Construction" document (December 2006). The detailed erosion and sediment control plan will be approved by the Town and Region prior to any site alteration being undertaken. All reasonable measures will be taken to ensure sediment loading to the adjacent properties and storm sewers is minimized both during and following construction.

10.0 Site Grading

10.1. Existing Grades

The existing site is approximately 0.336 hectares and is currently occupied by two (2) two-storey commercial buildings, one (1) two and a half-storey commercial building, one (1) two-storey residential dwelling and outdoor parking area. Moreover, it is located between Old Lakeshore Road and Lakeshore Road, in the City of Burlington. The site generally drains to the existing stormwater system inside the property and by overland towards the adjacent right of ways (ROW).

10.2. Proposed Grades

The proposed grades will improve the existing drainage conditions to meet the City's requirements. The existing grades will be maintained along the property line and emergency overland flow will be directed to adjacent right of ways.

11.0 Conclusions and Recommendations

Based on our investigations, we conclude the following:

Storm Drainage

A more detailed Stormwater Management report will be prepared at the Site Plan Application. The property's existing drainage pattern is separated into two drainage areas (one flowing north towards Lakeshore Road and one flowing south towards Old Lakeshore Road). Following that fact, our analysis assumes that the drainage pattern is maintained under Post-development conditions. Therefore, the site stormwater discharge will be controlled to the 2-year pre-development flows as specified by the City of Burlington comments provided in the pre-consultation meeting held on January 16, 2019. Proposed storm laterals will be connected to the existing 450 mm diameter storm sewer on Old Lakeshore Road and to the existing 850 mm diameter storm sewer on Lakeshore Road.

Furthermore, given that the underground construction will be partially submerged into the existing groundwater table, long-term groundwater discharge, along with the installation of a permanent dewatering system, will be installed. In addition, a treatment facility will be required prior to discharging into the City's storm sewer network due to the fact that groundwater exceeds the City's storm sewer discharge criteria.

In order to attain the target flows and meet the City's Wet Weather Flow Management Guidelines (WWFMG), quantity controls will be utilized and up to 61.0 m^3 and 19.4 m^3 of underground storages will be required for both areas flowing towards Old Lakeshore Road and Lakeshore Road, respectively.

The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of the Environment, Conservation and Parks (MECP). During Site Plan Application, a detailed analysis will be provided to assess the water quality on site and determine additional measures in order to achieve a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

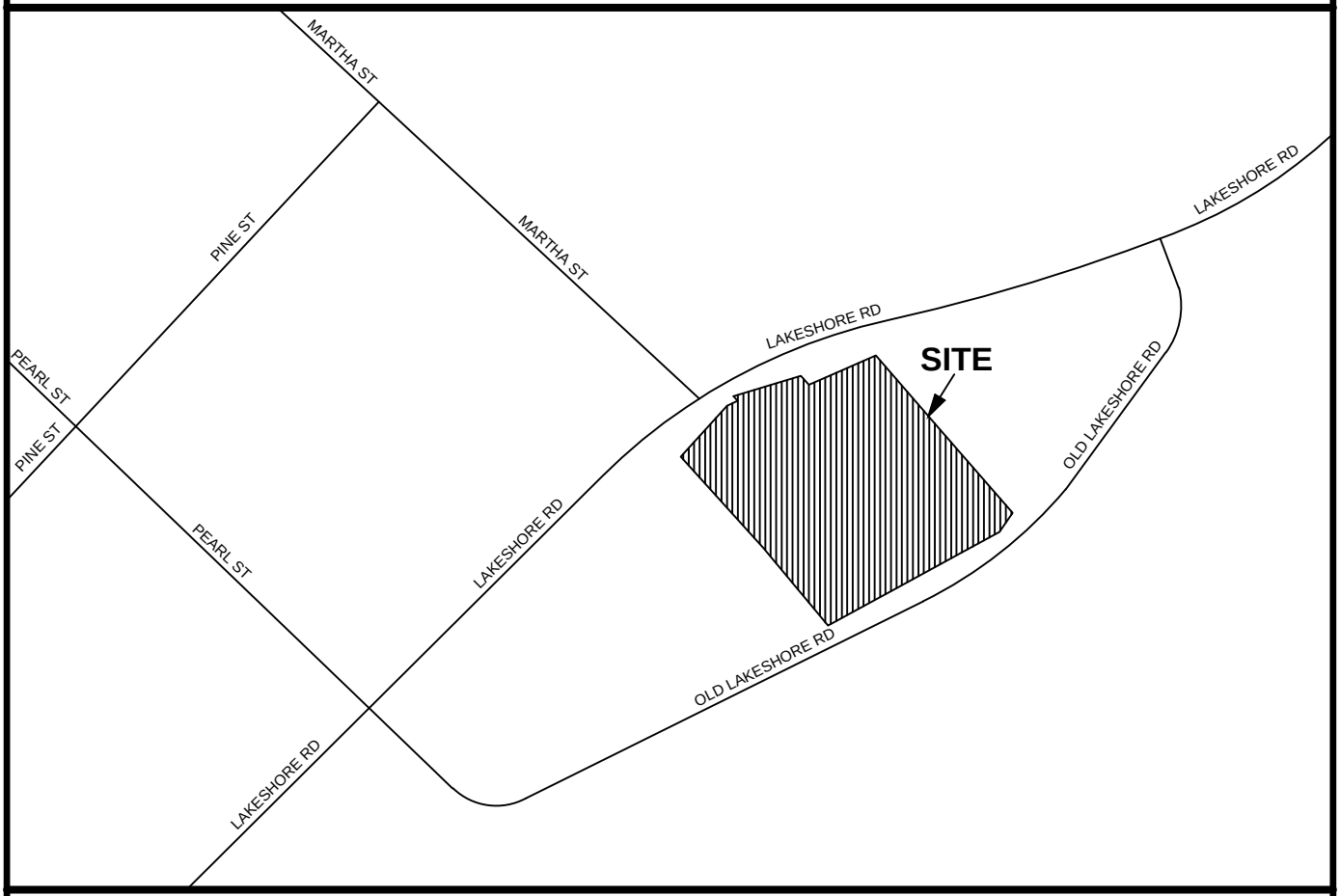
The development will be connected to a proposed manhole discharging into the 200mm sanitary sewer on Old Lakeshore Road. The additional net discharge flow from the proposed development (sanitary and groundwater), is anticipated at approximately 8.01 L/s.

Water Supply

Water supply for the site will be from the existing 300 mm diameter watermain on Lakeshore Road. It is anticipated that a total design flow of 71.31 L/s will be required to support the proposed development. The results of the hydrant flow test, prepared by Cole Engineering, dated November 28, 2018, 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 be gravity driven to the adjacent right-of-way's (ROW).



Lithos

150 Bermondsey Road, North York, Ontario M4A 1Y1

LOCATION PLAN

MIXED USE DEVELOPMENT
2093-2101 OLD LAKESHORE ROAD AND 2096-2100 LAKESHORE ROAD
BURLINGTON, ONTARIO

DATE:	SEPT. 2020	PROJECT No:	UD18-050
SCALE:	N.T.S.	FIGURE No:	FIG 1



Lithos

150 Bermondsey Road, North York, Ontario M4A 1Y1

AERIAL PLAN

MIXED USE DEVELOPMENT
2093-2101 OLD LAKESHORE ROAD AND 2096-2100 LAKESHORE ROAD
BURLINGTON, ONTARIO

DATE:	SEPT. 2020	PROJECT No:	UD18-050
SCALE:	N.T.S.	FIGURE No:	FIG 2

APPENDIX A
Site Photographs



North West Corner of Property – Facing East towards Old Lakeshore Road



North-East Corner of Property – Facing West towards Old Lakeshore Road



South-East Corner of Property – Facing West towards Lakeshore Road



South West- Corner of Property – Facing East towards Old Lakeshore Road

APPENDIX B
Background Information

SURVEYOR'S REAL PROPERTY REPORT

PART 1:

PLAN OF PART OF LOTS 6 & 10, LOT 7, 8 & 9, BLOCK Q REGISTERED PLAN 92 CITY OF BURLINGTON

SCALE 1 : 200

0 1 2 3 4 5 10 20m

AKSAN PILLER CORPORATION LTD.

PART 2:

PREPARED FOR CORE DEVELOPMENT GROUP Ltd.

LOCATION OF THE BUILDING:	WHOLLY ON THE PROPERTY,
EAVES:	CLEAR,
UTILITY BUILDINGS:	AS SHOWN ON PART 1,
DECKS:	AS SHOWN ON PART 1,
SWIMMING POOLS:	NONE,
EXISTING FENCES:	GENERALLY ALONG THE PROPERTY LINES, WITH DEVIATIONS AS SHOWN ON PART 1,
EASEMENTS:	NONE REQITED IN THE LAST REGISTERED INSTRUMENT,
DRIVEWAY:	AS SHOWN ON PART 1.

LEGEND:

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT PLANTED
IB	DENOTES	IRON BAR
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
CC	DENOTES	CUT CROSS
CP	DENOTES	CONCRETE PIN
WIT	DENOTES	WITNESS MONUMENT
O/U	DENOTES	ORIGIN UNKNOWN
N	DENOTES	NORTH
S	DENOTES	SOUTH
E	DENOTES	EAST
W	DENOTES	WEST
Fc.	DENOTES	FENCE
CLF	DENOTES	CHAIN LINK FENCE
BF	DENOTES	BOARD FENCE
P & W	DENOTES	POST AND WIRE FENCE
D1	DENOTES	INST. No.
D2	DENOTES	INST. No.
D3	DENOTES	INST. No.
PLAN	DENOTES	REGISTERED PLAN 92
P1	DENOTES	PLAN 20R-14079
P2	DENOTES	PLAN 20R-5044
P3	DENOTES	PLAN 20R-15858
CBX	DENOTES	CABLE BOX
UP	DENOTES	UTILITY POLE
MH	DENOTES	MAN HOLE
CB	DENOTES	CATCH BASIN
LP	DENOTES	LAMP POST
CONC	DENOTES	CONCRETE
WW	DENOTES	WALKWAY
CR/W	DENOTES	CONCRETE RETAINING WALL
646	DENOTES	R.G. SEWELL, O.L.S.
MMP	DENOTES	CONCRETE RETAINING WALL

Ø0.50 DENOTES TREE TRUNK DIAMETER

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2029259

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR. In accordance with Regulation 1026, Section 29(3)

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

BEARING NOTE:
BEARINGS ARE REFERRED TO THE SOUTHER LIMIT OF LAKESHORE ROAD AS SHOWN ON PLAN 20R-15858 HAVING AN ASTRONOMIC BEARING OF N75°25'18"E.

ELEVATIONS NOTE:
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE DERIVED FROM THE CITY OF BURLINGTON BENCH MARK 914001, ELEVATION = 77.901 m.

CAUTION:
TREE CALIPERS ARE NOT TO ARBORIST STANDARDS AND ARE DEFINED AT 1.4m ABOVE GRADE AT TREE FOR ARBORIST CALIPER REFER TO ARBORIST REPORT.

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 26th DAY OF SEPTEMBER, 2017

OCTOBER 4, 2017
DATE

HELMUT PILLER
Ontario Land Surveyor

AKSAN PILLER CORPORATION LTD
ONTARIO LAND SURVEYORS
943 MT PLEASANT ROAD, TORONTO, ONTARIO, M4P 2L7
(T) 416-488-1174 (F) 416-488-7843 (E) ap@apsurveys.ca www.apsurveys.ca

CALC.: MU DRAWN: LF CHECKED: HP
reference number: 17-24-12787-00

PROPOSED MIXED USE DEVELOPMENT
2096-2100 LAKESHORE ROAD, BURLINGTON

AREA SUMMARY

Lot Area (existing):	**3,357.2 m2**	**36,137 sf**
Lot Area (minus widening)	**3,250.2 m2**	**34,985 sf**
Total Residential GFA:	**22,587.8 m2**	**243,133 sf**
Total Commercial GFA:	**426.4 m2**	**4,590 sf**
Total Building GFA:	**23,014.2 m2**	**247,723 sf**
Floor Area Ratio:	**7.85**	(based on Gross Building Floor Area)

	COMMON AREA/ CIRCULATION		VEHICLE PARKING		RESIDENTIAL		COMMERCIAL		RESIDENTIAL INDOOR AMENITY		RESIDENTIAL STORAGE		CONSTRUCTION AREA (GCA)		EFFICIENCY
	m2	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	
P-5	111.2	1,197	2,577.4	27,743	0	0	0	0	0	0	195.2	2,101	**2,883.8**	**31,041**	
P-4	144.6	1,556	2,577.4	27,743	0	0	0	0	0	0	161.8	1,742	**2,883.8**	**31,041**	
P-3	181.6	1,955	2,577.4	27,743	0	0	0	0	0	0	124.8	1,343	**2,883.8**	**31,041**	
P-2	306.4	3,298	2,577.4	27,743	0	0	0	0	0	0	0.0	0	**2,883.8**	**31,041**	
P-1	331.0	3,563	2,552.8	27,478	0	0	0	0	0	0	0	0	**2,883.8**	**31,041**	
Ground Floor	518.2	5,578	0	0	0	0	347.6	3,742	349.1	3,758	0	0	**1,214.9**	**13,077**	*29%*
2	149.8	1,612	0	0	1,234.7	13,290	78.8	848	0	0	0	0	**1,463.3**	**15,751**	*90%*
3	149.8	1,612	0	0	1,234.7	13,290	0	0	0	0	0	0	**1,384.5**	**14,903**	*89%*
4	149.8	1,612	0	0	1,234.7	13,290	0	0	0	0	0	0	**1,384.5**	**14,903**	*89%*
5	149.8	1,612	0	0	1,234.7	13,290	0	0	0	0	0	0	**1,384.5**	**14,903**	*89%*
6	149.8	1,612	0	0	1,234.7	13,290	0	0	0	0	0	0	**1,384.5**	**14,903**	*89%*
7	103.5	1,114	0	0	409.4	4,407	0	0	237.1	0	0	0	**750.0**	**8,073**	*55%*
8	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
9	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
10	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
11	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
12	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
13	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
14	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
15	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
16	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
17	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
18	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
19	102.0	1,098	0	0	648.0	6,975	0	0	0	0	0	0	**750.0**	**8,073**	*86%*
20	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
21	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
22	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
23	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
24	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
25	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
26	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
27	99.8	1,074	0	0	650.2	6,999	0	0	0	0	0	0	**750.0**	**8,073**	*87%*
Mechanical PH	251.7	2,709	0	0	0	0	0	0	0	0	0	0	**251.7**	**2,709**	
Total	**4,719.6**	**50,801**	**12,862.4**	**138,450**	**19,560.5**	**210,547**	**426.4**	**4,590**	**586.2**	**6,310**	**481.8**	**5,186**	**38,636.9**	**415,884**	**83%**
					Note: not including balcony area		Note: includes 157.6m2 of existing comm. area in heritage building								

	GFA EXCLUSIONS		GROSS FLOOR AREA PER BYLAW 2020 PART 16	
	m2	*sf*	*m2*	*sf*
P-5	2,883.8	31,041	0	0
P-4	2,883.8	31,041	0	0
P-3	2,883.8	31,041	0	0
P-2	2,883.8	31,041	0	0
P-1	2,883.8	31,041	0	0
Ground Floor	407.0	4,381	807.9	8,696
2	20.8	224	1,442.5	15,527
3	20.8	224	1,363.7	14,679
4	20.8	224	1,363.7	14,679
5	20.8	224	1,363.7	14,679
6	20.8	224	1,363.7	14,679
7	21.0	226	729.0	7,847
8	21.0	226	729.0	7,847
9	21.0	226	729.0	7,847
10	21.0	226	729.0	7,847
11	21.0	226	729.0	7,847
12	21.0	226	729.0	7,847
13	21.0	226	729.0	7,847
14	21.0	226	729.0	7,847
15	21.0	226	729.0	7,847
16	21.0	226	729.0	7,847
17	21.0	226	729.0	7,847
18	21.0	226	729.0	7,847
19	21.0	226	729.0	7,847
20	21.0	226	729.0	7,847
21	21.0	226	729.0	7,847
22	21.0	226	729.0	7,847
23	21.0	226	729.0	7,847
24	21.0	226	729.0	7,847
25	21.0	226	729.0	7,847
26	21.0	226	729.0	7,847
27	21.0	226	729.0	7,847
Mechanical PH	251.7	2,709	0	0
Total	**15,622.7**	**168,161**	**23,014.2**	**247,723**

	GFA EXCLUSIONS		GROSS BUILDING FLOOR AREA PER BYLAW 2020 PART 16	
	m2	*sf*	*m2*	*sf*
P-5	2,577.4	27,743	306.4	3,298
P-4	2,577.4	27,743	306.4	3,298
P-3	2,577.4	27,743	306.4	3,298
P-2	2,577.4	27,743	306.4	3,298
P-1	2,552.8	27,478	331.0	3,563
Ground Floor	0	0	1,214.9	13,077
2	0	0	1,463.3	15,751
3	0	0	1,384.5	14,903
4	0	0	1,384.5	14,903
5	0	0	1,384.5	14,903
6	0	0	1,384.5	14,903
7	0	0	750.0	8,073
8	0	0	750.0	8,073
9	0	0	750.0	8,073
10	0	0	750.0	8,073
11	0	0	750.0	8,073
12	0	0	750.0	8,073
13	0	0	750.0	8,073
14	0	0	750.0	8,073
15	0	0	750.0	8,073
16	0	0	750.0	8,073
17	0	0	750.0	8,073
18	0	0	750.0	8,073
19	0	0	750.0	8,073
20	0	0	750.0	8,073
21	0	0	750.0	8,073
22	0	0	750.0	8,073
23	0	0	750.0	8,073
24	0	0	750.0	8,073
25	0	0	750.0	8,073
26	0	0	750.0	8,073
27	0	0	750.0	8,073
Mechanical PH	251.7	2,709	0	0
Total	**12,862.4**	**138,450**	**25,522.8**	**274,725**

UNITS SUMMARY

Level	RESIDENTIAL UNITS						
	1B	*1B+D*	*2B*	*2B+D*	*3B*	*3B+D*	**total**
1							0
2		1	1	8		4	14
3		1	1	8		4	14
4		1	1	8		4	14
5		1	1	8		4	14
6		1	1	8		4	14
7	3	3	1	1			8
8	6	2	1	2	1		12
9	6	2	1	2	1		12
10	6	2	1	2	1		12
11	6	2	1	2	1		12
12	6	2	1	2	1		12
13	6	2	1	2	1		12
14	6	2	1	2	1		12
15	6	2	1	2	1		12
16	6	2	1	2	1		12
17	6	2	1	2	1		12
18	6	2	1	2	1		12
19	6	2	1	2	1		12
20	5	2	1	1	2		11
21	5	2	1	1	2		11
22	5	2	1	1	2		11
23	5	2	1	1	2		11
24	5	2	1	1	2		11
25	5	2	1	1	2		11
26	5	2	1	1	2		11
27	5	2	1	1	2		11
Total	**115**	**48**	**26**	**73**	**28**	**20**	**310**
	37%	**15%**	**8%**	**24%**	**9%**	**6%**	**100%**
Avg. size (sf)	478	555	633	808	966	1,273	

Avg. Size (building): 678 sf

Proposed Vehicle Parking

Use	Units	Required Parking Rate	Proposed Parking Rate	Proposed Supply
Resident Parking	310	1.00	0.98	280* + 6 car share
Visitor Parking		0.25	0.10	30
Total Parking		**1.25**	**1.08**	**334****

*Includes 5 compact spaces
**316 physical spaces (includes 6 car share for an effective increase of 18 spaces)

Proposed Bicycle Parking

Land Use	Type	Units/ GFA (m2)	Min. Parking Rate	Min. Required Spaces	Proposed Supply
Residential	Short-Term	310	0.05	16	16
	Long-Term		0.5	155	155
Retail	Short-Term	426.4	3 plus 1 / 1000 m^2	4	8
	Long-Term		2 plus 1 / 1000 m^2	3	0
			Total Short-Term	**20**	**24**
			Total Long-Term	**158**	**155**
			TOTAL BICYCLE PARKING	**178**	**179**

Proposed Amenity Space

	Indoor (m2)	Outdoor (m2)	Total / unit
Residential	586.2		
Residential		580.9	
Residential (private balconies)		3,998.0	
Total Proposed	**586.2**	**4,578.9**	**5,165.1**
Total per unit	**1.9**	**14.8**	**16.7**
Zoning requirement			20.0

*

*proposed outdoor amenity excludes POPS open space at grade (1,032 m2)

Storage Lockers	**107**

General Notes:

1. These Contract Documents are the property of the Architect. The Architect bears no responsibility for the interpretations of these documents by the Contractor. Upon written application the Architect will provide written/graphic clarification or supplementary information regarding the intent of the Contract Documents. The Architect will review Shop Drawings submitted by the Contractor for design conformance only.

2. Drawings are not to be scaled for construction. Contractor to verify all existing conditions and dimensions required to perform the Work and report any discrepancies with the Contract Documents to the Architect before commencing work.

3. Positions of exposed or finished mechanical or electrical devices, fittings, and fatures are indicated on the Architectural drawings. The locations shown on the Architectural drawings govern over the Mechanical and Electrical drawings. Those items not clearly located will be located as directed by the Architect.

ARCHITECT:
STUDIO JCI
20 De Boers Drive suite 525
Toronto ON M3H 0H1
t. 416.901.8528 f. 416.901.8962
www.studiojci.com

STRUCTURAL:
READ JONES CHRISTOFFERSEN LTD.
100 University Ave, North Tower, Suite 400
Toronto ON M5J 1V6
t. 416.977.5335

MECHANICAL:
THE MITCHELL PARTNERSHIP INC.
285 Yorkland Blvd,
North York, ON M2J 1S5
t. 416.499.8000

ELECTRICAL:
MULVEY & BANANI INTERNATIONAL INC.
44 Mobile Drive, Toronto, Ontario
M4A 2P2
t. 416.751.2520

LANDSCAPE:
STUDIO TLA
20 Champlain Blvd,
North York, ON M2H 2Z1
t. 416.638.4911

CIVIL:
LITHOS GROUP INC.
150 Bermondsey Rd, Unit #200
North York, Ontario M4A 1Y1
t. 416.750.7769

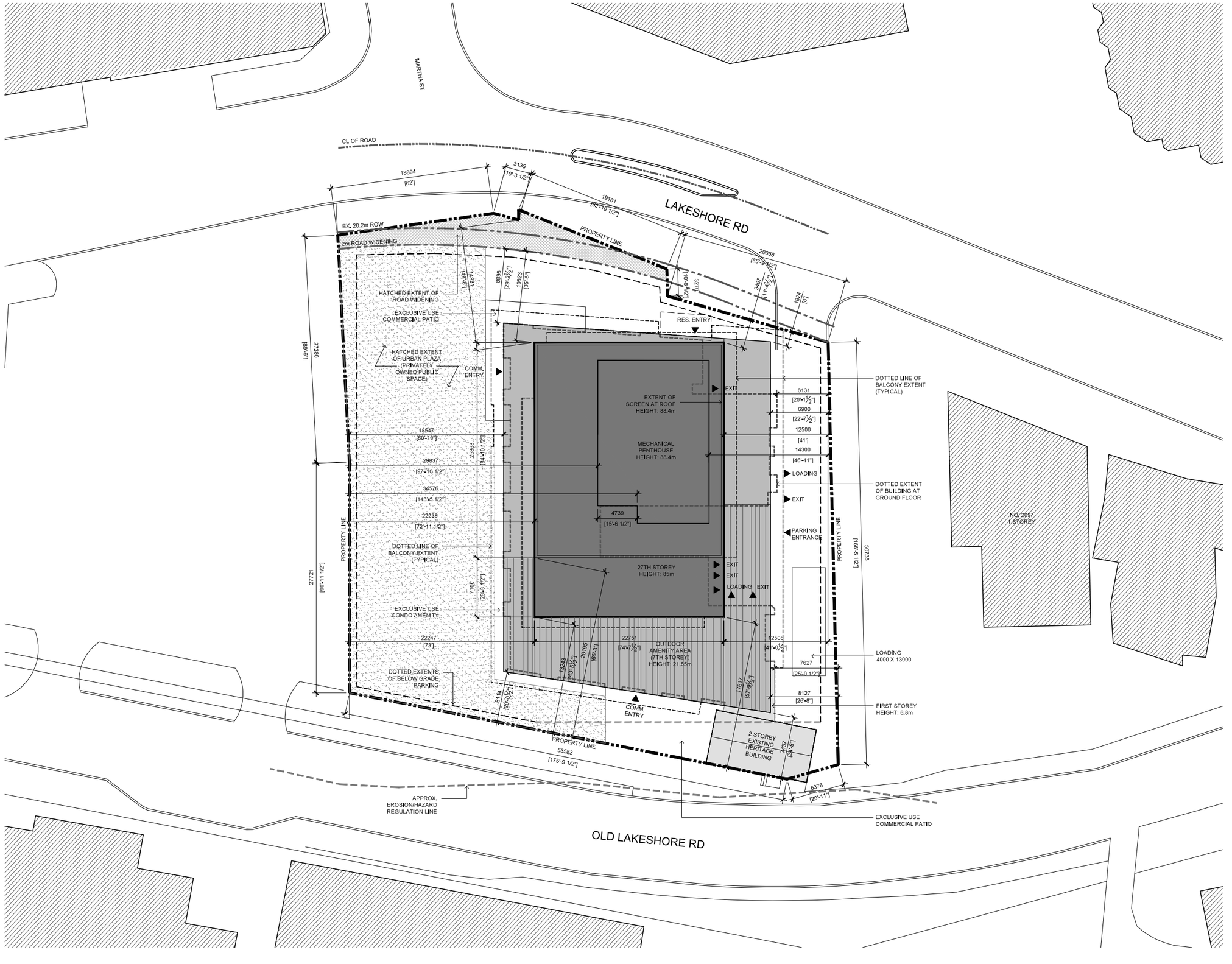
BURLINGTON MIXED-USE BUILDING

ADDRESS:
2096 - 2100 Lakeshore Rd, Burlington

PROJECT STATISTICS

PROJECT NO.: 1816
SCALE: N/A
DATE: September 24, 2020
DRAWN BY:

DRAWING NO.:
A0.00



General Notes:

1. These Contract Documents are the property of the Architect. The Architect bears no responsibility for the interpretations of these documents by the Contractor. Upon written application the Architect will provide written/graphic clarification or supplementary information regarding the intent of the Contract Documents. The Architect will review Shop Drawings submitted by the Contractor for design conformance only.

2. Drawings are not to be scaled for construction. Contractor to verify all existing conditions and dimensions required to perform the Work and report any discrepancies with the Contract Documents to the Architect before commencing work.

3. Positions of exposed or finished mechanical or electrical devices, fittings, and fixtures are indicated on the Architectural drawings. The locations shown on the Architectural drawings govern over the Mechanical and Electrical drawings. Those items not clearly located will be located as directed by the Architect.

ARCHITECT:

STUDIO JCI

20 De Boers Drive suite 525
Toronto ON M3H 0H1
t. 416.901.8528 f. 416.901.8962
www.studiojci.com

STRUCTURAL:

READ JONES CHRISTOFFERSEN LTD.

100 University Ave, North Tower, Suite 400
Toronto ON M5J 1V6
t. 416.977.5335

MECHANICAL:

THE MITCHELL PARTNERSHIP INC.

285 Yorkland Blvd,
North York, ON M2J 1S5
t. 416.499.8000

ELECTRICAL:

MULVEY & BANANI INTERNATIONAL INC.

44 Mobile Drive, Toronto, Ontario
M4A 2P2
t. 416.751.2520

LANDSCAPE:

STUDIO TLA

20 Champlain Blvd,
North York, ON M3H 2Z1
t. 416.638.4911

CIVIL:

LITHOS GROUP INC.

150 Bermondsey Rd, Unit #200
North York, Ontario M4A 1Y1
t. 416.750.7769

BURLINGTON MIXED-USE BUILDING

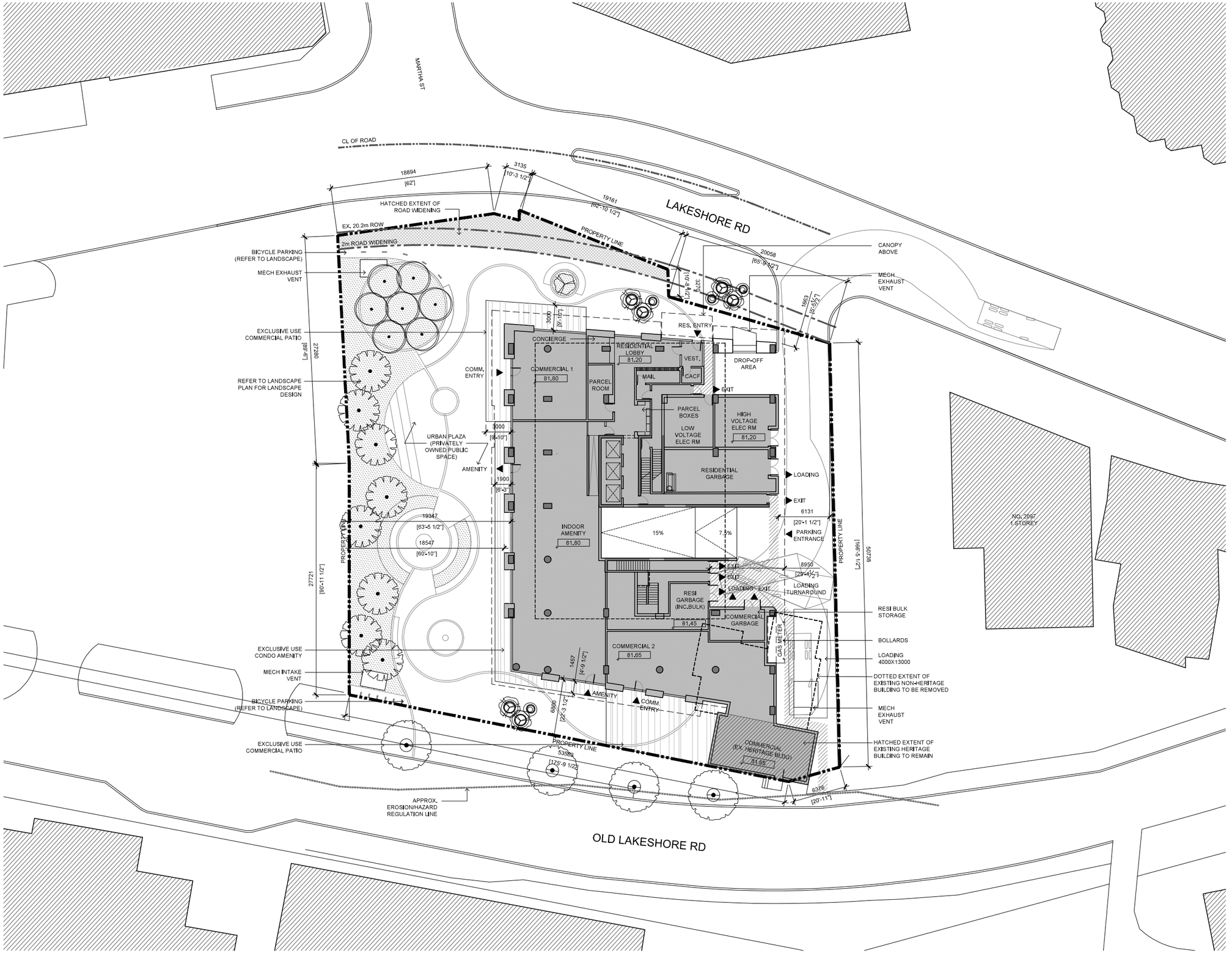
ADDRESS:
2096 - 2100 Lakeshore Rd, Burlington

CONCEPTUAL SITE PLAN

PROJECT NO.: 1816
SCALE: 1:200
DATE: September 24, 2020
DRAWN BY:

DRAWING NO.:

A1.00



General Notes:

1. These Contract Documents are the property of the Architect. The Architect bears no responsibility for the interpretations of these documents by the Contractor. Upon written application the Architect will provide written/graphic clarification or supplementary information regarding the intent of the Contract Documents. The Architect will review Shop Drawings submitted by the Contractor for design conformance only.

2. Drawings are not to be scaled for construction. Contractor to verify all existing conditions and dimensions required to perform the Work and report any discrepancies with the Contract Documents to the Architect before commencing work.

3. Positions of exposed or finished mechanical or electrical devices, fittings, and fatures are indicated on the Architectural drawings. The locations shown on the Architectural drawings govern over the Mechanical and Electrical drawings. Those items not clearly located will be located as directed by the Architect.

ARCHITECT:

STUDIO JCI

20 De Boers Drive suite 525
Toronto ON M3H 0H1
t. 416.901.8528 f. 416.901.8962
www.studiojci.com

STRUCTURAL:

READ JONES CHRISTOFFERSEN LTD.

100 University Ave, North Tower, Suite 400
Toronto ON M5J 1V6
t. 416.977.5335

MECHANICAL:

THE MITCHELL PARTNERSHIP INC.

285 Yorkland Blvd,
North York, ON M2J 1S5
t. 416.499.8000

ELECTRICAL:

MULVEY & BANANI INTERNATIONAL INC.

44 Mobile Drive, Toronto, Ontario
M4A 2P2
t. 416.751.2520

LANDSCAPE:

STUDIO TLA

20 Champlain Blvd,
North York, ON M3H 2Z1
t. 416.638.4911

CIVIL:

LITHOS GROUP INC.

150 Bermondsey Rd, Unit #200
North York, Ontario M4A 1Y1
t. 416.750.7769

BURLINGTON MIXED-USE BUILDING

ADDRESS:
2096 - 2100 Lakeshore Rd, Burlington

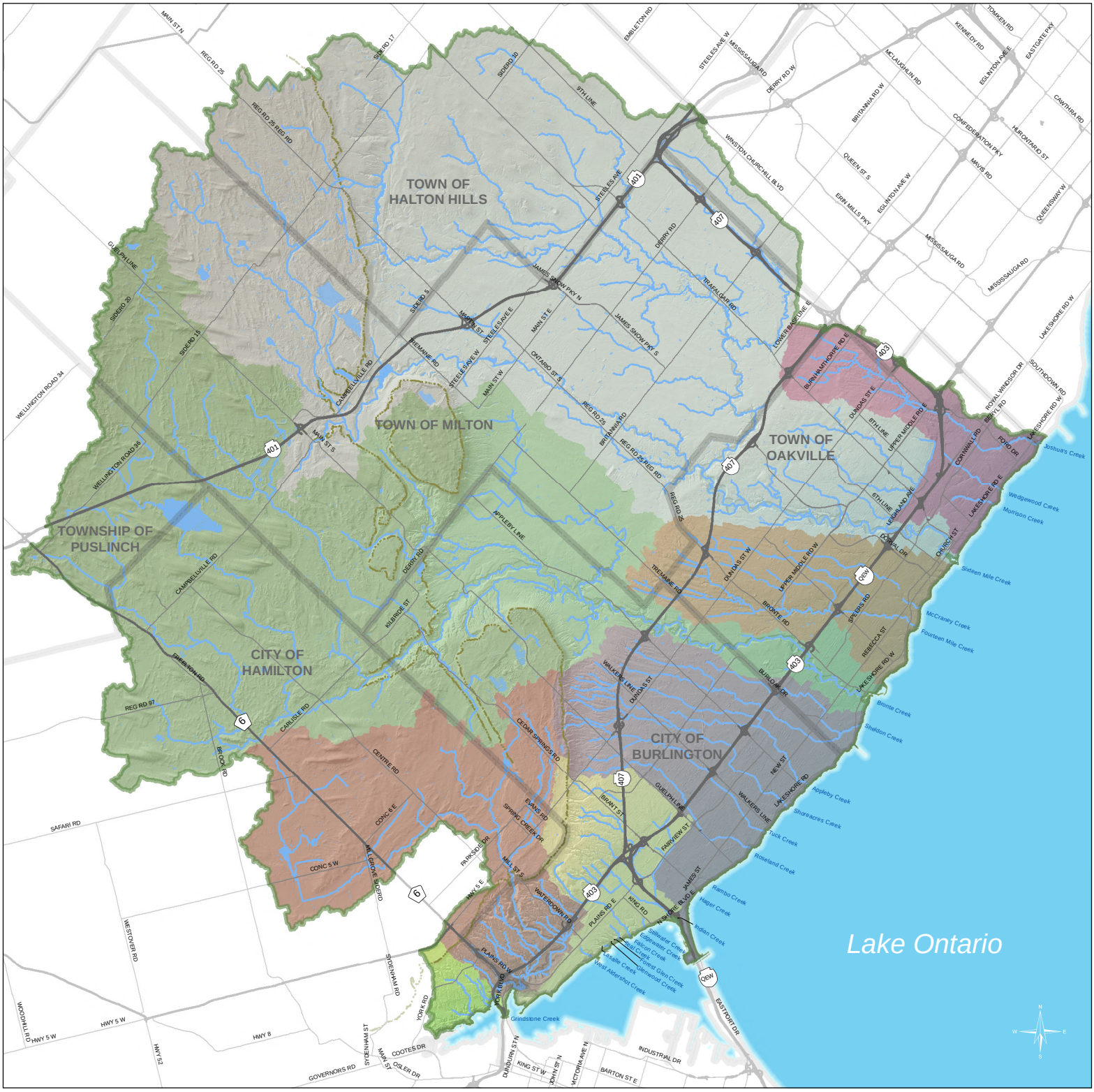
GROUND FLOOR SITE PLAN

PROJECT NO.: 1816
SCALE: 1:200
DATE: September 24, 2020
DRAWN BY:

DRAWING NO.:

A1.01

Conservation Halton Watersheds



Legend

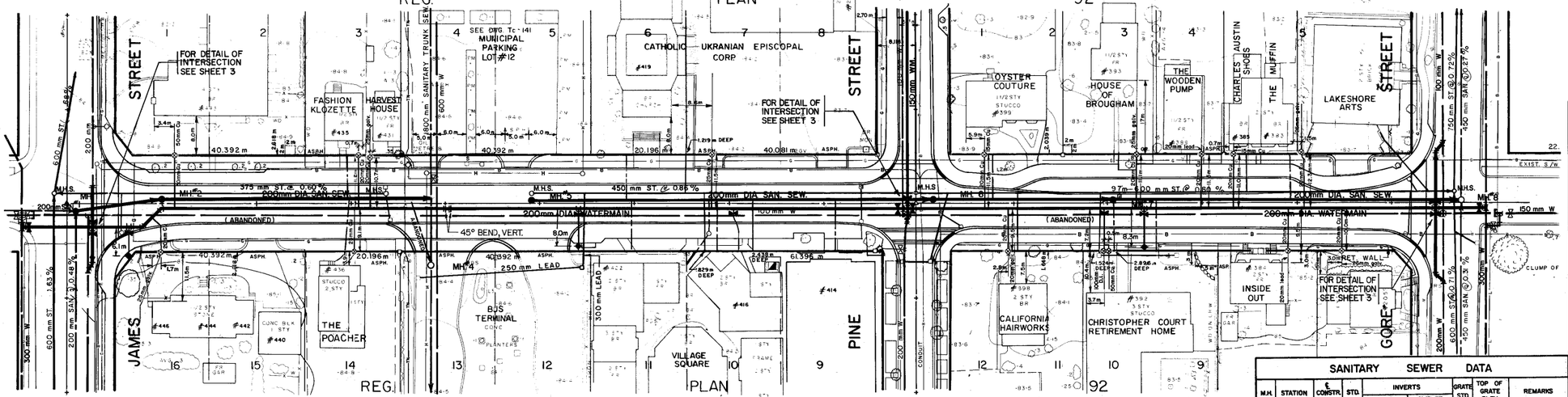
- Expressway / Highway
- Arterial Roads
- Creeks & Waterbodies
- Niagara Escarpment
- Municipal Boundaries

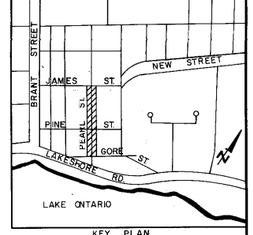
Watersheds

- Bronte Creek
- Burlington Urban Creeks
- Grindstone Creek
- North Cootes Paradise
- North Shore
- Oakville East Urban Creeks
- Oakville West Urban Creeks
- Sixteen Mile Creek

0 1 2 4 6 8 10 Kilometres

This mapping was produced by Conservation Halton and should be used for information purposes only. Data sources used in its production are of varying quality and accuracy and all boundaries should be considered approximate. Conservation Halton disclaims all responsibility for any and all mistakes or inaccuracies in the information and further disclaims all liability for loss or damage, which may result from the use of this information. This map is protected by copyright (© 2018) and may not be reproduced without written consent from Conservation Halton. Any copying, redistribution or republication the content thereof, for commercial gain is strictly prohibited. Produced by Conservation Halton GISP





KEY PLAN
SCALE · 1:12,500

1929 DATUM

GEOD. B.M. CITY HALL, AT SOUTHWEST SIDE OF BRANT STREET, 0.32 km NORTHWEST OF LAKESHORE RD., IMMEDIATELY NORTHWEST OF AND OPPOSITE JAMES STREET. TABLET IN NORTHWEST CONC. FOUNDATION WALL, 1.6 m NORTHEAST OF CURVED PORTION AT REAR OF BUILDING, 0.3048 m BELOW METAL SIDING. ELEV. 86.565

GEOD. B.M. B.M. SET ON HORIZONTAL GEODETIC CONTROL MONUMENT 650013 IN THE CITY OF BURLINGTON, LOCATED ON THE SIDE OF MARTHA STREET AT THE INTERSECTION OF MARTHA STREET AND NEW STREET. 4.328 m WEST OF FACE OF CURB. 5.15 m NORTH OF NEW STREET CENTRE LINE. ELEV. 84.989

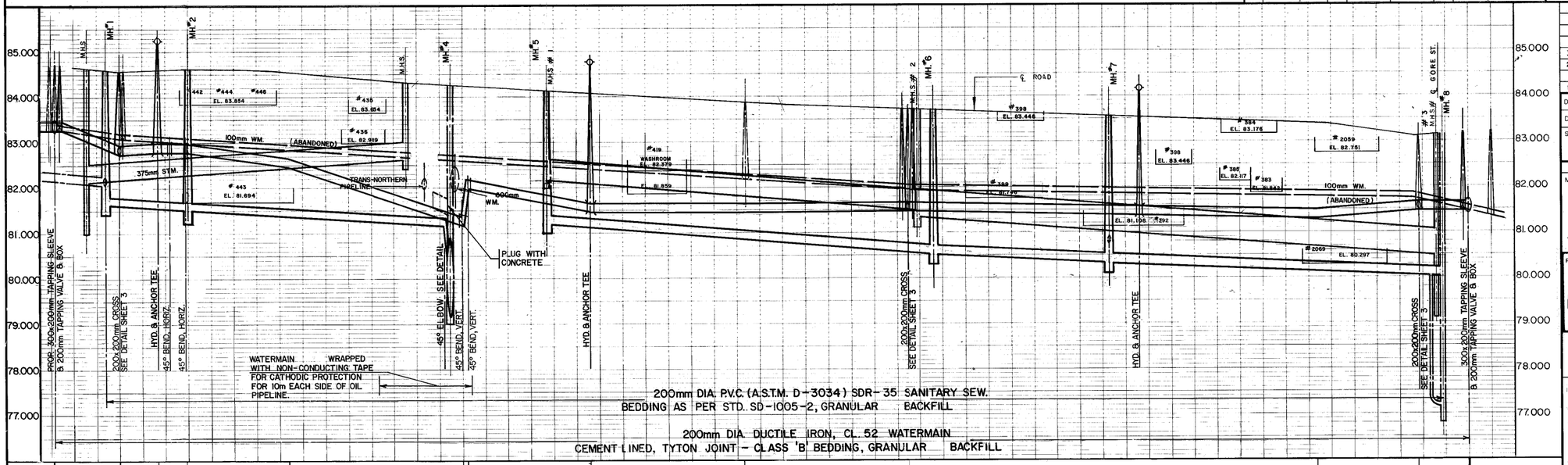
PEARL STREET

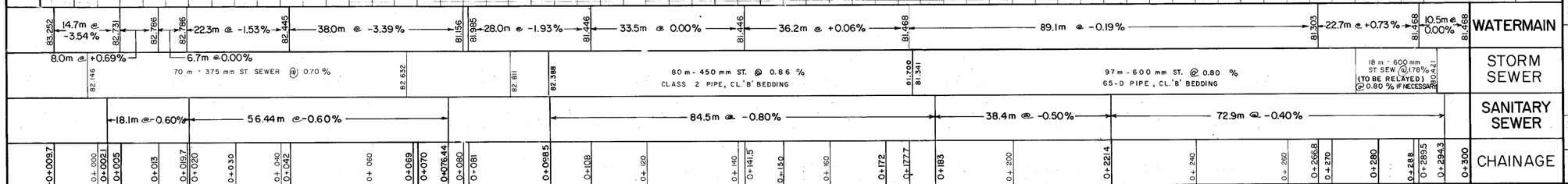
WATERMAIN DATA

ITEM	STATION	℄ CONSTR. OFFSET	STD.	INVERT ELEV.	REMARKS
300x200mm TAPPING SLEEVE & 200mm TAPPING VALVE & BOX	0+009.7	5.0m Rt.	405	83.252	
45° BEND, HORIZ & VERT.	0+004.0	14.4 m Rt.	421	83.666	
45° BEND, HORIZ. & VERT.	0+005.0	13.1 m Rt.	421	82.731	
200x100mm REDUCER	0+005.0	12.0 m Rt.	–	——	
200x200mm FL. CROSS & 2-200mm FL. G.V. & BOX	0+005.0	5.0m Rt.	405	82.731	
11¼° BEND, VERT.	0+005.0	4.0m Lt.	421	82.942	
HYD. & ANCHOR TEE	0+013.0	11.4m Rt.	441	82.786	WITH SEC. G.V. & BOX
45° BEND, HORIZ.	0+016	5.0m Rt.	421	82.786	
45° BEND, HORIZ.	0+019.7	1.0m Rt.	421	82.804	
45° BEND, VERT.	0+080	1.0m Rt.	421	81.156	
45° BEND, VERT.	0+081	1.0m Rt.	421	81.985	
HYD. & ANCHOR TEE	0+108	9.0m Rt.	441	81.446	WITH SEC. G.V. & BOX
200x200mm FL. CROSS & 2-200mm FL. G.V. & BOX	0+177.7	1.0m Rt.	405	81.468	
HYD. & ANCHOR TEE	0+228	9.3m Rt.	441		WITH SEC. G.V. & BOX
45° BEND, HORIZ. & VERT.	0+289.5	16.0 mRt.	421	—	
200x200mm FL. CROSS & 2-200mm FL. G.V. & BOX	0+289.5	1.0m Rt.	405	81.468	
200x100mm REDUCER	0+289.5	10.0 mLt.	—	—	
45° BEND, HORIZ. & VERT.	0+289.5	11.5 m Lt.	421	—	
45° BEND, HORIZ. & VERT.	0+291	15.5 m Rt.	421	81.767	
45° BEND, HORIZ. & VERT.	0+291	13.0m Lt.	421	81.888	
300x200mm TAPPING SLEEVE & 200mm TAPPING VALVE & BOX	0+300	1.0m Rt.	405	81.474	

SANITARY SEWER DATA

M.H.	STATION	℄ CONSTR. OFFSET	STD.	INVERTS INLET	INVERTS OUTLET	GRATE STD.	TOP OF GRATE ELEV.	REMARKS
1	0+002.1	1.5m Rt	322	EX.N. 82.025 EX.W. 82.041	S. 81.600	331	84.549	
2	0+020	1.0m Lt	322	N. 81.491	S. 81.419	331	84.601	
	0+076.44	1.0m Lt			SW. 81.080			45° ELBOW
EX.4	0+077.4	13.05mRt		EX.NE. 81.416 EX.E. 79.166	EX.W. 79.166		84.296	PLUG NE. INV.
5	0+098.5	1.0m Lt	322		S. 81.194	331	84.121	
6	0+183	1.0m Lt	322	N. 80.518	S. 80.518	331	83.685	
7	0+221.4	1.0m Lt	322	N. 80.326 EX.W. 80.754	S. 80.326	331	83.531	
EX.8	0+294.3	0.4m Lt		N. 80.034 EX.W. 76.923	EX.E. 76.911		83.161	DROP. 77.178 N.





Nº	DATE	BY	REVISIONS
3	JULY/86	M.P.S.	AS CONSTRUCTED - WATER
2	JUNE/84	D. MIS	EXIST. W/M TO BE REMOVED 3 m EITHER SIDE OF T.N.P.L.
1	MAY/84	D. MIS	SAN. SEWER RAISED FROM JAMES ST. TO 1800 mm SANITARY TRUNK SEWER.

DESIGN M.P.S. CHECKED
DRAWN M.P.S. CHECKED
DATE: JAN. 1984
SCALE 1:500 HORZ. 5m 0 5m 10m 15m; 0.5m 0 0.5m 1.0m 1.5m; 1:50 VERT.
REFERENCES S-04-20-C S-04-06-C

APPROVALS

Municipal

DIRECTOR OF PUBLIC WORKS

DATE

Regional

DIRECTOR OF PUBLIC WORKS

MANAGER OF DESIGN & CONSTRUCTION

86 06 17

FIELD NOTES

STAMP

CITY OF BURLINGTON

JOINT CONTRACT

REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT

200mm WM. & 200mm SAN. SEW.

PEARL STREET

CITY OF BURLINGTON

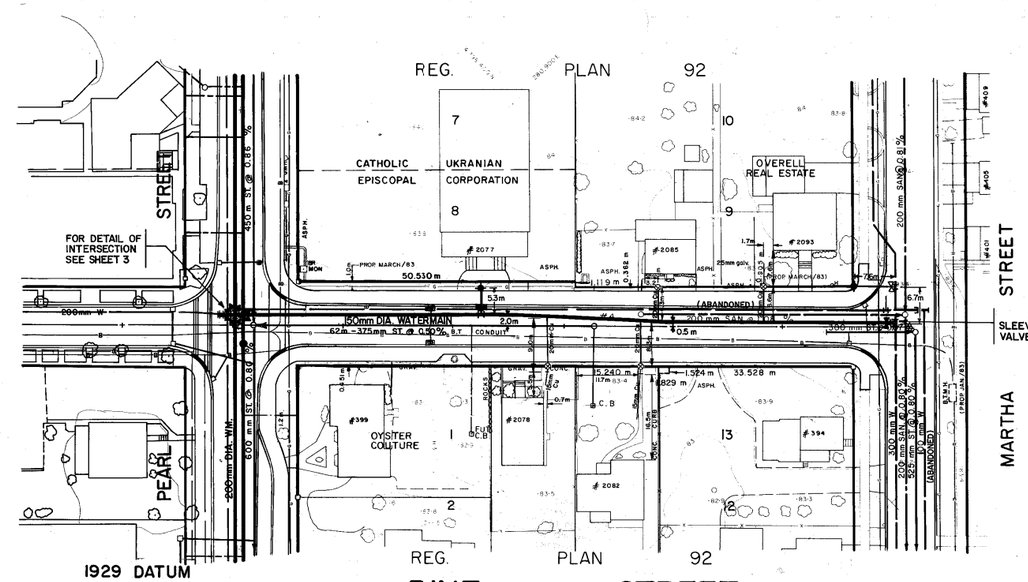
JAMES ST. TO GORE ST.

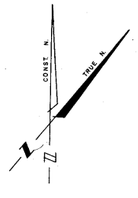
MUNICIPAL DRAWING Nº MP - 9R

REGIONAL DRAWING Nº B-5213

CONTRACT Nº 84-8 / PR-732

SHEET 1 OF 3





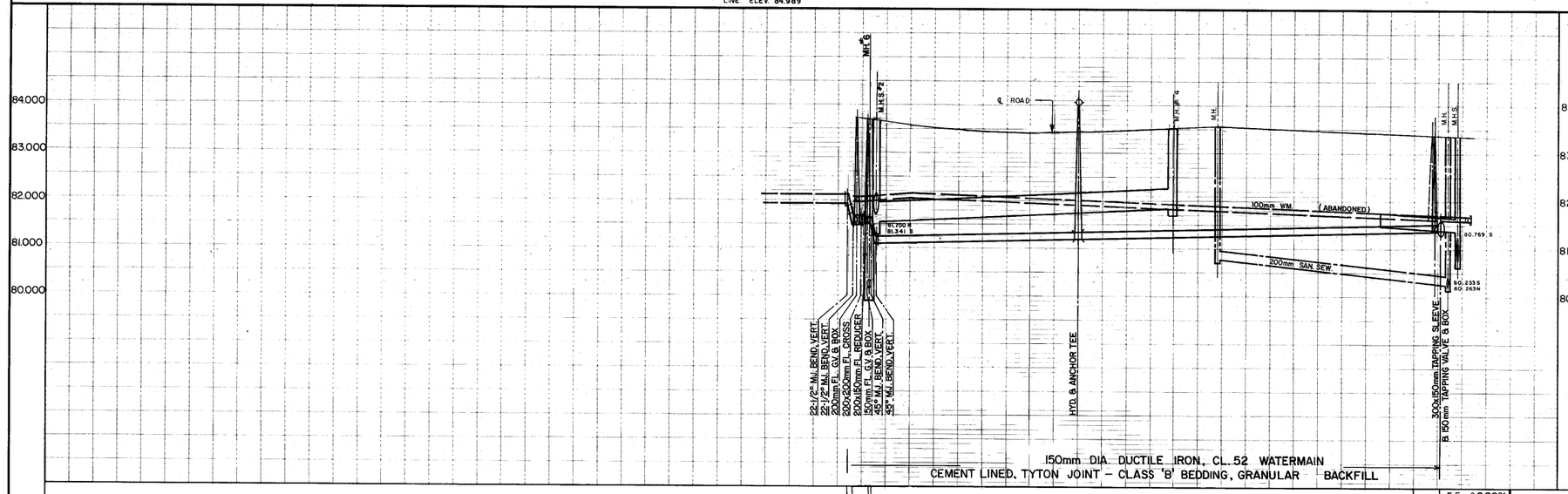
KEY PLAN
SCALE: 1:12,500

GEOD. B.M. CITY HALL, AT SOUTHWEST SIDE OF BRANT STREET, 0.32 km NORTHWEST OF LAKESHORE RD., IMMEDIATELY NORTHWEST OF AND OPPOSITE JAMES STREET. TABLET IN NORTHWEST CONC. FOUNDATION WALL, 1.6 m NORTHEAST OF CURVED PORTION AT REAR OF BUILDING, 0.3048 m BELOW METAL SIDING. ELEV. 86.565

GEOD. B.M. B.M. SET ON HORIZONTAL GEODETIC CONTROL MONUMENT 650013 IN THE CITY OF BURLINGTON, LOCATED ON THE SIDE OF MARTHA STREET AT THE INTERSECTION OF MARTHA STREET AND NEW STREET. 4.328 m WEST OF FACE OF CURB. 5.15 m NORTH OF NEW STREET CENTRE LINE. ELEV. 84.989

WATERMAIN DATA

ITEM	STATION	℄ CONSTR. OFFSET	STD.	INVERT ELEV.	REMARKS
22 1/2° BEND, VERT.	0+237.2	2.0m Lt.	421	81.958	
22 1/2° BEND, VERT.	0+238.2	2.0m Lt	421	81.468	
200mm FL. G.V. & BOX	0+239.7	2.0m Lt.	405	81.468	
200x200mm FL. CROSS	0+240.2	2.0m Lt.		81.468	
200x150mm FL. REDUCER	0+240.52	2.0m Lt.	—	——	
150mm FL. G.V. & BOX	0+240.79	2.0m Lt.	405	81.508	
45° BEND, VERT.	0+241.6	2.0m Lt.	421	81.508	
45° BEND, VERT.	0+242.1	2.0m Lt.	421	81.092	
HYD. & ANCHOR TEE	0+235	7.3m Lt.	441	81.191	WITH SEC. G.V. & BOX
HYDRANT	0+333	7.4m Lt.	441	——	
300x150mm TAPPING SLEEVE & 150mm TAPPING VALVE & BOX	0+360.5	0.5m Lt.	405	81.357	



NO	DATE	BY	REVISIONS
1	JULY/86	M.P.S.	AS CONSTRUCTED - WATER

DESIGN	M.P.S.	CHECKED	DATE
DRAWN	M.P.S.	CHECKED	JAN. 1984

SCALE 1:500 HORZ. (5m 0 5m 10m 15m) (0.5m 0 0.5m 1.0m 1.5m) 1:50 VERT

REFERENCES
20R-1910
20R-1185
20R-1365
10R-5273
20R-5482

FIELD NOTES
P-242
P-292

APPROVALS

Municipal

DIRECTOR OF PUBLIC WORKS

DATE

Regional

DIRECTOR OF PUBLIC WORKS

MANAGER OF DESIGN & CONSTRUCTION

STAMP

84 of 17

CITY OF BURLINGTON

JOINT CONTRACT

REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT

150mm DIA. WATERMAIN

PINE STREET

CITY OF BURLINGTON

PEARL ST. TO MARTHA ST.

MUNICIPAL DRAWING Nº MP-4 R

REGIONAL DRAWING Nº B-5214

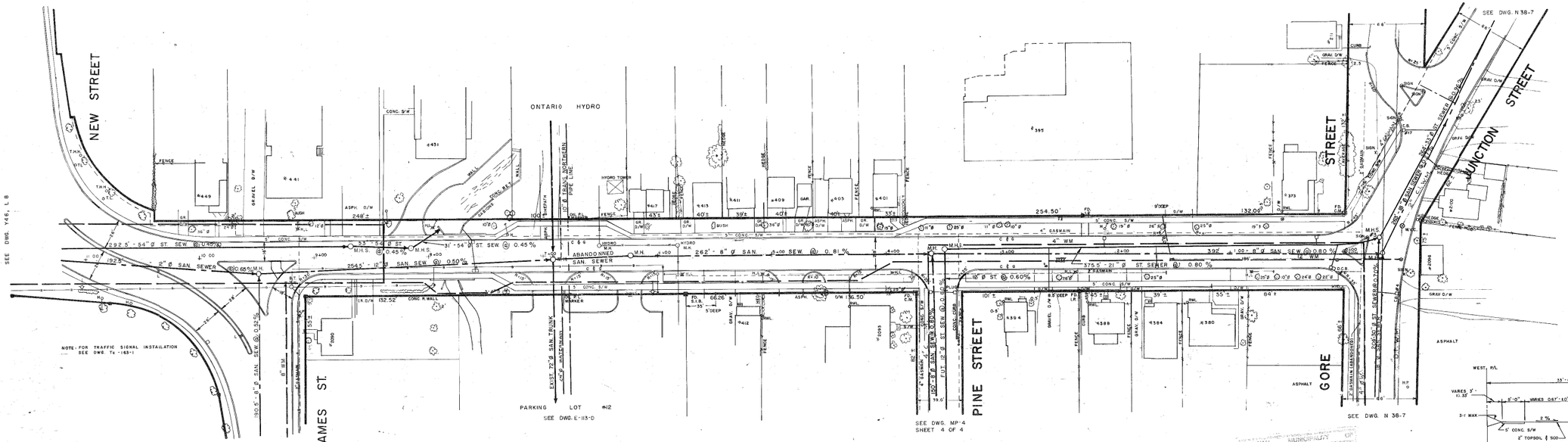
CONTRACT Nº 84-8 / PR-732

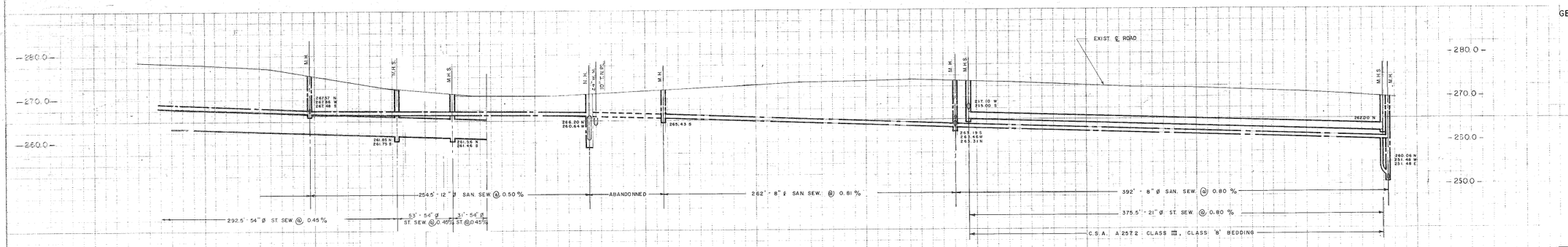
SHEET 2 OF 3

B-5214

PR-732 2 of 3

R 4 CM 1:50 1:1334-2





	11+00	10+50	10+00	9+50	9+44	9+00	8+75	8+59.42	8+50	8+25	8+00	7+75	7+59.56	7+50	7+25	7+00	6+50	6+00	5+50	5+00	4+70	4+50	4+20	4+10	4+00	3+70	3+50.3	3+50	3+00	2+50	2+00	1+50	1+00	0+50	0+20	0+00	-0+33
EXIST. ℄ ROAD					276.46	273.53	272.82	272.28	271.99	271.56	270.83	270.70	270.67	270.68	270.86	271.14	271.70	272.26	272.82	273.38	273.72	273.90	274.03	274.03	274.01	273.84	273.77	273.66	273.22	272.78	272.34	271.90	271.46	270.80	270.40		
ORIG. ℄ ROAD					275.86		272.29	271.48		271.05	270.81	270.73		270.66	270.62	270.73	271.08	271.97	272.85	273.52	273.82						273.95	273.76	273.33	272.83	272.35	271.93	271.54	270.81	270.40	270.12	269.75
CHAINAGES																																					

GEOD. B.M. CITY HALL, AT S/W SIDE OF BRANT ST., 0.2 MILES N/W OF LAKESHORE RD, IMMEDIATELY N/W AND OPPOSITE JAMES ST. TABLET IN N/W CONC. FOUNDATION WALL, 5.5' N/E OF CURVED PORTION AT REAR OF BLDG., 12" BELOW METAL SIDING. ELEV. 284.005

B.M. PLATE ON PUMP HOUSE, LOCATED JUST WEST OF RAMBO, BEING 0.2 MILES E OF BRANT ST. ON LAKESHORE RD. PLATE IS FIXED TO THE S. FACE OF BRICK BLDG. BEING 0.5' E. OF THE S/W CORNER AND 1.0' ABOVE EXISTING CONC. S/W. ELEV. 256.464

B-3666

REVISION Nº	DESCRIPTION	DATE	BY
2	TRANSFER TO OPERATING MAP	80-8-5	D.P.R.
1	"AS CONSTRUCTED" (CONTR. 78-10) (N-242)	OCT./79	D.M.

CITY OF BURLINGTON
DEPARTMENT OF PUBLIC WORKS

MARTHA STREET
GORE STREET — JAMES STREET

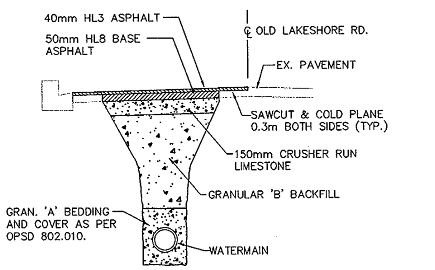
DESIGN BY	P.F.	CHK'D		FIELD NOTES	INDEX Nº
DRAWN BY	Z. PILLER	CHK'D		J-IC-1, M 102, P.194 M-15	
SCALE	HORZ. 1"=40' VERT 1"=10'	DATE	NOV, 1971	REFERENCES	
APPROVED	DIRECTOR OF PUBLIC WORKS	DATE		E 61-3, L 71-3, K 84, SUR. 8-6,	W 67

PR-326-78

B-3666

GENERAL NOTES

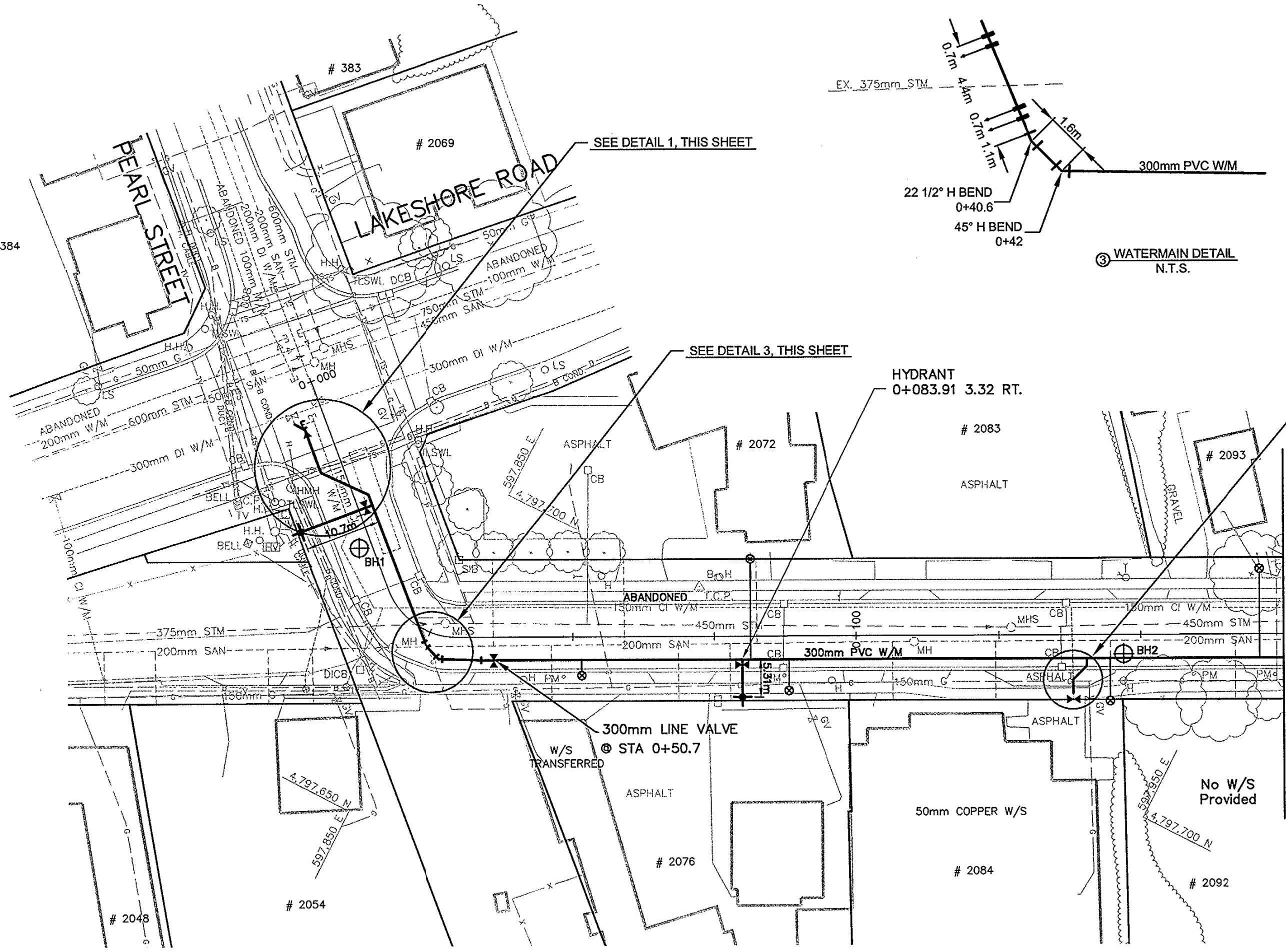
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ALL WATERMAIN AND SANITARY SEWER INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS) AS AMENDED BY THE REGIONAL MUNICIPALITY OF HALTON.
3. THE LOCATION OF ALL EXISTING WATERMAIN, SANITARY SEWER, UTILITIES AND SERVICES ARE APPROXIMATE. THE CONTRACTOR MUST VERIFY THE LOCATION, VERIFY SIZE AND ELEVATION IN THE FIELD PRIOR TO CONSTRUCTION.
4. DRIVEWAY MATERIAL IS ASPHALT UNLESS OTHERWISE SPECIFIED.
5. WATERMAIN MATERIAL IS TO BE EITHER DUCTILE IRON PRESSURE CLASS 350 AS PER AWWA C-150 OR PVC SDR-18 CL-150 AS PER AWWA C-900.
6. UNLESS OTHERWISE NOTED, ALL EXISTING WATER SERVICES ARE TO BE REPLACED WITH A MIN. 19mm DIA. COPPER FOR RESIDENTIAL DWELLINGS AND 25mm DIA. COPPER FOR INDUSTRIAL AND COMMERCIAL PREMISES AS PER OPSD 1104.010. UNLESS OTHERWISE NOTED, SERVICES ARE TO BE REPLACED FROM THE MAIN TO THE PROPERTY LINE WITH A NEW CURB STOP AND SERVICE BOX AT THE PROPERTY LINE.
7. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS AND BLOW OFFS REQUIRED FOR TESTING THE NEW WATERMAIN.
8. MAXIMUM ALLOWABLE PIPE JOINT DEFLECTION OF THE WATERMAIN SHALL BE 70% OF THE MANUFACTURER'S SPECIFICATIONS. PIPE BARREL DEFLECTION IS STRICTLY PROHIBITED.
9. CORROSION PROTECTION IS REQUIRED FOR ALL METALLIC PIPE, VALVES, FITTINGS SERVICES AND HYDRANTS. CATHODIC PROTECTION (ZINC ANODE) AS PER THE DETAILS IN THE REGIONAL DESIGN SPECIFICATIONS OR 8 MIL MEDIUM DENSITY POLYETHYLENE ENCASEMENT AS PER AWWA C-105 SHALL BE USED.
10. AFTER REMOVING VALVE BOXES AND HYDRANTS, BACKFILL WITH COMPACTED GRANULAR 'A'. WHERE EXISTING VALVE CHAMBERS ARE TO BE ABANDONED, ALL VALVES WITHIN THE CHAMBER ARE TO BE LEFT IN PLACE AND THE CHAMBER IS TO BE BROKEN DOWN TO 1.0m BELOW FINAL GRADE AND BACKFILLED WITH NON-SHRINK BACKFILL TO SUBGRADE. THE AFFECTED AREA SHALL BE COMPLETELY RESTORED. ALL HYDRANTS SHOWN FOR REMOVAL SHALL BE RETURNED TO REGIONAL STORES AT 1179 BRONTE RD., OAKVILLE. UNLESS OTHERWISE NOTED, ALL VALVES WHICH ARE SHOWN FOR REMOVAL SHALL BE DISPOSED OF BY CONTRACTOR.
11. EXISTING WATERMAIN IS TO BE EITHER REMOVED OR PLUGGED AND ABANDONED AS REQUIRED.
12. HYDRANTS ARE TO BE INSTALLED SUCH THAT THE LOWER ROD/STEM LENGTH SHALL NOT EXCEED 1.7m MEASURED FROM THE BREAK-OFF FLANGE.
13. REGIONAL MUNICIPALITY OF HALTON APPROVED MECHANICAL RESTRAINTS ARE TO BE USED ON ALL STANDARD BENDS, VALVES, FITTINGS AND HYDRANTS. REFER TO TABLE.



ROAD RESTORATION DETAIL

N.T.S.

NOTE: ASPHALT DRIVEWAY RESTORATION IS TO BE FULL WIDTH OF DRIVEWAY WITH 50mm HL3A.



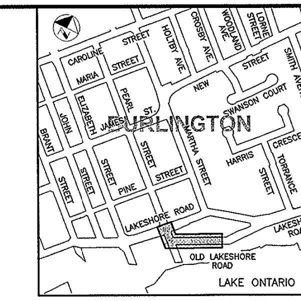
③ WATERMAIN DETAIL

N.T.S.

LEGEND

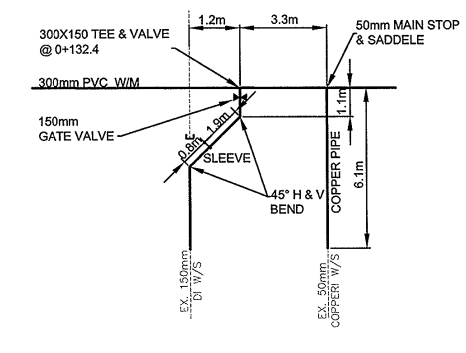
⊕ BH1	BOREHOLES– REFER TO PETO MACCULLUM LTD. GEO-TECHNICAL REPORT # 93HF095 REGION FILE: FS 364 (1993)
⊗	WATER BOXES
	EX. HYDRANT REMOVAL
	EX. VALVE BOX REMOVAL
	EX. WVC OR EX. MH REMOVAL
[—]	PLUG

NOTE: USED 25mm COPPER PIPE FOR ALL NEW WATER SERVICES EXCEPLT # 2084 (USED 50mm COPPER PIPES)



KEYPLAN

N.T.S.

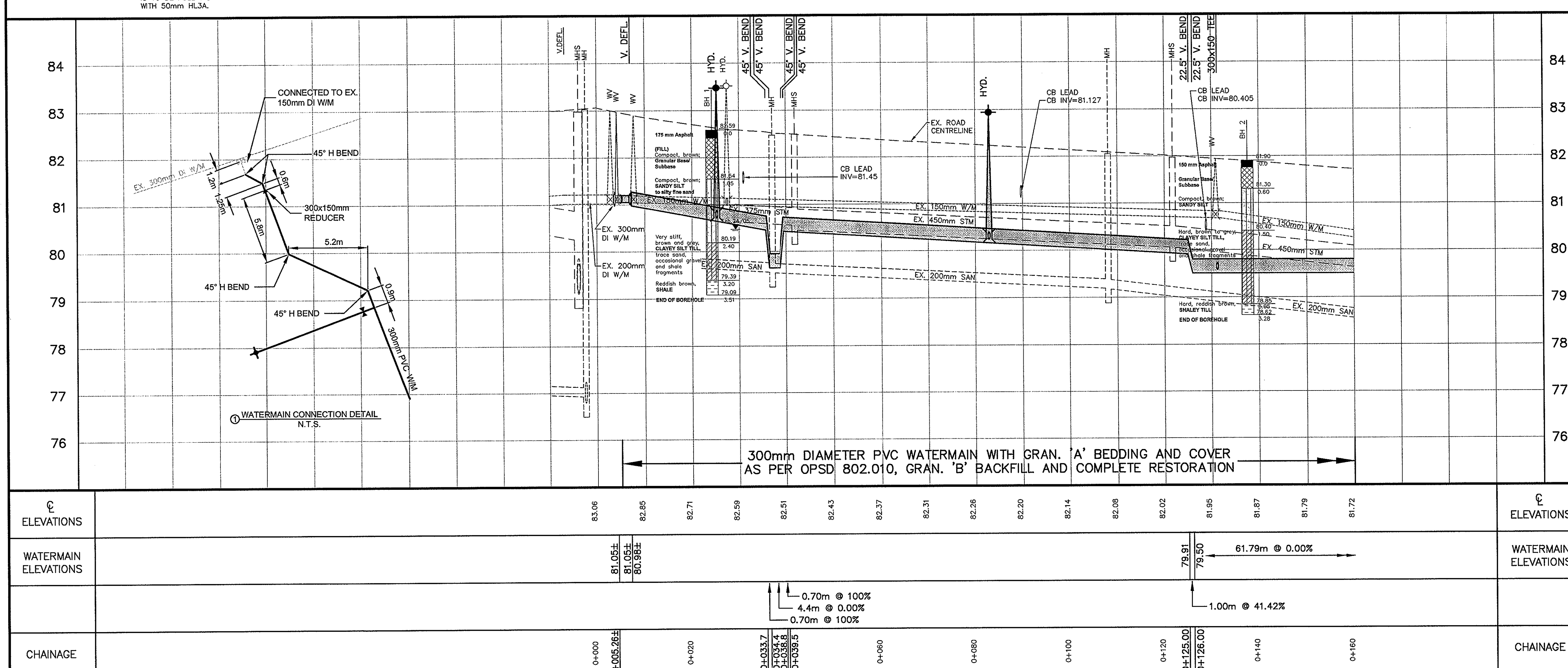


② WATERSERVICE CONNECTION DETAIL

N.T.S.

REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED

OLD LAKESHORE ROAD



Nº	Date	By	REVISIONS	MANU	CAD
2	MAY 19	KDH	As Constructed		X
1	NOV 08	E.A.H.	As Constructed		X

Design	B.K.	Ch'kd		Date JANUARY 2005
Drawn	C.S.J.	Ch'kd		
Scale Horiz. 1:500 Vert. 1:50				References
APPROVALS				Field Notes REGION BOOK
Municipal				Stamp
Regional				

Director, Engineering Services

Manager, Design Services

Halton

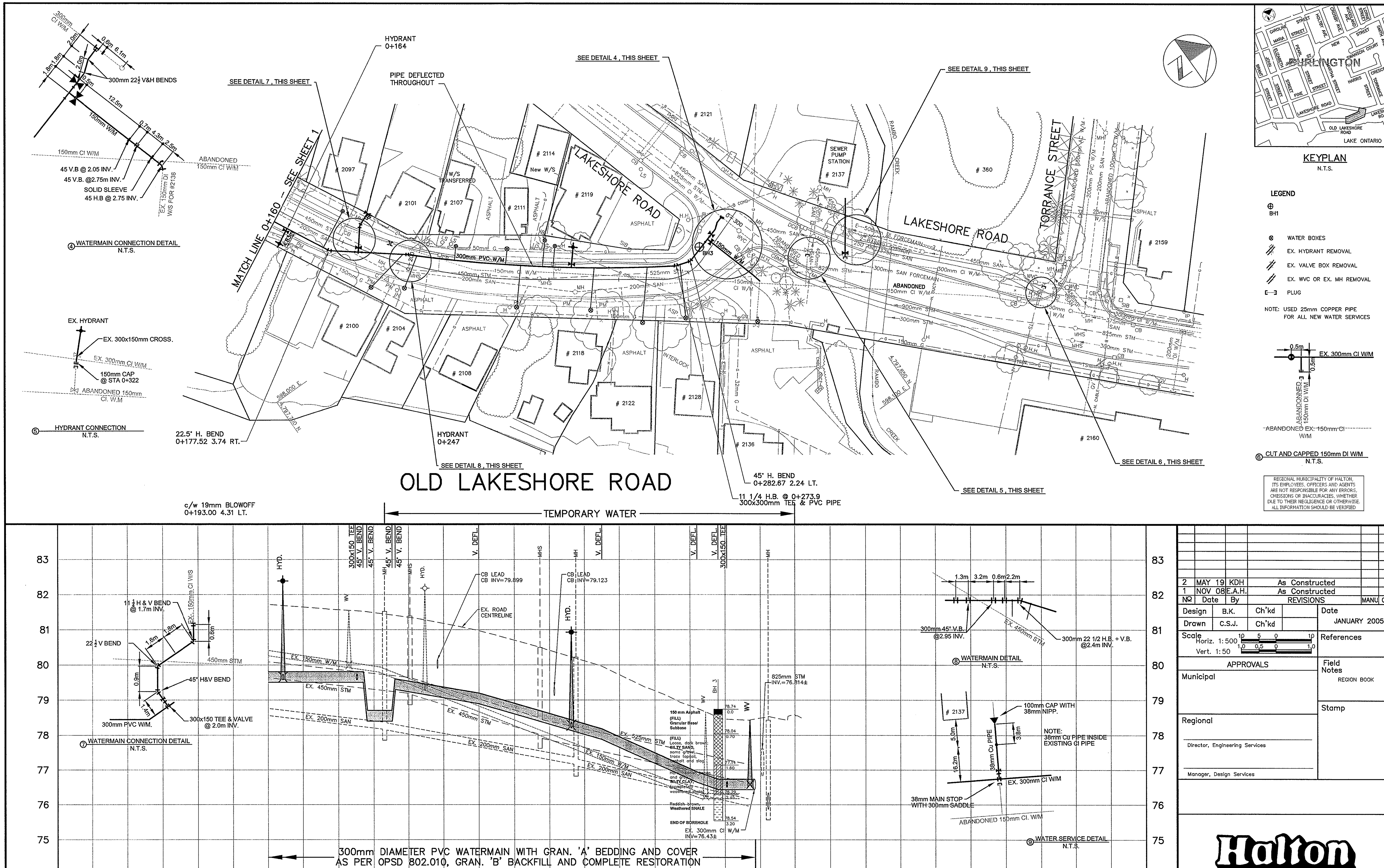
WATERMAIN REPLACEMENT ON
OLD LAKESHORE ROAD
FROM PEARL STREET TO
140m SOUTHWEST OF LAKESHORE ROAD
IN THE CITY OF BURLINGTON

Consultant File Nº	Re B-12080
CONTRACT Nº W-2295-06	Drawing Nº SHEET 1 OF 2

PR-2295-06 1 of 2

B-12080

B-12081



REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED

℄ ELEVATIONS: 81.72, 81.64, 81.57, 81.48, 81.35, 81.18, 80.97, 80.70, 80.41, 80.11, 79.72, 79.26, 78.84, 78.46, 78.49, 78.58 78.49

WATERMAIN ELEVATIONS: 61.79m @ 0.00% 79.50 | 78.40 | 78.40 | 79.30 23.48m @ 1.75% 78.89 | 34.76m @ 2.90% 77.88 | 24.76m @ 5.00% 76.64 | 76.43± | 76.43±

0.90m @ 100% — 7.44m @ 0.00% — 1.10m @ 100% — 10.60m @ 0.00% — 5.47m @ 3.85%

CHAINAGE: 0+160, 0+180, 0+186.97, 0+188.03, 0+195.31, 0+196.20, 0+200, 0+220, 0+240, 0+255, 0+260, 0+280, 0+282, 0+288, 0+298.58±, 0+300, 0+311.80

Nº	Date	By	REVISIONS	MANU	CAD
2	MAY 19	KDH	As Constructed		X
1	NOV 08	E.A.H.	As Constructed		X

Design	B.K.	Ch'kd	
Drawn	C.S.J.	Ch'kd	

Date JANUARY 2005

Scale Horiz. 1:500 Vert. 1:50

References

APPROVALS

Municipal

Field Notes REGION BOOK

Regional

Director, Engineering Services

Manager, Design Services

Stamp

Halton

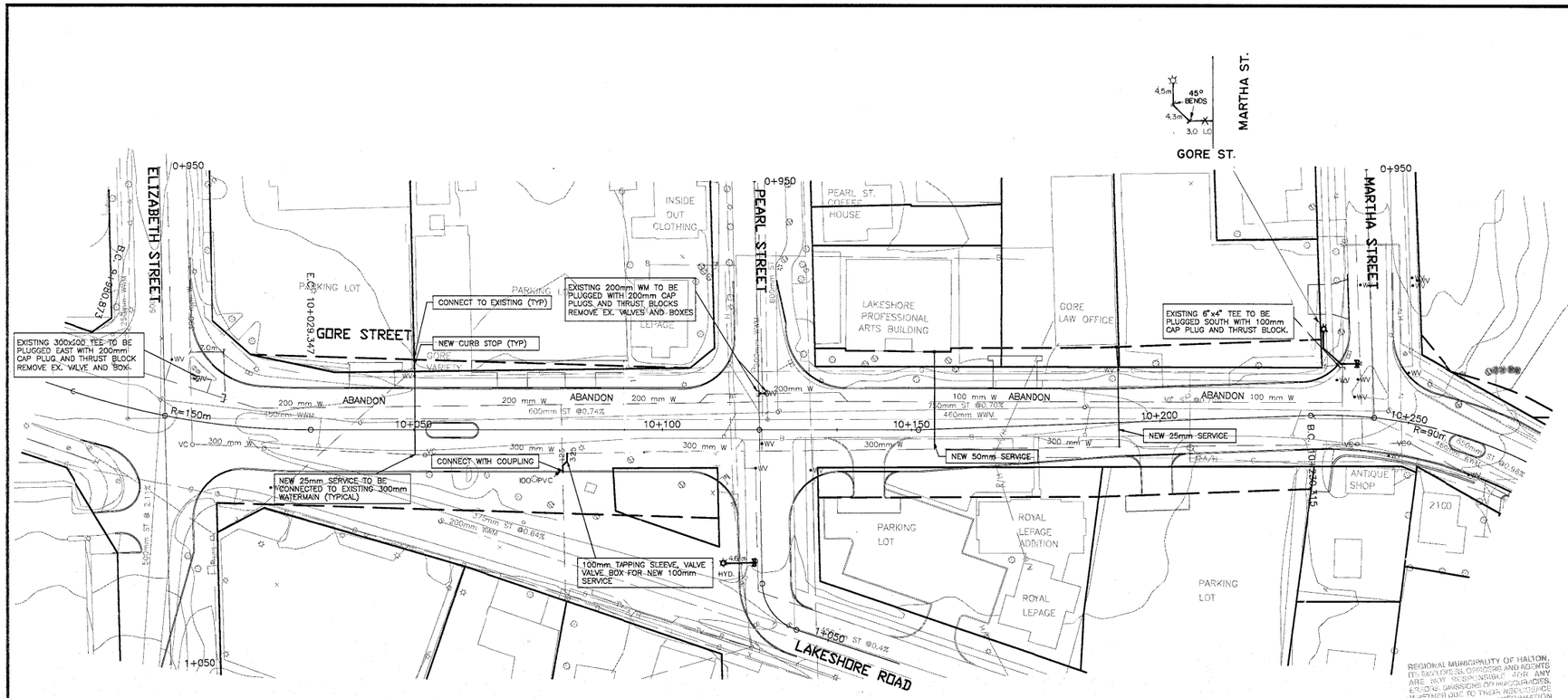
WATERMAIN REPLACEMENT ON
OLD LAKESHORE ROAD
FROM 140m SOUTHWEST OF LAKESHORE ROAD TO LAKESHORE ROAD
IN THE CITY OF BURLINGTON

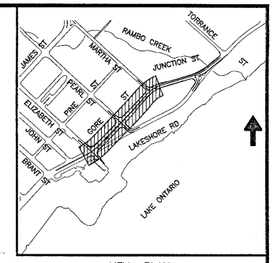
Consultant File Nº

Re(B-12081

CONTRACT Nº W–2295–06

Drawing Nº SHEET 2 OF 2



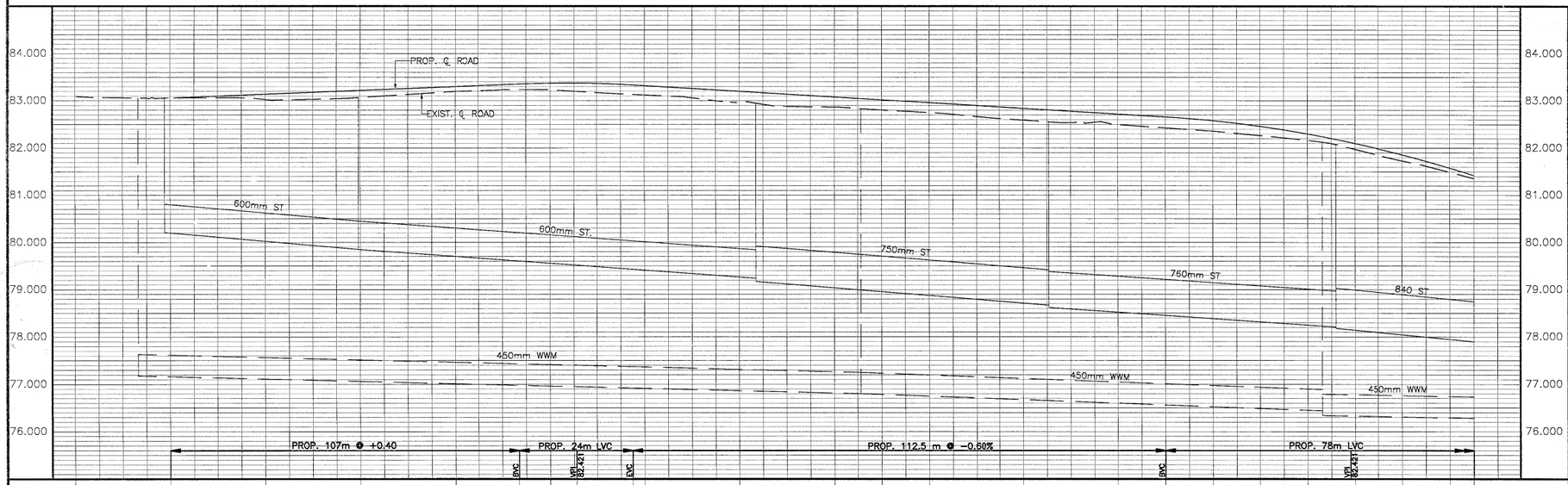


KEY PLAN

GENERAL NOTES

1. All Watermain and Sanitary sewer installation shall conform to the to the latest revisions of the Ontario Provincial Standard Drawings (OPSD) and Specifications (OPSS) as amended by the Regional Municipality of Halton.
2. The locations of all existing Watermain, Sanitary Sewer, Utilities and Service Laterals are approximate. The Contractor must verify the location, size and elevation in the field prior to construction.
3. All existing sanitary laterals shall be replaced with 125mm PVC SDR28 diameter Connections for single family and semi-detached dwellings and 150mm PVC SDR28 diameter connections for all others. The new lateral is to be placed from the sewer to the property line in accordance with OPSD 1006.02. The minimum and maximum cover at the property line shall be 2.15m and 2.75m respectively unless otherwise noted.
4. All existing water services to be replaced with 20mm diameter copper for residential dwellings and 25mm diameter copper for industrial and commercial premises as per OPSD 1104.01 unless otherwise noted. New services are to be replaced from the main to the property line with a new curb stop and service box at the property line, unless otherwise ncted.
5. The Contractor shall provide all temporary caps, plugs and blow offs required for testing the new watermain.
6. Maximum allowable pipe joint deflection of the watermain shall be 70% of the Manufacturer's specifications. Pipe Barrel bending is not permitted.
7. The proposed watermain is to be tested, flushed, chlorinated and accepted by the Region prior to being put into service.
8. Corrosion protection is required for all ductile iron valves and fittings. Use either cathodic protection (zinc anode) as per the details in the specification or 3 mil medium density Polyethylene encasement as per AWWA C105/A21.5-93.
9. All existing sanitary manholes to be either removed or broken down 1.0 metres below final grade and backfilled with Granular material and complete restoration unless otherwise ncted. Frames and covers are to be salvaged and returned to Regional stores at 2316 South Service Road, Oakville.
12. Existing valve boxes to be removed are to have granular backfill and complete restoration. Existing valves in valve chambers to be removed are to have the chamber broken down to 1.0 metres below final grade backfilled with granular to subgrade and complete restoration. All existing hydrants to be removed are to be returned to Regional Stores 2316 South Service Road, Oakville.
13. Regional Municipality of Halton Approved Mechanical Restraints shall be used on all standard bends, valves, fittings and hydrants. Refer to table below for length of pipe to be restrained on both sides of fittings.

REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, EITHER DUE TO THIS REPRODUCTION OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.



℄ ELEV'S	83.090	83.060	83.140	83.220	83.300	83.354	83.372	83.330	83.060	83.195	83.075	83.015	82.955	82.835	82.715	82.655	82.575	82.455	82.295	82.095	81.852	81.569
CHAINAGE	0+090	10+000	10+020	10+040	10+060	10+073.50	10+080	10+085.50	10+097.50	10+160	10+120	10+140	10+150	10+160	10+180	10+200	10+210	10+220	10+230	10+233.5	10+240	10+243.9	10+249	10+250	10+260	10+270

2	03.09.97	JJA	AS CONSTRUCTED	
1	14/06/95	WWM	ISSUED FOR TENDER	
NO.	DATE	BY	REVISIONS	
DESIGN	R. KLEINE	CHECKED	R.D.K.	DATE
DRAWN	R. KLEINE	CHECKED	R.D.K.	JUNE 1995
SCALE HORZ. 0 10 20				REFERENCES:
VERT. 0 1.0 2.0				

APPROVALS

MUNICIPAL

DIRECTOR OF ENGINEERING

DATE

REGIONAL

COMMISSIONER OF PUBLIC WORKS

DIRECTOR OF DESIGN & CONSTRUCTION

95-06-19

FIELD NOTES:

STAMP: LICENSED PROFESSIONAL ENGINEER ROBERT D. KIVI 95/06/19 PROVINCE OF ONTARIO

CONSULTANT

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

REGIONAL MUNICIPALITY OF Halton

CITY OF BURLINGTON

TITLE

GORE/JUNCTION STREET

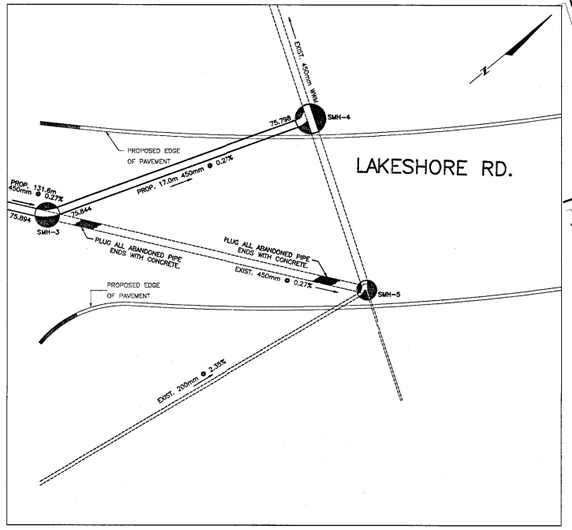
WATERMAIN ABANDONING
STA 9+975 TO STA 10+275

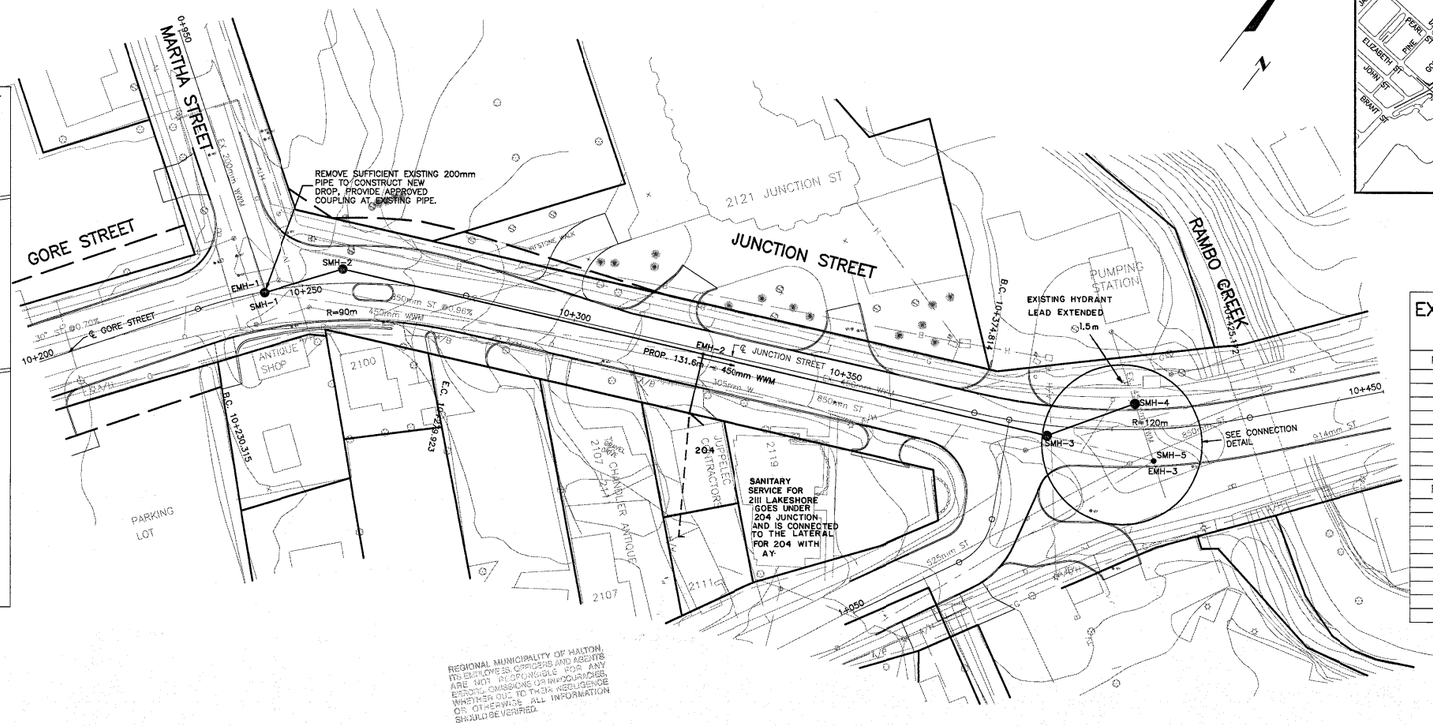
MUNICIPAL DRAWING NO.	REGIONAL DRAWING NO.
TL-22R	B - 7326
CONTRACT NO. PR-1603 95-10	SHEET 1 OF 5

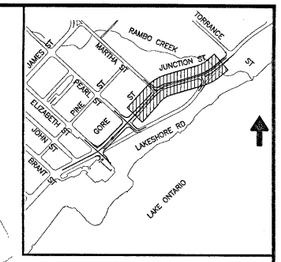
B - 7326

POSITION EDGE OF PRINT ON THIS LINE

DOWNSTREAM WASTEWATER MAIN CONNECTIONS







KEY PLAN

EXISTING SERVICE CONNECTIONS

(PER VIDEO SURVEY NOV 25, 1995)

FROM EMH-1 TO EMH-2

DISTANCE	LOCATION
11.8	12 O'clock
13.8	12 O'clock
26.8	12 O'clock
43.8	12 O'clock
56.8	12 O'clock
64.2	12 O'clock
68.7	12 O'clock

FROM EMH-2 TO EMH-3

DISTANCE	LOCATION
8.4	12 O'clock
8.9	12 O'clock
11.6	12 O'clock
18.4	12 O'clock
18.4	1 O'clock
41.8	12 O'clock
41.8	2 O'clock
43.5	12 O'clock

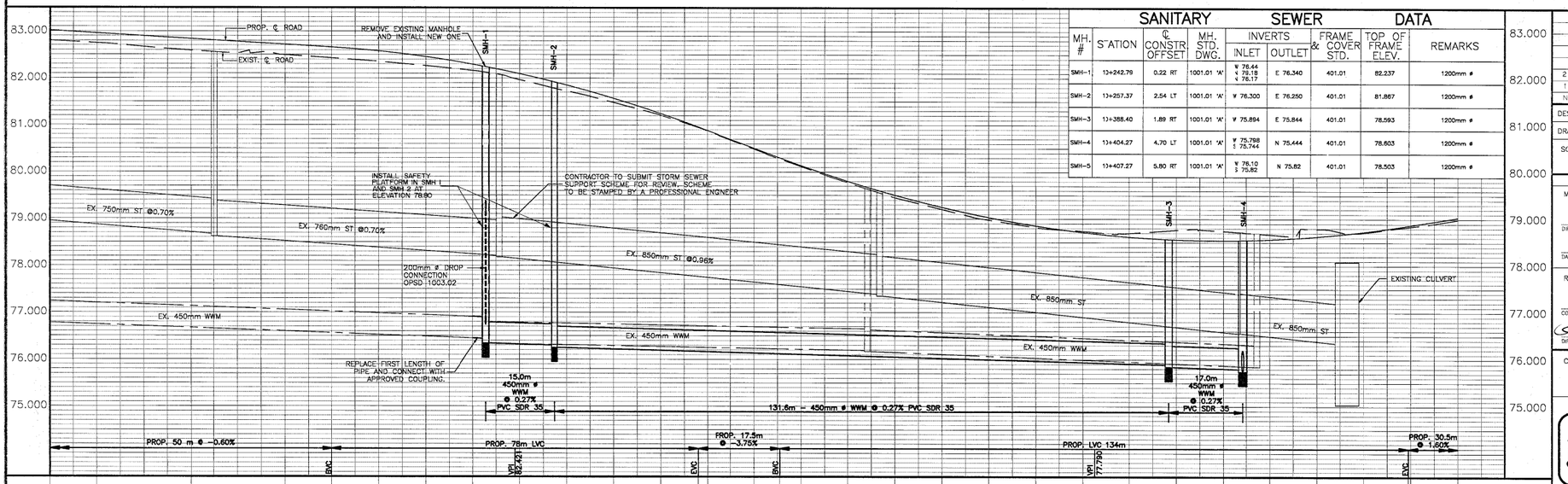
NOTES:

A. The existing sanitary sewer flows from buildings are to be mcintained at all times during construction. Pumping around the construction area will be permitted subject to review of the contractor's construcion plan.

B. All benching to be according to OPSD 1004.01.

C. Contractor to locate and confirm all active sewer leads and provide new connections from the proposed main to the property line including approved couping. Abandoned sewer leads shall not be reconstructed but are to be plugged with concrete at the edge of trench.

D. All excavations to be in vertical trench.



SANITARY SEWER DATA

MH. #	STATION	℄ CONSTR. OFFSET	MH. STD. DWG.	INVERTS INLET	INVERTS OUTLET	FRAME & COVER STD.	TOP OF FRAME ELEV.	REMARKS
SMH-1	1+242.79	0.22 RT	1001.01 'A'	W 76.44 N 79.18 N 76.17	E 76.340	401.01	82.237	1200mm ø
SMH-2	1+257.37	2.54 LT	1001.01 'A'	W 76.300	E 76.250	401.01	81.867	1200mm ø
SMH-3	1+388.40	1.89 RT	1001.01 'A'	W 75.894	E 75.844	401.01	78.593	1200mm ø
SMH-4	1+404.27	4.70 LT	1001.01 'A'	W 75.798 S 75.744	N 75.444	401.01	78.603	1200mm ø
SMH-5	1+407.27	5.80 RT	1001.01 'A'	W 76.10 S 75.82	N 75.82	401.01	78.503	1200mm ø

℄ ELEV'S	83.015	82.955	82.835	82.715	82.655	82.575	82.455	82.295	82.095	81.852	81.569	81.246	80.959	80.884	80.509	80.302	80.138	78.801	79.504	79.247	79.030	78.853	78.716	78.618	78.560	78.543	78.565	78.627	78.730	78.864	78.872	79.032
WASTEWATER MAIN																																
									W 76.44 N 79.18 N 76.74	E 76.340																W 75.894 E 75.844		W 75.798 S 75.744	N 75.744					
CHAINAGE	10+150	10+160	10+180	10+200	10+210	10+220	10+230	10+240	10+242.8	10+249	10+250	10+257.4	10+260	10+270	10+280	10+288	10+290	10+300	10+305.5	10+310	10+320	10+330	10+340	10+350	10+360	10+370	10+372.5	10+380	10+388.4	10+390	10+400	10+404.3	10+410	10+420	10+430	10+439.5	10+440	10+450

B - 7327

NO.	DATE	BY	REVISIONS
2	03 09 97	JJA	AS CONSTRUCTED
1	14/06/95	JMM	ISSUED FOR TENDER

DESIGN	R.KLEINE	CHECKED	R.D.K.	DATE
DRAWN	R.KLEINE	CHECKED	R.D.K.	JUNE 1995

SCALE HORZ. ℄ 10 20 VERT. ℄ 1.0 2.0

REFERENCES:

FIELD NOTES:

APPROVALS

MUNICIPAL

DIRECTOR OF ENGINEERING

DATE

REGIONAL

COMMISSIONER OF PUBLIC WORKS

DIRECTOR OF DESIGN & CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER ROBERT B. KIVI 21/06/95 PROVINCE OF ONTARIO

CONSULTANT

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

REGIONAL MUNICIPALITY OF Halton

TO THE CORPORATION OF THE CITY OF BURLINGTON

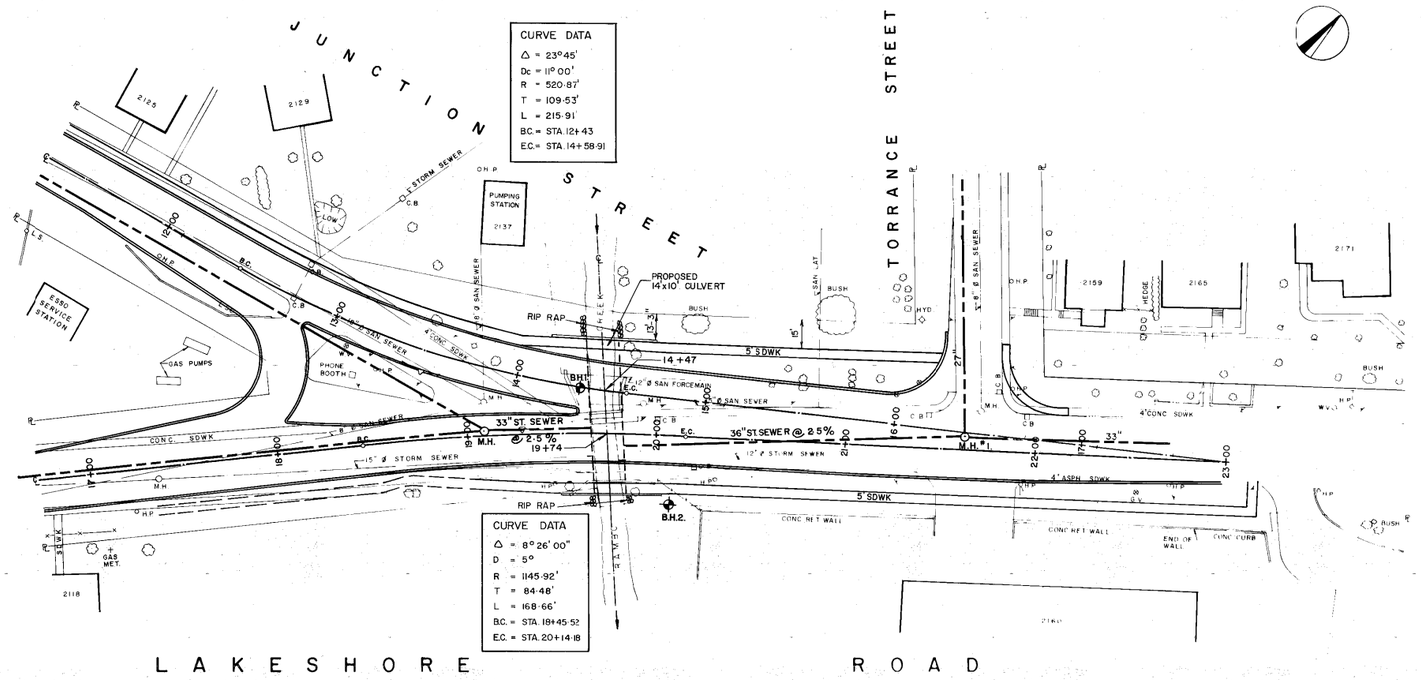
TITLE

GORE/JUNCTION STREET

WASTEWATER MAIN REPLACEMENT
STA 10+150 TO STA 10+450

MUNICIPAL DRAWING NO.	REGIONAL DRAWING NO.
TL-22R	B - 7327
CONTRACT NO. PR-1603 95-10	SHEET 2 OF 5

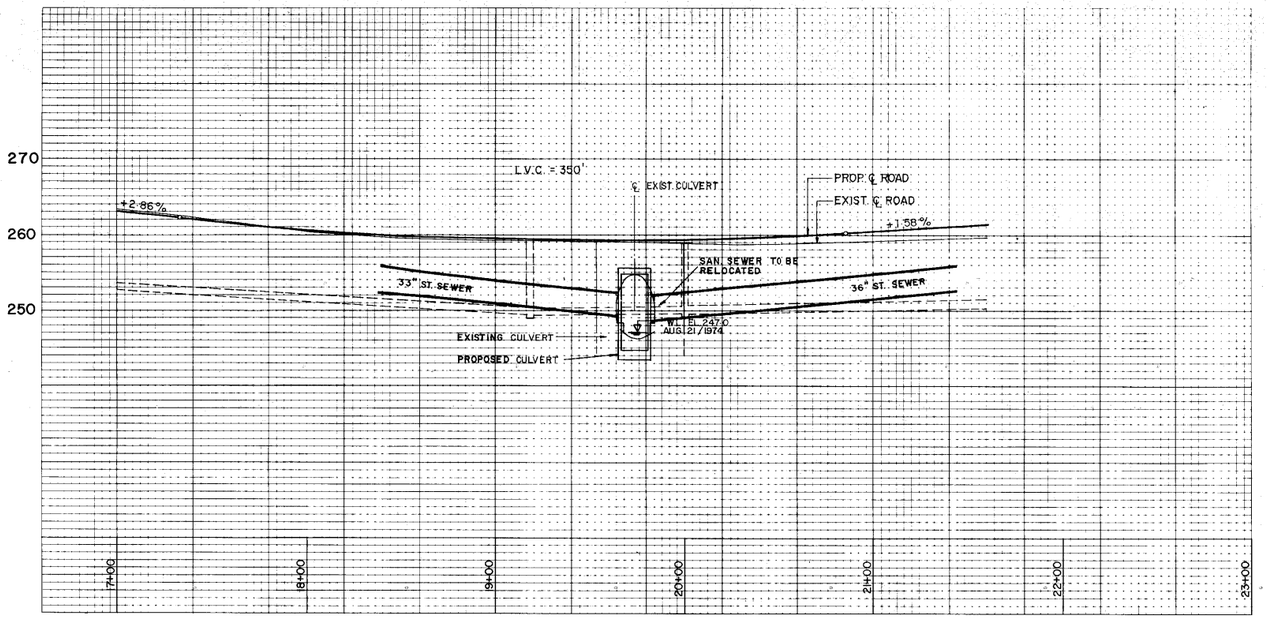
PR-1603 2/5



PLAN

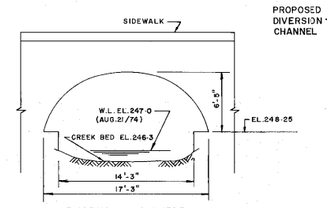
SCALE : 1"= 40'-0"

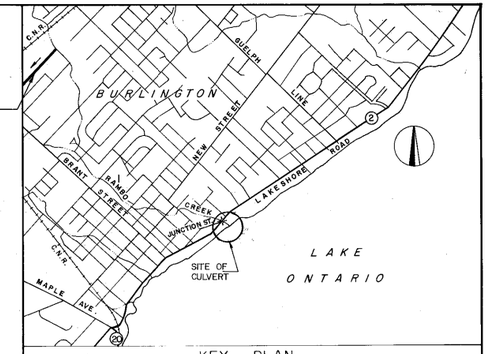
B.M. EL 259.95
NORTHEAST CORNER OF CONC. ABUTMENT
NORTH SIDE OF LAKESHORE ROAD
AT RAMBO CREEK BRIDGE



PROFILE

1" = 10'-0" VERT.
1" = 40'-0" HORIZ.





KEY PLAN

2·5"= 1 MILE

NOTES :

1. ELEVATION OF HWL BASED ON REGIONAL FLOOD ON REDUCED DRAINAGE AREA - ASSUMING FLOOD CONTROL CHANNEL IS CONSTRUCTED. IF FLOOD CONTROL CHANNEL IS NOT BUILD, NEW CULVERT WILL NOT ALTER THE REGIONAL FLOOD LINE OF 256 AS INDICATED IN THE MacLAREN REPORT (Oct. 1965)

SOILS INFORMATION

BOREHOLE NO. 1.

248.8	0.0	GROUND SURFACE
		VERY LOOSE BROWN SILTY SAND
247.8	1.0	VERY LOOSE BLACK ORGANIC SANDY SILT
246.8	2.0	
		SOFT TO FIRM RED BROWN CLAYEY SILT, SOME GRAVEL TRACE OF SAND (TILL)
243.8	5.0	WEATHERED RED BROWN SHALE BEDROCK
242.8	6.0	
		FAIRLY SOUND RED BROWN SHALE BEDROCK
240.8	8.0	END OF HOLE

PRACTICAL REFUSAL TO AUGERING

BOREHOLE NO.2.

259.9	0.0	GROUND SURFACE
		STIFF RED BROWN CLAYEY SILT, SOME GRAVEL, OCCASIONAL LIMESTONE AND SHALE FRAGMENTS (FILL)
247.9	12.0	
		STIFF MOTTLED BROWN CLAYEY SILT, TRACE OF SAND
244.9	15.0	
		VERY LOOSE BLACK ORGANIC SILT, TRACE OF GRAVEL OCCASIONAL SAND LAYERS 1/8"TH.
242.9	17.0	
		SOFT TO FIRM RED BROWN CLAYEY SILT SOME SAND AND GRAVEL (TILL)
241.4		
240.9	19.0	
		WEATHERED RED BROWN SHALE BEDROCK
		FAIRLY SOUND RED BROWN SHALE BEDROCK
237.9	22.0	END OF HOLE

PRACTICAL REFUSAL TO AUGERING

AS CONSTRUCTED

1. WATERSHED AREA 0.86 SQUARE MILES OR 4.9 SQUARE MILES (730 cfs.)
2. DESIGN FLOOD FREQUENCY REGIONAL FLOOD OR 8 YEAR FLOOD
3. SPECIAL FEATORES AT SITE (DAMS, ICE, SCOUR, DRIFT, SLIDING BANKS ETC.) CHANNEL DIVERSION PROJECT EXPECTED TO PROCEED BY CONSERVATION AUTHORITY IN 1975.
4. (A) EXISTING STRUCTURES AT SITE, UPSTREAM AND DOWNSTREAM (GIVE LOCATION, TOTAL SPAN, HEIGHT ABOVE NORMAL HIGH WATER, NET AREA FOR FLOW AT N.H.W., ESTIMATED AGE)
   - 1st. UP STREAM (HYDRO RIGHT-OF-WAY) SPAN 18' HEIGHT ABOVE N.H.W.L - 2 FEET (WORK WITH HEAD) NET AREA FOR FLOW AT HWL = 63 SQ. FEET. AGE APPROX. 20 YEARS.
   - 2nd UP STREAM ON MARTHA ST. SPAN 10' HEIGHT 8·8' ARCH. AGE APPROX. 25 YEARS.

   (B) REASON FOR CHANGE IN HEIGHT OR SPAN OF PROPOSED STRUCTURE FROM THAT OF EXISTING STRUCTURE NO SUBSTANTIAL CHANGE
5. INFORMATION ON EXTREME FLOODING AT SITE OBTAINED FROM JAMES F. MacLAREN LTD. FLOOD CONTROL REPORT AND REFLECTS HIGHEST WATER ELEVATION TO BE 253.7 SEE NOTE AND LOWEST WATER ELEVATION TO BE 247.0
6. IS IT LIKELY THAT STREAM BED WILL BE LOWERED NO
7. IS STRUCTURE ON A MUNICIPAL DRAIN NO
8. DESIGN LOADING H20 S16 PLUS NA INCHES ASPHALT
9. (A) NAVIGATION CLEARANCES REQUIRED, IF ANY NA

   (B) RAILWAY CLEARANCES REQUIRED, IF ANY NA

   (C) REQUIREMENTS OF OTHER AGENCIES HALTON REGION CONSERVATION AUTHORITY

FINAL SUBMISSION

10. HAS APPROVAL BEEN OBTAINED FROM FEDERAL MINISTRY OF TRANSPORT (N.W.P. ACT) NA CANADIAN TRANSPORT COMMISSION
    RAILWAY COMPANIES NA
11. APPROX VOLUME OF CONCRETE 272 CU. YD.
    WEIGHT OF REINFORCEMENT 20 TONS
    WEIGHT OF STRUCTURAL STEEL TONS
    LENGTH OF PRESTRESSED BEAMS LIN. FT.
    LENGTH OF PIPE CULVERT LIN. FT.

NO.	DATE	REVISION

RAMBO CREEK CULVERT
LAKESHORE ROAD

OWNER

CITY OF BURLINGTON

TWP. LOT CON.

CO. or REGION HALTON STRUCTURE SITE NO. MUN. DIST. 4

SITE PLAN

DESIGN ENGINEER D.J.S. TEFFT DATE NOVEMBER 1974

DESIGN G.T.
DRAWN E.U.
CHECK P.A.

74031B PROJECT NO.

DRAWING NO. 1

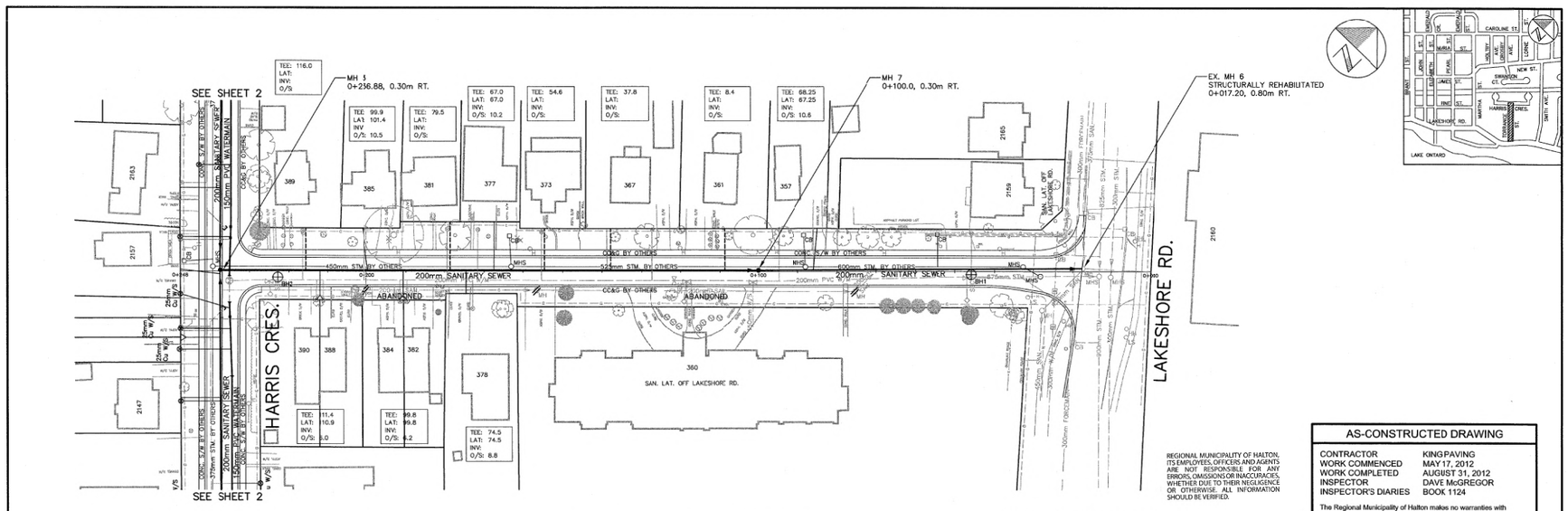
Philips Planning + Engineering Limited

REGISTERED PROFESSIONAL ENGINEER DONALD J.S. TEFFT PROVINCE OF ONTARIO

B-4413

B-4413

POSITION EDGE OF PRINT ON THIS LINE



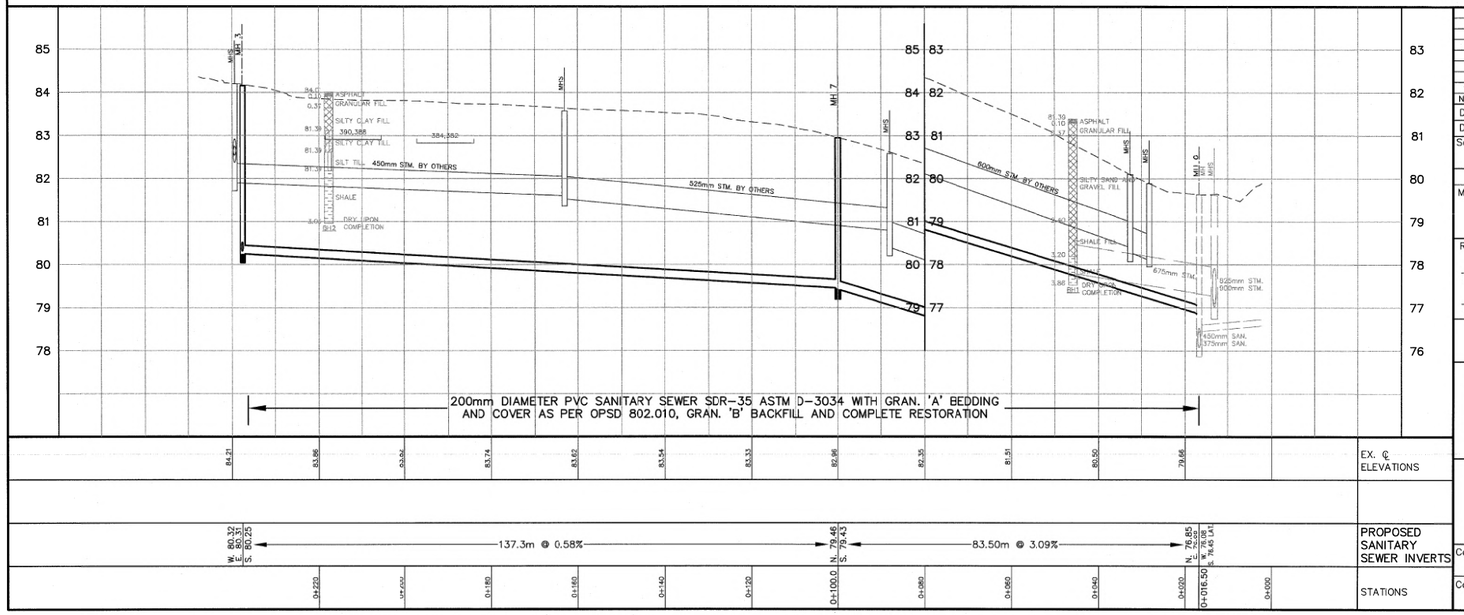
TORRANCE STREET

AS-CONSTRUCTED DRAWING

CONTRACTOR	KINGPAVING
WORK COMMENCED	MAY 17, 2012
WORK COMPLETED	AUGUST 31, 2012
INSPECTOR	DAVE McGREGOR
INSPECTOR'S DIARIES	BOOK 1124

The Regional Municipality of Halton makes no warranties with respect to the accuracy of this drawing and assumes no responsibility for its use. All information should be verified.

FOR GENERAL NOTES AND RESTORATION DETAIL SEE SHEET 1.



NO	Date	By	REVISION	Man.	CAD
1	JUNE 2014	E.W.S.	AS CONSTRUCTED		X

Design	S.J.S.	Ch'kd		Date MARCH 2012
Drawn	E.W.S.	Ch'kd		References
Scale 1:500 Horiz. 10 5 0 10; 1:50 Vert. 1 0.5 0 1				

APPROVALS

Municipal

Regional

Director, Wastewater Services

Manager, Wastewater Design & Construction

Field Notes

Stamp

Halton REGION — CITY OF BURLINGTON

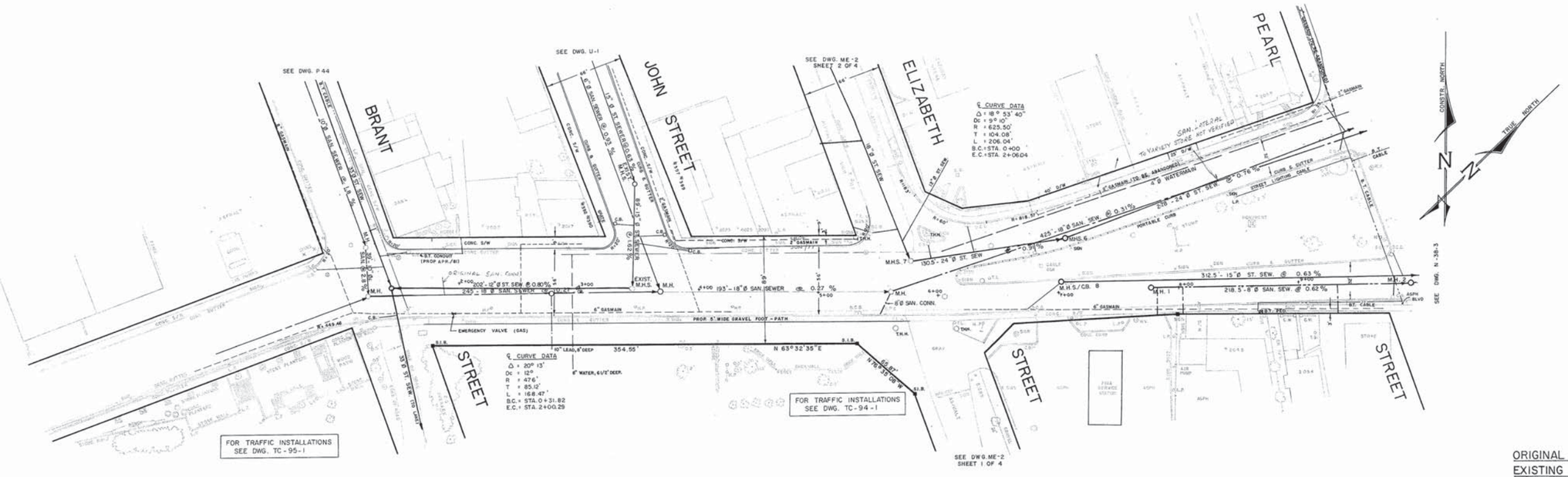
WATERMAIN AND SANITARY SEWER REPLACEMENT ON
TORRANCE STREET
IN THE CITY OF BURLINGTON
FROM LAKESHORE RD. E. HARRIS CRES.

Consultant File NO. B13771

Contract NO. WS-2815-12 Drawing NO. SHEET 3 OF 3

PR-2815-12 3 of 3

Drawing: R:\DESIGN\PROJECTS\PR-2815 HARRIS TORRANCE AC.DWG
Layout: AS CONSTRUCTED
Date: 08/20/2014 Time: 03:32:34 PM



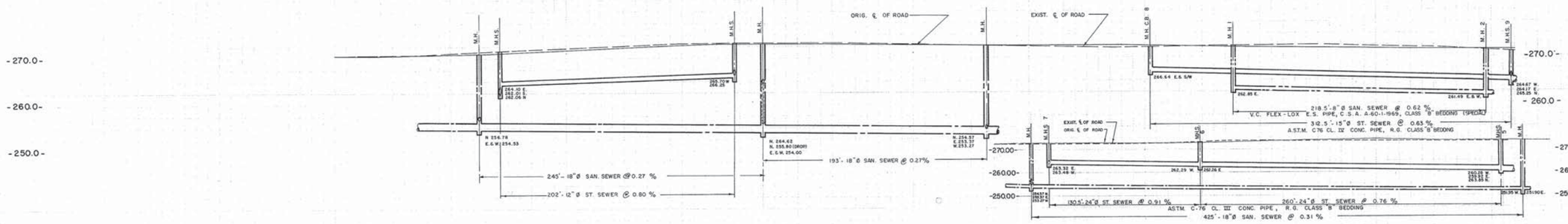
KEY - PLAN
SCALE: 1" = 1000'

LAKESHORE ROAD

ORIGINAL ROAD BASE: CONCRETE (STA. 5+50 - 10+00)
EXISTING ROAD BASE:
15" GRAN. "B", 6" GRAN. "A", 4" H.M. 5, 1 1/2" H.M. 3.

YEAR CONSTRUCTED: 1974/75

ALL SAN. LATERALS SHOULD BE VERIFIED

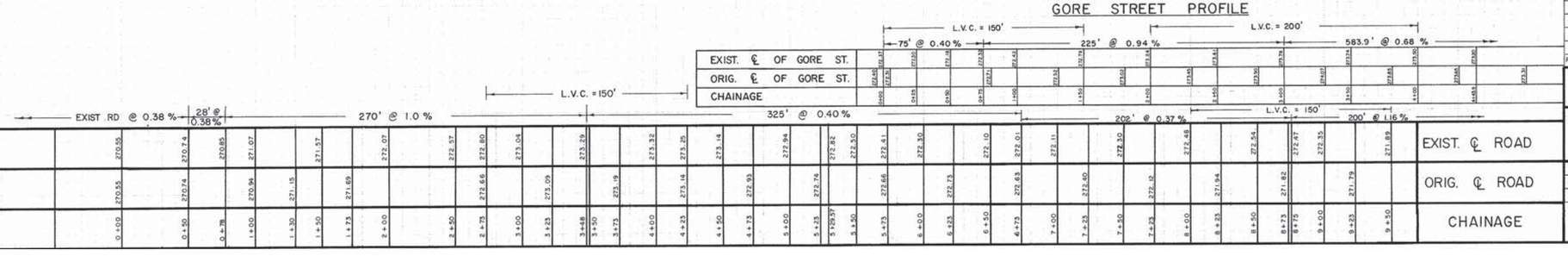


GEOD. B.M. N°65001 — ELEV. 274.00
CONCRETE MONUMENT IN ISLAND OF LAKESHORE, GORE, AND PEARL STREETS, TABLET LOCATED IN CONCRETE AT GROUND LEVEL.

NOTE: OTHER MATERIAL MAY BE ACCEPTABLE, PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE ENGINEER.

GORE STREET PROFILE
SCALE: HORZ. 1" = 40'
VERT. 1" = 20'

GORE STREET PROFILE

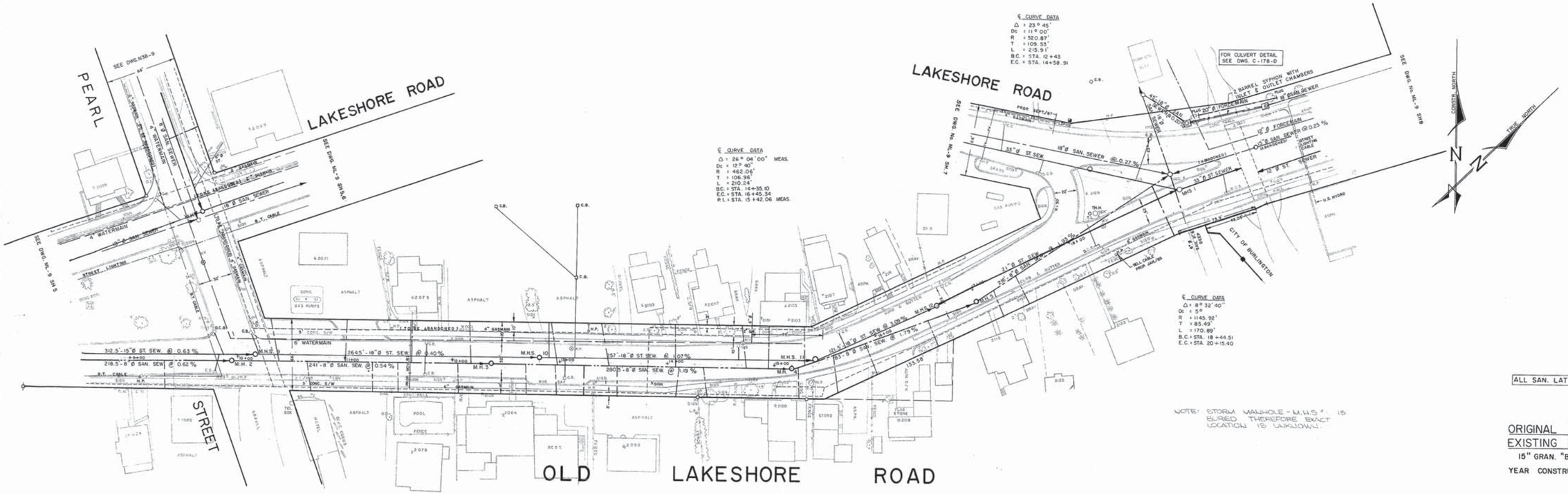


REVISION. Nº	DESCRIPTION	DATE	BY
1	"AS CONSTRUCTED" L-155, G-130, G-149	SEPT 21/76	L.A.

CITY OF BURLINGTON
ENGINEERING DEPARTMENT

LAKESHORE ROAD
300' W. OF BRANT ST. — 300' E. OF ELIZABETH ST.

DESIGN	S.S.M.	CHK'D		FIELD NOTES	INDEX Nº
DRAWN BY	Z. PILLER	CHK'D		L.71-VIII., L.71-IX.,	N 38-2
SCALE	HORZ. 1" = 40' VERT. 1" = 10'	DATE	DEC. 1971	REFERENCES	
APPROVED	DIRECTOR OF PUBLIC WORKS			20R-3295	
	DATE				

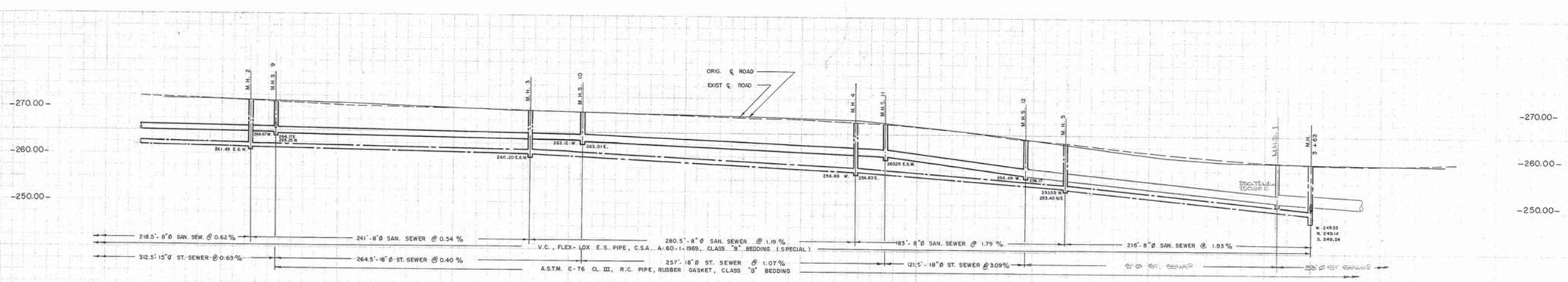


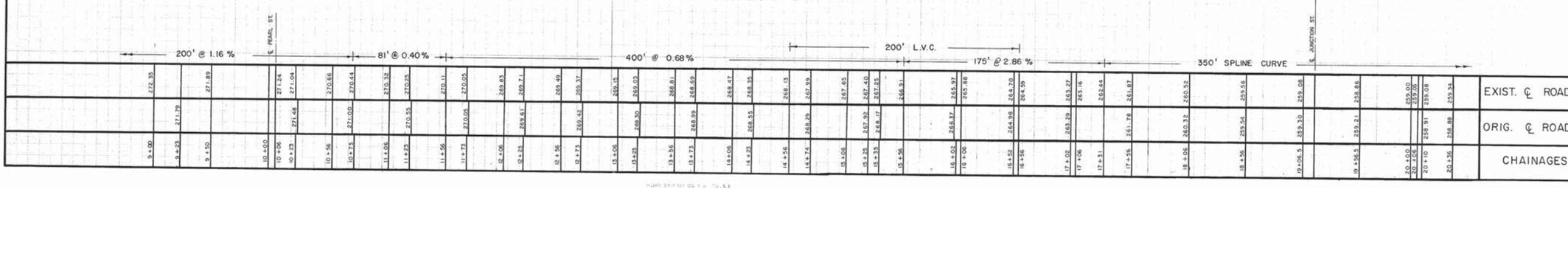
ORIGINAL ROAD BASE: CONCRETE (STA. 10+00 - E'LY)
EXISTING ROAD BASE:
15" GRAN. "B", 6" GRAN. "A", 4" H.M. 5, 1 1/2" H.M. 3.
YEAR CONSTRUCTED: 1974 / 75

B.M. 1
CONC. MON. - NR 6500II - IN ISLAND OF LAKESHORE RD., GORE ST. AND PEARL ST. TABLET IN CONC. AT GROUND LEVEL. ELEV. 274.00

B.M. 2
S/W CORNER OF S/W TOP OF CONC. STEP AT HOUSE NR 2107 LAKESHORE RD. ELEV. 269.15

NOTE: OTHER MATERIALS MAY BE ACCEPTABLE, PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE ENGINEER.



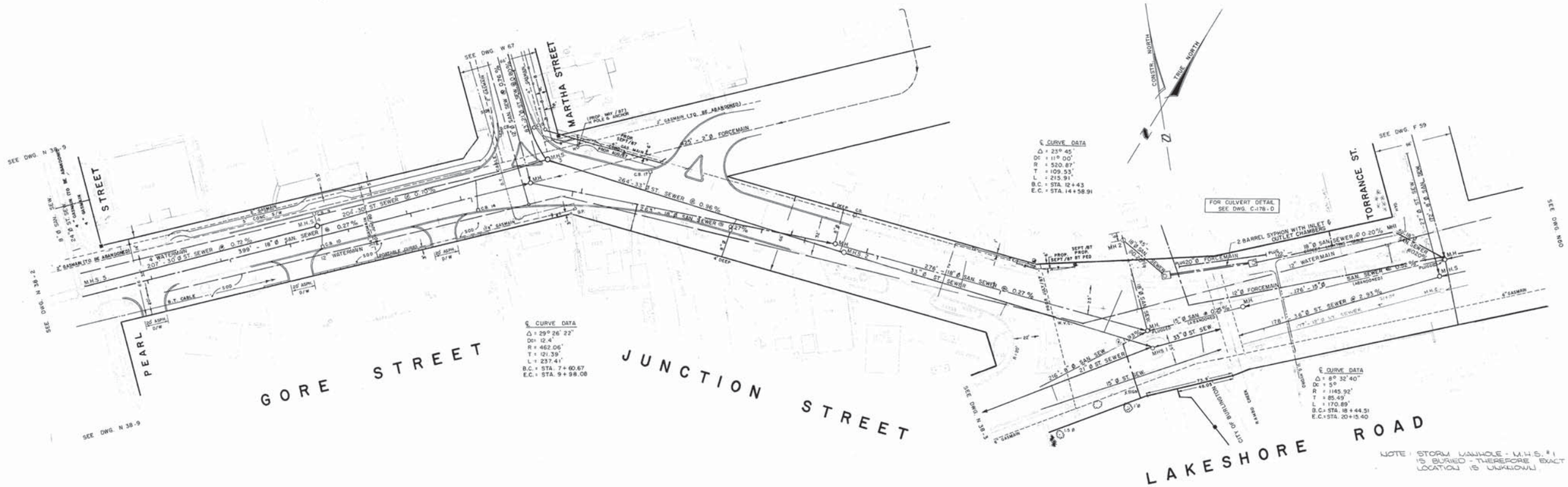


REVISION NR	DESCRIPTION	DATE	BY
1	"AS CONSTRUCTED" L-155, G-130, G-149	OCT. 22 / 76	L.A.

CITY OF BURLINGTON
ENGINEERING DEPARTMENT

OLD LAKESHORE ROAD
PEARL STREET — LAKESHORE ROAD

DESIGN	S.S.M.	CHK'D		FIELD NOTES	INDEX NR
DRAWN BY	Z. PILLER	CHK'D		L.71-VH, L.71,	N 38-3
SCALE	HORIZ. 1"=40' VERT. 1"=10'	DATE	DEC, 1971	REFERENCES	
APPROVED	DIRECTOR OF PUBLIC WORKS	DATE		COR-4644	





KEY PLAN
SCALE: 1" = 1000'

ALL SAN. LATERALS SHOULD BE VERIFIED

EXISTING ROAD BASE:
15" GRAN. "B", 6" GRAN. "A",
4" H.M. 5, 1 1/2" H.M. 3.

YEAR CONSTRUCTED: 1974-75

NOTE: STORM MANHOLE - M.H.S. # 1 IS BURIED - THEREFORE EXACT LOCATION IS UNKNOWN.

B.M. 1. GEOD. B.M. Nº 650011. (ELEV. 274.01)
CONC. MON. IN ISLAND FORMED BY INTERSECTION OF LAKESHORE RD., GORE ST. & PEARL ST. - 36' NORTH OF H.P. Nº P-52, 3' SOUTHEAST OF EDGE OF GORE ST., TABLET IN TOP OF CONC. AT GROUND ELEV.

2. TOPO. B.M. (ELEV. 260.33)
NORTHEAST CORNER OF CONC. ABUTMENT NORTH SIDE OF LAKESHORE RD. AT RAMBO CREEK BRIDGE.

NOTES
1. OTHER MATERIALS MAY BE ACCEPTABLE PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE ENGINEER.

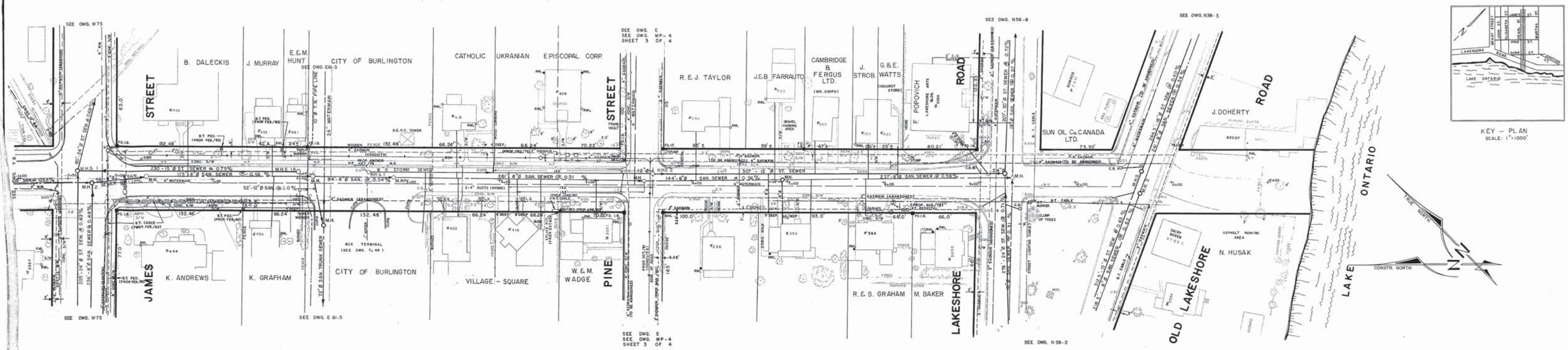
REVISION Nº	DESCRIPTION	DATE	BY
1	"AS CONSTRUCTED" L-155, G-130	OCT. 26/76	L.A.

CITY OF BURLINGTON
ENGINEERING DEPARTMENT
LAKESHORE ROAD
GORE ST. & JUNCTION ST.
PEARL STREET - LAKESHORE ROAD

DESIGN	S.S.M.	CHK'D		FIELD NOTES	INDEX Nº
DRAWN BY	L.A.	CHK'D			
SCALE	HORZ - 1"= 40' VERT - 1"= 10'	DATE		REFERENCES	N 38-8
APPROVED	DIRECTOR OF PUBLIC WORKS DATE:				

EXIST. ℄ ROAD	273.20	272.88	272.52	272.18	271.84	271.50	271.16	270.68	269.93	269.14	268.82	267.62	266.05	264.57	264.23	262.51	261.08	259.95	259.11	258.80	258.56	258.32	258.37	258.72	259.36	260.18	260.94	261.65	261.80	262.72
ORIG. ℄ ROAD	273.73	273.31	272.59	272.45	272.17	271.64	271.44	270.87	270.84	269.48	268.31	267.69	265.03	262.89	260.47	259.08	257.85	256.71	256.07	255.80	256.22	259.30	259.19	258.81	258.88	259.13	259.73	260.59	260.59	
CHAINAGE	4+40	4+90	5+40	5+90	6+40	6+90	7+40	7+90	8+40	8+80	8+90	9+40	9+90	10+20	10+40	10+90	11+40	11+90	12+40	12+65	12+90	13+40	13+90	14+25	14+40	14+90	15+40	15+90	16+33.58 C.L.400	0+50

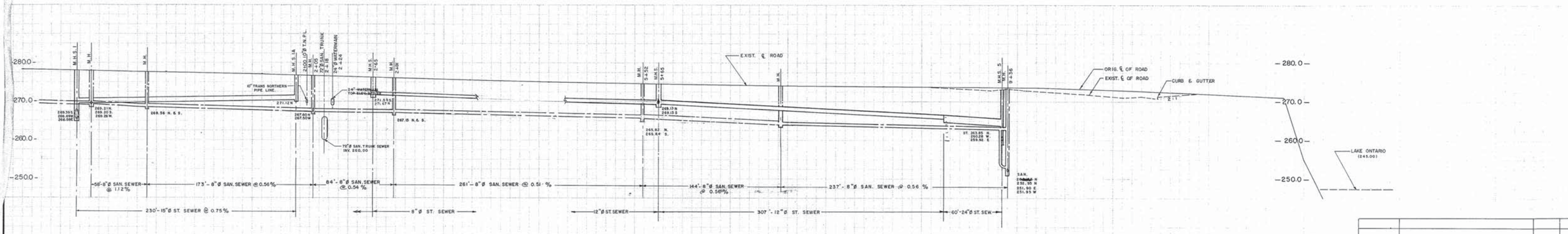
8-8ε И

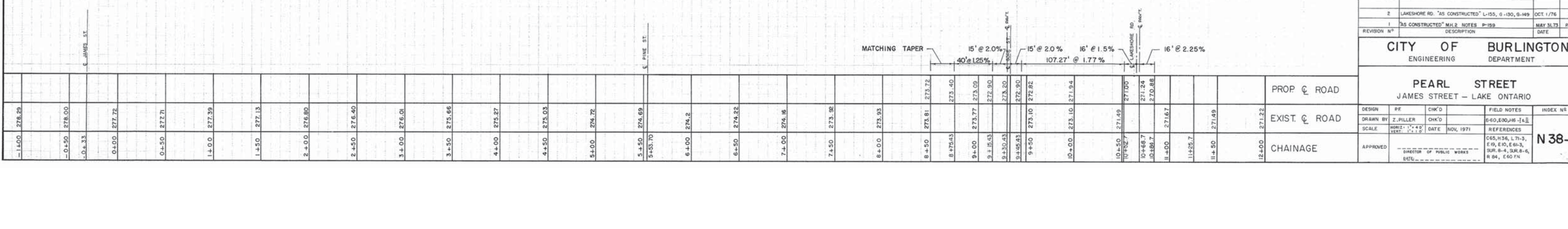


NOTE.

RWL. ○ DENOTES RAIN WATER LEADER WITH OUTLET ABOVE GROUND.

RWL. ● DENOTES RAIN WATER LEADER EXTENDED INTO GROUND.





REVISION N°	DESCRIPTION	DATE	BY
2	LAKESHORE RD. "AS CONSTRUCTED" L-155, G-130, G-149	OCT. 1/76	L.A.
1	"AS CONSTRUCTED" M.H.2 NOTES P-159	MAY 31,73	P.A.

CITY OF BURLINGTON
ENGINEERING DEPARTMENT

PEARL STREET
JAMES STREET – LAKE ONTARIO

DESIGN	P.F.	CHK'D		FIELD NOTES	INDEX N°
DRAWN BY	Z. PILLER	CHK'D		E-60, E-30, H-16 - [&][illegible]	
SCALE	HORIZ. 1"=40' VERT. 1"=10'	DATE	NOV, 1971	REFERENCES	N 38-9
APPROVED	DIRECTOR OF PUBLIC WORKS			C65, H36, L 71-3, E 19, E10, E 61-3, SUR. 8-4, SUR. 8-6, R 84, E 60 FN	

FISHER ENVIRONMENTAL LTD.

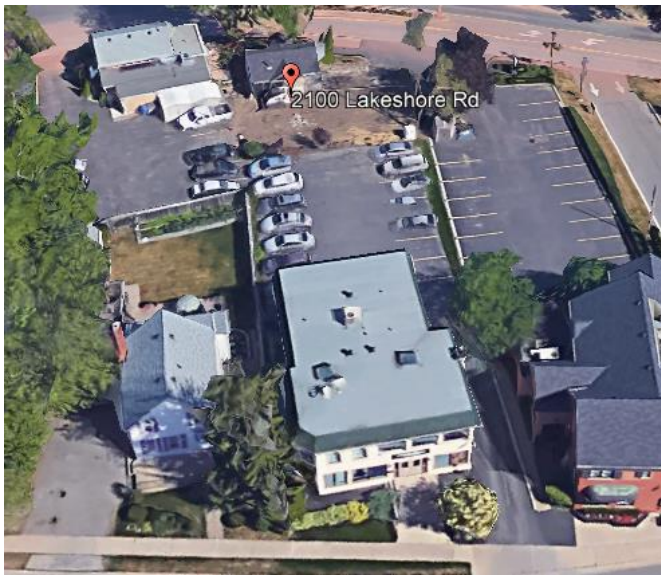
ENGINEERING

Professional Engineers Ontario

LABORATORY

CALA Canadian Association for Laboratory Accreditation Inc.

HYDROGEOLOGICAL INVESTIGATION



2093, 2097, 2101 Old Lakeshore Road & 2096, 2100 Lakeshore Road, Burlington, Ontario

Prepared for:

Core FSC Lakeshore Limited &

Core FSC Lakeshore GP Inc.

400 Esna Park Drive, Unit 15
Markham, ON
L3R 3K2

Tel: (905) 475-7755
Fax: (905) 475-7718
www.fisherenvironmental.com

Project No. FE-P 19-9969

September 18, 2020

Issued to:	Core FSC Lakeshore Limited & Core FSC Lakeshore GP Inc.
Contact:	Ida Assogna, M.Pl., MCIP, RPP Director of Development, 287 Macpherson Avenue, Suite 202 Toronto, ON M4V 1A4 Tel: (416) 966-2673 ext. 306
Project Name:	Hydrogeological Investigation
Project Address:	2093, 2097, 2101 Old Lakeshore Road and 2096, 2100 Lakeshore Road, Burlington, Ontario
Project Number:	FE-P 19-9969 HYDRO
Issued on:	September 18, 2020
Project Manager: **(Primary Contact)**	Marius Voinea, P. Geo. Project Manager marius@fisherenvironmental.com
Report Prepared By:	Clive Wiggan. PhD., EIT., Geotechnical Technician clive@fisherenvironmental.com
Report Reviewed By:	Frank Fan, PEng., Geotechnical Engineer frank@fisherenvironmental.com

Treatment of the groundwater will be required prior to discharging to the storm sewer.

Results of the analyses are presented in Appendix F.

10. DISCUSSION

Hydraulic conductivity values from the slug and pumping tests vary between **9.72 x 10^{-9} m/s** (0.00048 m/day) and **7.75 x 10^{-7} m/s** (0.067 m/day). No, or insignificant groundwater drawdown was recorded in the observation wells during pumping from MW2, MW6, MW205 and MW206. Discharge rates during pumping from MW205 and MW206 were negligible. Additionally, the relatively high flow rates observed from MW2 and MW310 during the pumping tests are not considered representative of the prevailing groundwater conditions on the entire Site but rather point to localized regions of weathered / fractured shale acting as water bearing media. This is also reflected in the rock quality designation, in which the rock cores recovered from BH2 and BH301, at the depth of the well screens, were rated as fair and poor respectively, indicating the presence of fractures and weathering of the shale bedrock.

Hydraulic conductivity calculated from the D_{10} Grain size distribution shows that the silt and clay overburden can be considered to act as an aquitard with the underlying weathered shale comprising the upper aquifer.

For the purposes of construction dewatering, it is recommended that water be pumped from sump pits during excavation. Any weathered or fractured shale seams encountered should be cleaned as best as possible and the area grouted to reduce seepage into the excavation. Under observed worse-case conditions from the slug and pumping tests, **the maximum construction dewatering rate, which takes into consideration accumulated precipitation and seasonal high groundwater levels**, is approximately **119.34 m^3/day** or **119,340 litres/day** over the entire Site. Groundwater dewatering rate, not including accumulated precipitation, is **64.34 m^3/day or 64,340 litres/day**. For permanent drainage, the **average** discharge rate is **60.16 m^3/day** or **60,160 litres/day**.

As the groundwater dewatering rate is more than 50,000 litres/day registration on the EASR is required. An application for PTTW is however not required as the daily discharge is less than 400,000 L/day. These recommendations should however be revised after a period of continuous monitoring of the groundwater levels particularly throughout the wet season. For permanent drainage, sump pits each with two pumps (one as backup) capable of extracting a minimum of 90,250 L/day (minimum FS 1.5) are recommended.

The most recent groundwater quality analysis for samples, taken below the proposed five (5) underground parking levels, show compliance with all parameters based on the existing Ontario Halton Sanitary Sewer By-Law No. 02-03 (MAR 2003): Halton Sanitary Sewer By-law No. 2-03 and Halton Storm Sewer By-Law No. 02-03.

Chemical analyses of parameters for the proposed storm sewer show exceedances of Manganese, Nonylphenol Ethoxylates and total suspended solids. Treatment of the groundwater will therefore be required before discharging to the storm sewer.

11. LIMITATIONS

This report is limited in scope to those items specifically referenced in the text. The discussions and recommendations presented in this report are intended only as guidance for the named client, design engineers and those directly involved in the implementation and control of the project. The information on which these recommendations are based is subject to confirmation by engineering personnel at the time of construction. Localized variations in the subsoil conditions may be present between and beyond the boreholes and should be verified during construction.

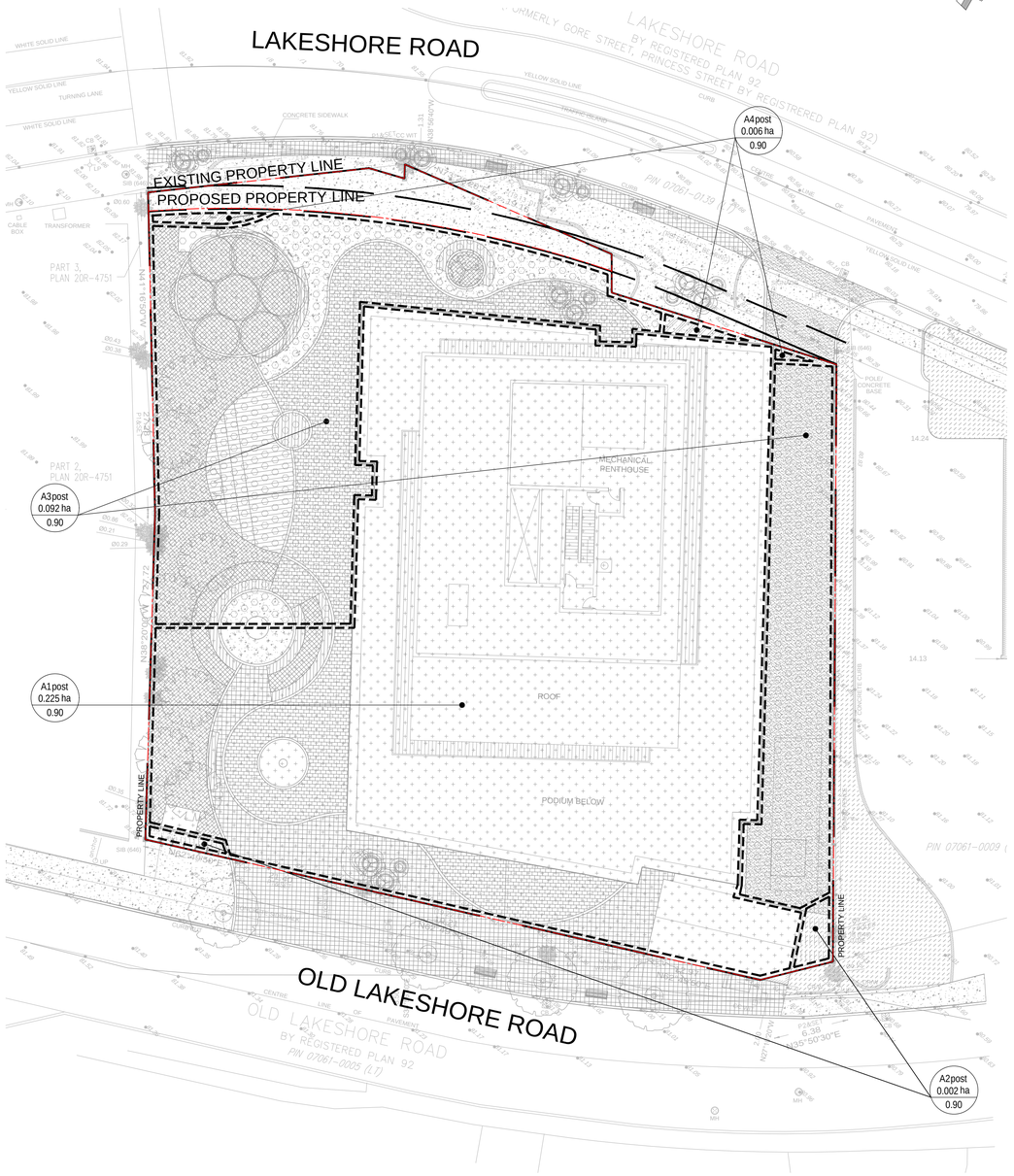
As more specific subsurface information becomes available during excavations on the Site, this report may be updated. Contractors bidding on or undertaking the work should decide on their own investigations, as well as their own interpretations of the factual borehole results. This concern specifically applies to the classification of the subsurface soil and the potential reuse of these soils on/off Site. Contractors must draw their own conclusions as to how the near surface and subsurface conditions may affect them.

APPENDIX C
Storm Analysis

PRE-DEVELOPMENT



POST-DEVELOPMENT



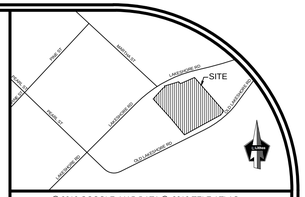
RUN-OFF COEFFICIENTS

DRAINAGE AREA	CONTROL	LAND USE	AREA (ha)	INITIAL COEFFICIENT	COMPOSITE COEFFICIENT	DESIGN COEFFICIENT
A1 PRE (TOWARDS OLD LAKESHORE ROAD)	GRAVITY DRIVEN INTO THE STORM CHAMBERS	HARDSCAPE	0.174	0.90	0.82	0.50
		LANDSCAPE	0.026	0.30		
A2 PRE (TOWARDS LAKESHORE ROAD)	GRAVITY DRIVEN INTO THE STORM CHAMBERS	HARDSCAPE	0.105	0.90	0.80	0.50
		LANDSCAPE	0.020	0.30		

RUN-OFF COEFFICIENTS

DRAINAGE AREA	CONTROL	AREA (ha)	COEFFICIENT
A1 POST > ROOFTOPS / TERRACES / OUTDOOR AMENITY AREA	CONTROLLED IN TANK 1	0.225	0.90
A2 POST > UNCONTROLLED AREA	TOWARDS OLD LAKESHORE ROAD	0.002	0.90
A3 POST > OUTDOOR AMENITY AREA / DRIVEWAY AREA (AD 1-9, DAD1, TRENCH DRAIN 1)	CONTROLLED IN TANK 2	0.092	0.90
A4 POST > UNCONTROLLED AREA	TOWARDS LAKESHORE ROAD	0.006	0.90

DRAINAGE AREA	LEGEND	AREA (ha)	TOTAL AREA (ha)
A1 POST		0.225	0.325
A2 POST		0.002	
A3 POST		0.092	
A4 POST		0.006	



© 2019 GOOGLE, MAP DATA © 2019 TELE ATLAS

LOCATION PLAN
NTS

LEGEND

PROPOSED PROPERTY LINE

EXISTING PROPERTY LINE

DRAINAGE AREA

A1 pre / 0.200 ha / 0.50 — STORM DRAINAGE AREA NUMBER; DRAINAGE AREA (ha); COMPOSITE RUNOFF COEFFICIENT

A1post / 0.175 ha / 0.90 — STORM DRAINAGE AREA NUMBER; DRAINAGE AREA (ha); COMPOSITE RUNOFF COEFFICIENT

LIST OF DRAWINGS

SG-01 (PRELIMINARY SITE GRADING PLAN)
SS-01 (PRELIMINARY SITE SERVICING PLAN)
STM1 (PRE AND POST-STORM DRAINAGE PLAN)

SITE PLAN INFORMATION

STUDIO JCI
20 DE BOERS DR. SUITE 525, TORONTO, ONTARIO, M3J 0H1
T: (416) 901-6528 F: (416) 901-8962
www.studiojci.com

SURVEY INFORMATION

AKSAN PILLER CORPORATION LTD.
ONTARIO LAND SURVEYORS
943 MT PLEASANT ROAD, TORONTO, ON, M4P 2L7
T: (416) 488-1174 F: (416) 488-7843 E:ap@apsurveys.ca
www.apsurveys.ca

BENCHMARK

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE DERIVED FROM THE CITY OF BURLINGTON BENCH MARK 914001, ELEVATION = 77.901 m.

NO	REVISION	DATE	BY
2.	ISSUED FOR ZONING APPLICATION	SEPT. 30, 2020	NM
1.	ISSUED FOR ZONING APPLICATION	AUG. 22, 2019	NM

DRAFT

CITY OF BURLINGTON

PRE AND POST-STORM DRAINAGE PLAN

MIXED USE DEVELOPMENT
2093-2101 OLD LAKESHORE ROAD AND 2096-2100 LAKESHORE ROAD
BURLINGTON, ONTARIO

CITY OF Burlington

Manager,Development Engineering — Date

Lithos

150 Bermondsay Road, Toronto, Ontario M4A 1Y1

DESIGNED BY: AL	DATE: MAR 21, 2019		CHECKED BY: NM
DRAWN BY: AL	PROJECT No:		APPROVED BY:NM
SCALE: 1:300	UD18-050		DRAWING No: STM1

© COPYRIGHT 2019
Lithos Group Ltd.

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

2093-2101 Old Lakeshore Road and
2096-2100 Lakeshore Road
File No. UD18-050
City of Burlington
Date: September 2020

Pre-Development Storm flows towards Old Lakeshore Road

Area Number	Surface	Area (ha)	C
Hardscape area towards Old Lakeshore	Hardscape	0.174	0.90
Landscape area towards Old Lakeshore	Landscape	0.026	0.30
Total Area towards Old Lakeshore (A1 Pre)		0.200	0.82

Formula:	$I = A / (t + B)c$
A, B, C	Constants
t	time of duration
I	Rainfall intensity

Event 2-year
A = 592.60
B = 6
C = 0.78

IDF Data Set City of Burlington

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Total Area towards Old Lakeshore (A1 Pre)	0.200	0.50	0.10	10	68.2	0.019	18.9

Event 5-year
A = 697.40
B = 5
C = 0.764

IDF Data Set City of Burlington

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Total Area towards Old Lakeshore (A1 Pre)	0.200	0.50	0.10	10	88.1	0.024	24.5

Event 100-year
A = 1114.20
B = 5
C = 0.761

IDF Data Set City of Burlington

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Total Area towards Old Lakeshore (A1 Pre)	0.200	0.50	0.10	10	141.9	0.039	39.4

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

2093-2101 Old Lakeshore Road and
2096-2100 Lakeshore Road
File No. UD18-050
City of Burlington
Date: September 2020

Pre-Development Storm flows towards Lakeshore Road

Area Number	Surface	Area (ha)	C
Hardscape area towards Lakeshore Road	Hardscape	0.105	0.90
Landscape area towards Lakeshore Road	Landscape	0.020	0.30
Total Area towards Lakeshore Road - A2 Pre		0.125	0.80

Formula:	$I = A / (t + B)c$
A, B, C	Constants
t	time of duration
I	Rainfall intensity

Event 2-year

A = 592.60
B = 6
C = 0.78

IDF Data Set City of Burlington

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Total Area towards Lakeshore Road - A2 Pre	0.125	0.50	0.06	10	68.2	0.012	11.9

Event 5-year

A = 697.40
B = 5
C = 0.764

IDF Data Set City of Burlington

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Total Area towards Lakeshore Road - A2 Pre	0.125	0.50	0.06	10	88.1	0.015	15.3

Event 100-year

A = 1114.20
B = 5
C = 0.761

IDF Data Set City of Burlington

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Hardscape area towards Lakeshore Road	0.125	0.50	0.06	10	141.9	0.025	24.7

Modified Rational Method - Two Year Storm
Site Flow and Storage Summary - towards Old Lakeshore Road
2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road
File No. UD18-050

Drainage Area A1 Post

Rooftops / Terraces / Outdoor Amenity Area/Loading Area (AD10-14, DAD2)- Controlled In SouthTank

Area (A1) =	**0.215**	ha
"C" =	**0.90**	
AC1 =	**0.19**	
Tc =	**10**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**36.6**	L/s

Drainage Area A2 Post

Uncontrolled Site Area towards Old Lakeshore Road

Area (A2) =	**0.002**	ha
"C" =	**0.90**	
AC2=	**0.002**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**0.5**	L/s

Groundwater Dewatering

Punm Peak Flow Rate = **5.70** L/s

Total Site

Total Site = A1+A2+ Groundwater Dewatering

2-yr A1, A2 Pre-Development Site Release Rate =	**18.9**	L/s
Controlled Release Rate =	**9.6**	L/s
Uncontrolled Flow (A2)	0.5	L/s
Total Site Release Rate Achieved =	**10.1**	L/s
Max. Storage Tank-1 Size =	**29.7**	m^3
Stor. Tank footpring Area =	**83.00**	m^2

2 Year Design Storm

a=	592.60
c=	0.780
B=	6
I=	a/((Tc+B)^c)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(8)	(9)	(10)
Time	**Rainfall Intensity**	**Storm Runoff (A1 Post)**	**Runoff Volume (A1 Post)**	**Storm Runoff (A2 Post)**	**Runoff Volume (A2 Post)**	**Dewatering Volume**	**Total Storm Runoff Volume**	**Target Released Volume**	**Storage Volume**	**Storage Depth of Tank**
(min)	**(mm/hr)**	**(m^3/s)**	**(m^3)**	**(m^3/s)**	**(m^3)**	**(m3)**	**(m^3)**	**(m^3)**	**(m^3)**	
10.0	68.2	0.037	21.98	0.000	0.20	3.42	25.40	5.76	19.6	0.24
15.0	55.1	0.030	26.67	0.000	0.25	5.13	31.80	8.64	23.2	0.28
20.0	46.7	0.025	30.11	0.000	0.56	6.84	36.95	11.52	25.4	0.31
25.0	40.7	0.022	32.81	0.000	0.61	8.55	41.36	14.40	27.0	0.32
30.0	36.2	0.019	35.03	0.000	0.65	10.26	45.29	17.28	28.0	0.34
35.0	32.7	0.018	36.93	0.000	0.69	11.97	48.90	20.16	28.7	0.35
40.0	29.9	0.016	38.58	0.000	0.72	13.68	52.26	23.04	29.2	0.35
45.0	27.6	0.015	40.05	0.000	0.75	15.39	55.44	25.92	29.5	0.36
50.0	25.7	0.014	41.37	0.000	0.77	17.10	58.47	28.80	29.7	0.36
55.0	24.0	0.013	42.57	0.000	0.79	18.81	61.38	31.68	29.7	0.36
60.0	22.6	0.012	43.67	0.000	0.81	20.52	64.19	34.56	29.6	0.36
65.0	21.3	0.011	44.69	0.000	0.83	22.23	66.92	37.44	29.5	0.36
70.0	20.2	0.011	45.64	0.000	0.85	23.94	69.58	40.32	29.3	0.35
75.0	19.2	0.010	46.53	0.000	0.87	25.65	72.18	43.20	29.0	0.35
80.0	18.4	0.010	47.37	0.000	0.88	27.36	74.73	46.08	28.6	0.35
85.0	17.6	0.009	48.16	0.000	0.90	29.07	77.23	48.97	28.3	0.34
90.0	16.8	0.009	48.91	0.000	0.91	30.78	79.69	51.85	27.8	0.34
95.0	16.2	0.009	49.62	0.000	0.92	32.49	82.11	54.73	27.4	0.33
100.0	15.6	0.008	50.30	0.000	0.94	34.20	84.50	57.61	26.9	0.32
105.0	15.0	0.008	50.95	0.000	0.95	35.91	86.86	60.49	26.4	0.32
110.0	14.5	0.008	51.57	0.000	0.96	37.62	89.19	63.37	25.8	0.31
115.0	14.1	0.008	52.17	0.000	0.97	39.33	91.50	66.25	25.3	0.30
120.0	13.6	0.007	52.75	0.000	0.98	41.04	93.79	69.13	24.7	0.30
125.0	13.2	0.007	53.30	0.000	0.99	42.75	96.05	72.01	24.0	0.29
130.0	12.8	0.007	53.84	0.000	1.00	44.46	98.30	74.89	23.4	0.28
135.0	12.5	0.007	54.35	0.000	1.01	46.17	100.52	77.77	22.8	0.27
140.0	12.1	0.007	54.86	0.000	1.02	47.88	102.74	80.65	22.1	0.27
145.0	11.8	0.006	55.34	0.000	1.03	49.59	104.93	83.53	21.4	0.26
150.0	11.5	0.006	55.81	0.000	1.04	51.30	107.11	86.41	20.7	0.25
155.0	11.3	0.006	56.27	0.000	1.05	53.01	109.28	89.29	20.0	0.24
160.0	11.0	0.006	56.72	0.000	1.06	54.72	111.44	92.17	19.3	0.23
165.0	10.7	0.006	57.15	0.000	1.06	56.43	113.58	95.05	18.5	0.22
170.0	10.5	0.006	57.58	0.000	1.07	58.14	115.72	97.93	17.8	0.21
175.0	10.3	0.006	57.99	0.000	1.08	59.85	117.84	100.81	17.0	0.21
180.0	10.1	0.005	58.39	0.000	1.09	61.56	119.95	103.69	16.3	0.20
185.0	9.9	0.005	58.78	0.000	1.09	63.27	122.05	106.57	15.5	0.19
190.0	9.7	0.005	59.17	0.000	1.10	64.98	124.15	109.45	14.7	0.18
195.0	9.5	0.005	59.54	0.000	1.11	66.69	126.23	112.33	13.9	0.17
200.0	9.3	0.005	59.91	0.000	1.11	68.40	128.31	115.21	13.1	0.16
205.0	9.1	0.005	60.27	0.000	1.12	70.11	130.38	118.09	12.3	0.15
210.0	9.0	0.005	60.62	0.000	1.13	71.82	132.44	120.97	11.5	0.14
215.0	8.8	0.005	60.97	0.000	1.13	73.53	134.50	123.85	10.6	0.13
220.0	8.6	0.005	61.31	0.000	1.14	75.24	136.55	126.73	9.8	0.12
225.0	8.5	0.005	61.64	0.000	1.15	76.95	138.59	129.61	9.0	0.11
230.0	8.4	0.004	61.97	0.000	1.15	78.66	140.63	132.49	8.1	0.10
235.0	8.2	0.004	62.29	0.000	1.16	80.37	142.66	135.37	7.3	0.09
240.0	8.1	0.004	62.60	0.000	1.16	82.08	144.68	138.25	6.4	0.08
245.0	8.0	0.004	62.91	0.000	1.17	83.79	146.70	141.13	5.6	0.07
250.0	7.8	0.004	63.21	0.000	1.18	85.50	148.71	144.02	4.7	0.06
255.0	7.7	0.004	63.51	0.000	1.18	87.21	150.72	146.90	3.8	0.05
260.0	7.6	0.004	63.81	0.000	1.19	88.92	152.73	149.78	2.9	0.04
265.0	7.5	0.004	64.09	0.000	1.19	90.63	154.72	152.66	2.1	0.02
270.0	7.4	0.004	64.38	0.000	1.20	92.34	156.72	155.54	1.2	0.01

Modified Rational Method - Five Year Storm
Site Flow and Storage Summary - towards Old Lakeshore Road
2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road
File No. UD18-050

Drainage Area A1 Post

Rooftops / Terraces / Outdoor Amenity Area/Loading Area (AD10-14, DAD2)- Controlled In SouthTank

Area (A1) = **0.215** ha
"C" = **0.90**
AC1 = **0.19**
Tc = **10** min
Time Increment = **5.0** min

Max. Release Rate = **47.4** L/s

Drainage Area A2 Post

Uncontrolled Site Area towards Old Lakeshore Road

Area (A2) = **0.002** ha
"C" = **0.90**
AC2= **0.002**
Tc = **10.0** min
Time Increment = **5.0** min

Max. Release Rate = **0.6** L/s

Groundwater Dewatering

Punm Peak Flow Rate = **5.70** L/s

Total Site

Total Site = A1+A2+ Groundwater Dewatering

2-yr A1, A2 Pre-Development Site Release Rate = **18.9** L/s

Controlled Release Rate = **10.8** L/s

Uncontrolled Flow (A2) 0.6 L/s

Total Site Release Rate Achieved = **11.4** L/s

Max. Storage Tank-1 Size = **37.4** m^3

Stor. Tank footpring Area = **83.00** m^2

5 Year Design Storm

a=	697.40
c=	0.764
B=	5
I=	a/((Tc+B)^c)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(8)	(9)	(10)
Time	**Rainfall**	**Storm Runoff (A1 Post)**	**Runoff Volume (A1 Post)**	**Storm Runoff (A2 Post)**	**Runoff Volume (A2 Post)**	**Dewatering Volume**	**Total Storm Runoff Volume**	**Target Released Volume**	**Storage Volume**	**Storage Depth of Tank**
(min)	**Intensity (mm/hr)**	**(m^3/s)**	**(m^3)**	**(m^3/s)**	**(m^3)**	**(m3)**	**(m^3)**	**(m^3)**	**(m^3)**	
10.0	88.1	0.047	28.41	0.000	0.26	3.42	31.83	6.47	25.4	0.31
15.0	70.7	0.038	34.21	0.000	0.32	5.13	39.34	9.70	29.6	0.36
20.0	59.6	0.032	38.46	0.001	0.72	6.84	45.30	12.93	32.4	0.39
25.0	51.9	0.028	41.82	0.001	0.78	8.55	50.37	16.16	34.2	0.41
30.0	46.1	0.025	44.61	0.000	0.83	10.26	54.87	19.40	35.5	0.43
35.0	41.6	0.022	47.00	0.000	0.87	11.97	58.97	22.63	36.3	0.44
40.0	38.1	0.020	49.09	0.000	0.91	13.68	62.77	25.86	36.9	0.44
45.0	35.1	0.019	50.96	0.000	0.95	15.39	66.35	29.10	37.3	0.45
50.0	32.6	0.018	52.64	0.000	0.98	17.10	69.74	32.33	37.4	0.45
55.0	30.5	0.016	54.18	0.000	1.01	18.81	72.99	35.56	37.4	0.45
60.0	28.7	0.015	55.60	0.000	1.03	20.52	76.12	38.79	37.3	0.45
65.0	27.2	0.015	56.92	0.000	1.06	22.23	79.15	42.03	37.1	0.45
70.0	25.8	0.014	58.15	0.000	1.08	23.94	82.09	45.26	36.8	0.44
75.0	24.5	0.013	59.31	0.000	1.10	25.65	84.96	48.49	36.5	0.44
80.0	23.4	0.013	60.40	0.000	1.12	27.36	87.76	51.73	36.0	0.43
85.0	22.4	0.012	61.43	0.000	1.14	29.07	90.50	54.96	35.5	0.43
90.0	21.5	0.012	62.41	0.000	1.16	30.78	93.19	58.19	35.0	0.42
95.0	20.7	0.011	63.35	0.000	1.18	32.49	95.84	61.42	34.4	0.41
100.0	19.9	0.011	64.24	0.000	1.20	34.20	98.44	64.66	33.8	0.41
105.0	19.2	0.010	65.10	0.000	1.21	35.91	101.01	67.89	33.1	0.40
110.0	18.6	0.010	65.92	0.000	1.23	37.62	103.54	71.12	32.4	0.39
115.0	18.0	0.010	66.71	0.000	1.24	39.33	106.04	74.36	31.7	0.38
120.0	17.4	0.009	67.48	0.000	1.26	41.04	108.52	77.59	30.9	0.37
125.0	16.9	0.009	68.21	0.000	1.27	42.75	110.96	80.82	30.1	0.36
130.0	16.4	0.009	68.93	0.000	1.28	44.46	113.39	84.05	29.3	0.35
135.0	16.0	0.009	69.62	0.000	1.30	46.17	115.79	87.29	28.5	0.34
140.0	15.6	0.008	70.28	0.000	1.31	47.88	118.16	90.52	27.6	0.33
145.0	15.2	0.008	70.93	0.000	1.32	49.59	120.52	93.75	26.8	0.32
150.0	14.8	0.008	71.56	0.000	1.33	51.30	122.86	96.99	25.9	0.31
155.0	14.4	0.008	72.18	0.000	1.34	53.01	125.19	100.22	25.0	0.30
160.0	14.1	0.008	72.77	0.000	1.35	54.72	127.49	103.45	24.0	0.29
165.0	13.8	0.007	73.36	0.000	1.36	56.43	129.79	106.68	23.1	0.28
170.0	13.5	0.007	73.92	0.000	1.38	58.14	132.06	109.92	22.1	0.27
175.0	13.2	0.007	74.48	0.000	1.39	59.85	134.33	113.15	21.2	0.26
180.0	12.9	0.007	75.02	0.000	1.40	61.56	136.58	116.38	20.2	0.24
185.0	12.7	0.007	75.55	0.000	1.41	63.27	138.82	119.62	19.2	0.23
190.0	12.4	0.007	76.06	0.000	1.42	64.98	141.04	122.85	18.2	0.22
195.0	12.2	0.007	76.57	0.000	1.42	66.69	143.26	126.08	17.2	0.21
200.0	11.9	0.006	77.07	0.000	1.43	68.40	145.47	129.31	16.2	0.19
205.0	11.7	0.006	77.55	0.000	1.44	70.11	147.66	132.55	15.1	0.18
210.0	11.5	0.006	78.03	0.000	1.45	71.82	149.85	135.78	14.1	0.17
215.0	11.3	0.006	78.49	0.000	1.46	73.53	152.02	139.01	13.0	0.16
220.0	11.1	0.006	78.95	0.000	1.47	75.24	154.19	142.25	11.9	0.14
225.0	10.9	0.006	79.40	0.000	1.48	76.95	156.35	145.48	10.9	0.13
230.0	10.8	0.006	79.84	0.000	1.49	78.66	158.50	148.71	9.8	0.12
235.0	10.6	0.006	80.28	0.000	1.49	80.37	160.65	151.94	8.7	0.10
240.0	10.4	0.006	80.70	0.000	1.50	82.08	162.78	155.18	7.6	0.09
245.0	10.3	0.006	81.12	0.000	1.51	83.79	164.91	158.41	6.5	0.08
250.0	10.1	0.005	81.54	0.000	1.52	85.50	167.04	161.64	5.4	0.06
255.0	10.0	0.005	81.94	0.000	1.52	87.21	169.15	164.88	4.3	0.05
260.0	9.8	0.005	82.34	0.000	1.53	88.92	171.26	168.11	3.2	0.04
265.0	9.7	0.005	82.74	0.000	1.54	90.63	173.37	171.34	2.0	0.02
270.0	9.5	0.005	83.12	0.000	1.55	92.34	175.46	174.57	0.9	0.01

Modified Rational Method - Hundred Year Storm
Site Flow and Storage Summary - towards Old Lakeshore Road
2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road

Drainage Area A1 Post

Rooftops / Terraces / Outdoor Amenity Area (AD11-14, DAD2)- Controlled In Tank 1

Area (A1) = **0.215** ha
"C" = **0.90**
AC1 = **0.19**
Tc = **10** min
Time Increment = **5.0** min

Max. Release Rate = **76.3** L/s

Drainage Area A2 Post

Uncontrolled Site Area towards Old Lakeshore Road

Area (A2) = **0.002** ha
"C" = **0.90**
AC2= **0.002**
Tc = **10.0** min
Time Increment = **5.0** min

Max. Release Rate = **1.0** L/s

Groundwater Dewatering

Punm Peak Flow Rate = **5.70** L/s

Total Site

Total Site = A1+A2+ Groundwater Dewatering

2-yr A1, A2 Pre-Development Site Release Rate = **18.9** L/s

Controlled Release Rate = **13.8** L/s

Uncontrolled Flow (A2) 1.0 L/s

Total Site Release Rate Achieved = **14.7** L/s

Max. Storage Tank-1 Size = **61.0** m^3
Stor. Tank footpring Area = **83.0** m^2

100 Year Design Storm

a=	1114.20
c=	0.761
B=	5
I=	a/((Tc+B)^c)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Time	**Rainfall**	**Storm Runoff (A1 Post)**	**Runoff Volume (A1 Post)**	**Storm Runoff (A2 Post)**	**Runoff Volume (A2 Post)**	**Dewatering Volume**	**Total Storm Runoff Volume**	**Target Released Volume**	**Storage Volume**	**Storage Depth of Tank**
(min)	**Intensity (mm/hr)**	**(m^3/s)**	**(m^3)**	**(m^3/s)**	**(m^3)**	**(m3)**	**(m^3)**	**(m^3)**	**(m^3)**	
10.0	141.9	0.076	45.76	0.001	0.43	3.42	49.18	8.26	40.9	0.49
15.0	114.0	0.061	55.14	0.001	0.51	5.13	60.27	12.39	47.9	0.58
20.0	96.2	0.052	62.04	0.001	1.15	6.84	68.88	16.51	52.4	0.63
25.0	83.7	0.045	67.51	0.001	1.26	8.55	76.06	20.64	55.4	0.67
30.0	74.5	0.040	72.04	0.001	1.34	10.26	82.30	24.77	57.5	0.69
35.0	67.3	0.036	75.93	0.001	1.41	11.97	87.90	28.90	59.0	0.71
40.0	61.5	0.033	79.33	0.001	1.48	13.68	93.01	33.03	60.0	0.72
45.0	56.8	0.031	82.37	0.001	1.53	15.39	97.76	37.16	60.6	0.73
50.0	52.8	0.028	85.12	0.001	1.58	17.10	102.22	41.28	60.9	0.73
55.0	49.4	0.027	87.64	0.000	1.63	18.81	106.45	45.41	61.0	0.74
60.0	46.5	0.025	89.95	0.000	1.67	20.52	110.47	49.54	60.9	0.73
65.0	43.9	0.024	92.11	0.000	1.71	22.23	114.34	53.67	60.7	0.73
70.0	41.7	0.022	94.12	0.000	1.75	23.94	118.06	57.80	60.3	0.73
75.0	39.7	0.021	96.01	0.000	1.79	25.65	121.66	61.93	59.7	0.72
80.0	37.9	0.020	97.79	0.000	1.82	27.36	125.15	66.06	59.1	0.71
85.0	36.3	0.020	99.48	0.000	1.85	29.07	128.55	70.18	58.4	0.70
90.0	34.8	0.019	101.09	0.000	1.88	30.78	131.87	74.31	57.6	0.69
95.0	33.5	0.018	102.62	0.000	1.91	32.49	135.11	78.44	56.7	0.68
100.0	32.3	0.017	104.08	0.000	1.94	34.20	138.28	82.57	55.7	0.67
105.0	31.2	0.017	105.48	0.000	1.96	35.91	141.39	86.70	54.7	0.66
110.0	30.1	0.016	106.83	0.000	1.99	37.62	144.45	90.83	53.6	0.65
115.0	29.2	0.016	108.13	0.000	2.01	39.33	147.46	94.95	52.5	0.63
120.0	28.3	0.015	109.38	0.000	2.03	41.04	150.42	99.08	51.3	0.62
125.0	27.4	0.015	110.58	0.000	2.06	42.75	153.33	103.21	50.1	0.60
130.0	26.7	0.014	111.75	0.000	2.08	44.46	156.21	107.34	48.9	0.59
135.0	25.9	0.014	112.88	0.000	2.10	46.17	159.05	111.47	47.6	0.57
140.0	25.2	0.014	113.98	0.000	2.12	47.88	161.86	115.60	46.3	0.56
145.0	24.6	0.013	115.04	0.000	2.14	49.59	164.63	119.73	44.9	0.54
150.0	24.0	0.013	116.08	0.000	2.16	51.30	167.38	123.85	43.5	0.52
155.0	23.4	0.013	117.08	0.000	2.18	53.01	170.09	127.98	42.1	0.51
160.0	22.9	0.012	118.06	0.000	2.20	54.72	172.78	132.11	40.7	0.49
165.0	22.4	0.012	119.02	0.000	2.21	56.43	175.45	136.24	39.2	0.47
170.0	21.9	0.012	119.95	0.000	2.23	58.14	178.09	140.37	37.7	0.45
175.0	21.4	0.012	120.86	0.000	2.25	59.85	180.71	144.50	36.2	0.44
180.0	21.0	0.011	121.74	0.000	2.27	61.56	183.30	148.62	34.7	0.42
185.0	20.6	0.011	122.61	0.000	2.28	63.27	185.88	152.75	33.1	0.40
190.0	20.1	0.011	123.46	0.000	2.30	64.98	188.44	156.88	31.6	0.38
195.0	19.8	0.011	124.29	0.000	2.31	66.69	190.98	161.01	30.0	0.36
200.0	19.4	0.010	125.11	0.000	2.33	68.40	193.51	165.14	28.4	0.34
205.0	19.0	0.010	125.90	0.000	2.34	70.11	196.01	169.27	26.7	0.32
210.0	18.7	0.010	126.69	0.000	2.36	71.82	198.51	173.40	25.1	0.30
215.0	18.4	0.010	127.45	0.000	2.37	73.53	200.98	177.52	23.5	0.28
220.0	18.1	0.010	128.20	0.000	2.39	75.24	203.44	181.65	21.8	0.26
225.0	17.8	0.010	128.94	0.000	2.40	76.95	205.89	185.78	20.1	0.24
230.0	17.5	0.009	129.67	0.000	2.41	78.66	208.33	189.91	18.4	0.22
235.0	17.2	0.009	130.38	0.000	2.43	80.37	210.75	194.04	16.7	0.20
240.0	16.9	0.009	131.08	0.000	2.44	82.08	213.16	198.17	15.0	0.18
245.0	16.7	0.009	131.77	0.000	2.45	83.79	215.56	202.29	13.3	0.16
250.0	16.4	0.009	132.45	0.000	2.46	85.50	217.95	206.42	11.5	0.14
255.0	16.2	0.009	133.12	0.000	2.48	87.21	220.33	210.55	9.8	0.12
260.0	16.0	0.009	133.78	0.000	2.49	88.92	222.70	214.68	8.0	0.10
265.0	15.7	0.008	134.42	0.000	2.50	90.63	225.05	218.81	6.2	0.08
270.0	15.5	0.008	135.06	0.000	2.51	92.34	227.40	222.94	4.5	0.05

Orifice Design

2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road

File No. UD18-050

Date: September 2020

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

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

Towards Old Lakeshore Road

Orifice Equation for 75 mm Tube

$$Q = C \times A \times \sqrt{2 \times g \times h}$$

100 yr event			**5 yr event**			**2 yr event**		
d=	75	mm	d=	75	mm	d=	75	mm
C=	0.82		C=	0.82		C=	0.82	
A=	0.004	m^2	A=	0.004	m^2	A=	0.004	m^2
g=	9.81	m/s^2	g=	9.81	m/s^2	g=	9.81	m/s^2
h=	0.74	m	h=	0.45	m	h=	0.36	m
Q=	**13.8**	**L/s**	**Q=**	**10.8**	**L/s**	**Q=**	**9.6**	**L/s**

Modified Rational Method - Two Year Storm
Site Flow and Storage Summary - towards Lakeshore Road
2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road
File No. UD18-050

Drainage Area A3 Post

Outdoor Amenity Area / North Driveway Area (AD1-9, DAD1, trench drain 1) - Controlled in North Tank

Area (A3) =	**0.102**	ha
"C" =	**0.90**	
AC3=	**0.09**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**17.4**	L/s

Drainage Area A4 Post

Uncontrolled Site Area towards Lakeshore Road

Area (A4) =	**0.006**	ha
"C" =	**0.90**	
AC4=	**0.01**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**1.0**	L/s

Total Site

Total Site = A3+A4

2-yr A3 Pre-Development Site Release Rate =	**11.9**	L/s
Controlled Release Rate =	**5.3**	L/s
Uncontrolled Flow (A4)	1.0	L/s
Total Site Release Rate Achieved =	**6.3**	L/s
Max. Storage Tank-2 Size =	**7.9**	m^3
Stor. Tank footpring Area =	**70.00**	m^2

2 Year Design Storm

a=	592.60
c=	0.780
B=	6
I=	a/((Tc+B)^c)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Time	**Rainfall Intensity**	**Storm Runoff (A3 Post)**	**Runoff Volume (A3 Post)**	**Storm Runoff (A4 Post)**	**Runoff Volume (A4 Post)**	**Total Storm Runoff Volume**	**Target Release Volume**	**Storage Volume**	**Storage Depth of Tank**
(min)	**(mm/hr)**	**(m^3/s)**	**(m^3)**	**(m^3/s)**	**(m^3)**	**(m^3)**	**(m^3)**	**(m^3)**	
10.0	68.2	0.017	10.43	0.001	0.61	10.43	3.19	7.2	0.10
15.0	55.1	0.014	12.65	0.001	0.74	12.65	4.79	7.9	0.11
20.0	46.7	0.012	14.28	0.001	0.84	14.28	6.39	7.9	0.11
25.0	40.7	0.010	15.56	0.001	0.92	15.56	7.98	7.6	0.11
30.0	36.2	0.009	16.62	0.001	0.98	16.62	9.58	7.0	0.10
35.0	32.7	0.008	17.52	0.000	1.03	17.52	11.18	6.3	0.09
40.0	29.9	0.008	18.30	0.000	1.08	18.30	12.77	5.5	0.08
45.0	27.6	0.007	19.00	0.000	1.12	19.00	14.37	4.6	0.07
50.0	25.7	0.007	19.63	0.000	1.15	19.63	15.97	3.7	0.05
55.0	24.0	0.006	20.20	0.000	1.19	20.20	17.56	2.6	0.04
60.0	22.6	0.006	20.72	0.000	1.22	20.72	19.16	1.6	0.02
65.0	21.3	0.005	21.20	0.000	1.25	21.20	20.76	0.4	0.01
70.0	20.2	0.005	21.65	0.000	1.27	21.65	22.35	0.0	0.00
75.0	19.2	0.005	22.07	0.000	1.30	22.07	23.95	0.0	0.00
80.0	18.4	0.005	22.47	0.000	1.32	22.47	25.55	0.0	0.00
85.0	17.6	0.004	22.85	0.000	1.34	22.85	27.14	0.0	0.00
90.0	16.8	0.004	23.20	0.000	1.36	23.20	28.74	0.0	0.00
95.0	16.2	0.004	23.54	0.000	1.38	23.54	30.34	0.0	0.00
100.0	15.6	0.004	23.86	0.000	1.40	23.86	31.93	0.0	0.00
105.0	15.0	0.004	24.17	0.000	1.42	24.17	33.53	0.0	0.00
110.0	14.5	0.004	24.47	0.000	1.44	24.47	35.12	0.0	0.00
115.0	14.1	0.004	24.75	0.000	1.46	24.75	36.72	0.0	0.00
120.0	13.6	0.003	25.02	0.000	1.47	25.02	38.32	0.0	0.00
125.0	13.2	0.003	25.29	0.000	1.49	25.29	39.91	0.0	0.00
130.0	12.8	0.003	25.54	0.000	1.50	25.54	41.51	0.0	0.00
135.0	12.5	0.003	25.79	0.000	1.52	25.79	43.11	0.0	0.00
140.0	12.1	0.003	26.02	0.000	1.53	26.02	44.70	0.0	0.00
145.0	11.8	0.003	26.26	0.000	1.54	26.26	46.30	0.0	0.00
150.0	11.5	0.003	26.48	0.000	1.56	26.48	47.90	0.0	0.00
155.0	11.3	0.003	26.70	0.000	1.57	26.70	49.49	0.0	0.00
160.0	11.0	0.003	26.91	0.000	1.58	26.91	51.09	0.0	0.00
165.0	10.7	0.003	27.11	0.000	1.59	27.11	52.69	0.0	0.00
170.0	10.5	0.003	27.32	0.000	1.61	27.32	54.28	0.0	0.00
175.0	10.3	0.003	27.51	0.000	1.62	27.51	55.88	0.0	0.00
180.0	10.1	0.003	27.70	0.000	1.63	27.70	57.48	0.0	0.00
185.0	9.9	0.003	27.89	0.000	1.64	27.89	59.07	0.0	0.00
190.0	9.7	0.002	28.07	0.000	1.65	28.07	60.67	0.0	0.00
195.0	9.5	0.002	28.25	0.000	1.66	28.25	62.27	0.0	0.00
200.0	9.3	0.002	28.42	0.000	1.67	28.42	63.86	0.0	0.00
205.0	9.1	0.002	28.59	0.000	1.68	28.59	65.46	0.0	0.00
210.0	9.0	0.002	28.76	0.000	1.69	28.76	67.06	0.0	0.00
215.0	8.8	0.002	28.92	0.000	1.70	28.92	68.65	0.0	0.00
220.0	8.6	0.002	29.09	0.000	1.71	29.09	70.25	0.0	0.00
225.0	8.5	0.002	29.24	0.000	1.72	29.24	71.85	0.0	0.00
230.0	8.4	0.002	29.40	0.000	1.73	29.40	73.44	0.0	0.00
235.0	8.2	0.002	29.55	0.000	1.74	29.55	75.04	0.0	0.00
240.0	8.1	0.002	29.70	0.000	1.75	29.70	76.64	0.0	0.00
245.0	8.0	0.002	29.85	0.000	1.76	29.85	78.23	0.0	0.00
250.0	7.8	0.002	29.99	0.000	1.76	29.99	79.83	0.0	0.00
255.0	7.7	0.002	30.13	0.000	1.77	30.13	81.43	0.0	0.00
260.0	7.6	0.002	30.27	0.000	1.78	30.27	83.02	0.0	0.00
265.0	7.5	0.002	30.41	0.000	1.79	30.41	84.62	0.0	0.00
270.0	7.4	0.002	30.54	0.000	1.80	30.54	86.22	0.0	0.00

Lithos

Modified Rational Method - Five Year Storm
Site Flow and Storage Summary - towards Lakeshore Road
2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road
File No. UD18-050

Drainage Area A3 Post

Outdoor Amenity Area / North Driveway Area (AD1-9, DAD1, trench drain 1) - Controlled in North Tank

Area (A3) = **0.102** ha
"C" = **0.90**
AC3= **0.09**
Tc = **10.0** min
Time Increment = **5.0** min
Max. Release Rate = **22.5** L/s

Drainage Area A4 Post

Uncontrolled Site Area towards Lakeshore Road

Area (A4) = **0.006** ha
"C" = **0.90**
AC4= **0.01**
Tc = **10.0** min
Time Increment = **5.0** min
Max. Release Rate = **1.3** L/s

Total Site

Total Site = A3+A4

2-yr A3 Pre-Development Site Release Rate = **11.9** L/s

Controlled Release Rate = **6.2** L/s

Uncontrolled Flow (A4) 1.3 L/s

Total Site Release Rate Achieved = **7.5** L/s

Max. Storage Tank-2 Size = **10.8** m^3

Stor. Tank footpring Area = **70.00** m^2

5 Year Design Storm

a=	697.40
c=	0.764
B=	5
I=	a/((Tc+B)^c)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Time	**Rainfall Intensity**	**Storm Runoff (A3 Post)**	**Runoff Volume (A3 Post)**	**Storm Runoff (A4 Post)**	**Runoff Volume (A4 Post)**	**Total Storm Runoff Volume**	**Target Release Volume**	**Storage Volume**	**Storage Depth of Tank**
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3)	(m^3)	(m^3)	
10.0	88.1	0.022	13.48	0.001	0.79	13.48	3.73	9.7	0.14
15.0	70.7	0.018	16.23	0.001	0.95	16.23	5.59	10.6	0.15
20.0	59.6	0.015	18.25	0.001	1.07	18.25	7.46	10.8	0.15
25.0	51.9	0.013	19.84	0.001	1.17	19.84	9.32	10.5	0.15
30.0	46.1	0.012	21.17	0.001	1.25	21.17	11.19	10.0	0.14
35.0	41.6	0.011	22.30	0.001	1.31	22.30	13.05	9.2	0.13
40.0	38.1	0.010	23.29	0.001	1.37	23.29	14.92	8.4	0.12
45.0	35.1	0.009	24.18	0.001	1.42	24.18	16.78	7.4	0.11
50.0	32.6	0.008	24.98	0.000	1.47	24.98	18.64	6.3	0.09
55.0	30.5	0.008	25.71	0.000	1.51	25.71	20.51	5.2	0.07
60.0	28.7	0.007	26.38	0.000	1.55	26.38	22.37	4.0	0.06
65.0	27.2	0.007	27.00	0.000	1.59	27.00	24.24	2.8	0.04
70.0	25.8	0.007	27.59	0.000	1.62	27.59	26.10	1.5	0.02
75.0	24.5	0.006	28.14	0.000	1.66	28.14	27.97	0.2	0.00
80.0	23.4	0.006	28.65	0.000	1.69	28.65	29.83	0.0	0.00
85.0	22.4	0.006	29.14	0.000	1.71	29.14	31.70	0.0	0.00
90.0	21.5	0.005	29.61	0.000	1.74	29.61	33.56	0.0	0.00
95.0	20.7	0.005	30.05	0.000	1.77	30.05	35.42	0.0	0.00
100.0	19.9	0.005	30.48	0.000	1.79	30.48	37.29	0.0	0.00
105.0	19.2	0.005	30.88	0.000	1.82	30.88	39.15	0.0	0.00
110.0	18.6	0.005	31.27	0.000	1.84	31.27	41.02	0.0	0.00
115.0	18.0	0.005	31.65	0.000	1.86	31.65	42.88	0.0	0.00
120.0	17.4	0.004	32.01	0.000	1.88	32.01	44.75	0.0	0.00
125.0	16.9	0.004	32.36	0.000	1.90	32.36	46.61	0.0	0.00
130.0	16.4	0.004	32.70	0.000	1.92	32.70	48.47	0.0	0.00
135.0	16.0	0.004	33.03	0.000	1.94	33.03	50.34	0.0	0.00
140.0	15.6	0.004	33.34	0.000	1.96	33.34	52.20	0.0	0.00
145.0	15.2	0.004	33.65	0.000	1.98	33.65	54.07	0.0	0.00
150.0	14.8	0.004	33.95	0.000	2.00	33.95	55.93	0.0	0.00
155.0	14.4	0.004	34.24	0.000	2.01	34.24	57.80	0.0	0.00
160.0	14.1	0.004	34.53	0.000	2.03	34.53	59.66	0.0	0.00
165.0	13.8	0.004	34.80	0.000	2.05	34.80	61.53	0.0	0.00
170.0	13.5	0.003	35.07	0.000	2.06	35.07	63.39	0.0	0.00
175.0	13.2	0.003	35.33	0.000	2.08	35.33	65.25	0.0	0.00
180.0	12.9	0.003	35.59	0.000	2.09	35.59	67.12	0.0	0.00
185.0	12.7	0.003	35.84	0.000	2.11	35.84	68.98	0.0	0.00
190.0	12.4	0.003	36.09	0.000	2.12	36.09	70.85	0.0	0.00
195.0	12.2	0.003	36.33	0.000	2.14	36.33	72.71	0.0	0.00
200.0	11.9	0.003	36.56	0.000	2.15	36.56	74.58	0.0	0.00
205.0	11.7	0.003	36.79	0.000	2.16	36.79	76.44	0.0	0.00
210.0	11.5	0.003	37.02	0.000	2.18	37.02	78.31	0.0	0.00
215.0	11.3	0.003	37.24	0.000	2.19	37.24	80.17	0.0	0.00
220.0	11.1	0.003	37.46	0.000	2.20	37.46	82.03	0.0	0.00
225.0	10.9	0.003	37.67	0.000	2.22	37.67	83.90	0.0	0.00
230.0	10.8	0.003	37.88	0.000	2.23	37.88	85.76	0.0	0.00
235.0	10.6	0.003	38.09	0.000	2.24	38.09	87.63	0.0	0.00
240.0	10.4	0.003	38.29	0.000	2.25	38.29	89.49	0.0	0.00
245.0	10.3	0.003	38.49	0.000	2.26	38.49	91.36	0.0	0.00
250.0	10.1	0.003	38.68	0.000	2.28	38.68	93.22	0.0	0.00
255.0	10.0	0.003	38.88	0.000	2.29	38.88	95.09	0.0	0.00
260.0	9.8	0.003	39.06	0.000	2.30	39.06	96.95	0.0	0.00
265.0	9.7	0.002	39.25	0.000	2.31	39.25	98.81	0.0	0.00
270.0	9.5	0.002	39.44	0.000	2.32	39.44	100.68	0.0	0.00

Modified Rational Method - Hundred Year Storm
Site Flow and Storage Summary - towards Lakeshore Road
2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road
File No. UD18-050

Drainage Area A3 Post

Outdoor Amenity Area / Driveway Area (AD1-10, DAD1, trench drain 1) - Controlled in North Tank

Area (A3) =	**0.102**	ha
"C" =	**0.90**	
AC3=	**0.09**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**36.2**	L/s

Drainage Area A4 Post

Uncontrolled Site Area towards Lakeshore Road

Area (A4) =	**0.006**	ha
"C" =	**0.90**	
AC4=	**0.01**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**2.1**	L/s

Total Site

Total Site = A3+A4

2-yr A3 Pre-Development Site Release Rate =	**11.9**	L/s
Controlled Release Rate =	**8.4**	L/s
Uncontrolled Flow (A4)	2.1	L/s
Total Site Release Rate Achieved =	**10.6**	L/s
Max. Storage Tank-2 Size =	**19.4**	m^3
Stor. Tank footpring Area =	**70.00**	m^2

100 Year Design Storm	
a=	1114.20
c=	0.761
B=	5
I=	a/((Tc+B)^c)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Time (min)	**Rainfall Intensity** (mm/hr)	**Storm Runoff (A3 Post)** (m^3/s)	**Runoff Volume (A3 Post)** (m^3)	**Storm Runoff (A4 Post)** (m^3/s)	**Runoff Volume (A4 Post)** (m^3)	**Total Storm Runoff Volume** (m^3)	**Target Released Volume** (m^3)	**Storage Volume** (m^3)	**Storage Depth of Tank**
10.0	141.9	0.036	21.71	0.002	1.28	21.71	5.07	16.6	0.24
15.0	114.0	0.029	26.16	0.002	1.54	26.16	7.60	18.6	0.27
20.0	96.2	0.025	29.43	0.001	1.73	29.43	10.13	19.3	0.28
25.0	83.7	0.021	32.03	0.001	1.88	32.03	12.67	19.4	0.28
30.0	74.5	0.019	34.18	0.001	2.01	34.18	15.20	19.0	0.27
35.0	67.3	0.017	36.02	0.001	2.12	36.02	17.74	18.3	0.26
40.0	61.5	0.016	37.64	0.001	2.21	37.64	20.27	17.4	0.25
45.0	56.8	0.014	39.08	0.001	2.30	39.08	22.80	16.3	0.23
50.0	52.8	0.013	40.38	0.001	2.38	40.38	25.34	15.0	0.21
55.0	49.4	0.013	41.58	0.001	2.45	41.58	27.87	13.7	0.20
60.0	46.5	0.012	42.68	0.001	2.51	42.68	30.40	12.3	0.18
65.0	43.9	0.011	43.70	0.001	2.57	43.70	32.94	10.8	0.15
70.0	41.7	0.011	44.65	0.001	2.63	44.65	35.47	9.2	0.13
75.0	39.7	0.010	45.55	0.001	2.68	45.55	38.00	7.5	0.11
80.0	37.9	0.010	46.39	0.001	2.73	46.39	40.54	5.9	0.08
85.0	36.3	0.009	47.19	0.001	2.78	47.19	43.07	4.1	0.06
90.0	34.8	0.009	47.96	0.001	2.82	47.96	45.60	2.4	0.03
95.0	33.5	0.009	48.68	0.001	2.86	48.68	48.14	0.5	0.01
100.0	32.3	0.008	49.38	0.000	2.90	49.38	50.67	0.0	0.00
105.0	31.2	0.008	50.04	0.000	2.94	50.04	53.21	0.0	0.00
110.0	30.1	0.008	50.68	0.000	2.98	50.68	55.74	0.0	0.00
115.0	29.2	0.007	51.30	0.000	3.02	51.30	58.27	0.0	0.00
120.0	28.3	0.007	51.89	0.000	3.05	51.89	60.81	0.0	0.00
125.0	27.4	0.007	52.46	0.000	3.09	52.46	63.34	0.0	0.00
130.0	26.7	0.007	53.02	0.000	3.12	53.02	65.87	0.0	0.00
135.0	25.9	0.007	53.55	0.000	3.15	53.55	68.41	0.0	0.00
140.0	25.2	0.006	54.07	0.000	3.18	54.07	70.94	0.0	0.00
145.0	24.6	0.006	54.58	0.000	3.21	54.58	73.47	0.0	0.00
150.0	24.0	0.006	55.07	0.000	3.24	55.07	76.01	0.0	0.00
155.0	23.4	0.006	55.55	0.000	3.27	55.55	78.54	0.0	0.00
160.0	22.9	0.006	56.01	0.000	3.29	56.01	81.07	0.0	0.00
165.0	22.4	0.006	56.46	0.000	3.32	56.46	83.61	0.0	0.00
170.0	21.9	0.006	56.91	0.000	3.35	56.91	86.14	0.0	0.00
175.0	21.4	0.005	57.34	0.000	3.37	57.34	88.68	0.0	0.00
180.0	21.0	0.005	57.76	0.000	3.40	57.76	91.21	0.0	0.00
185.0	20.6	0.005	58.17	0.000	3.42	58.17	93.74	0.0	0.00
190.0	20.1	0.005	58.57	0.000	3.45	58.57	96.28	0.0	0.00
195.0	19.8	0.005	58.97	0.000	3.47	58.97	98.81	0.0	0.00
200.0	19.4	0.005	59.35	0.000	3.49	59.35	101.34	0.0	0.00
205.0	19.0	0.005	59.73	0.000	3.51	59.73	103.88	0.0	0.00
210.0	18.7	0.005	60.10	0.000	3.54	60.10	106.41	0.0	0.00
215.0	18.4	0.005	60.47	0.000	3.56	60.47	108.94	0.0	0.00
220.0	18.1	0.005	60.82	0.000	3.58	60.82	111.48	0.0	0.00
225.0	17.8	0.005	61.17	0.000	3.60	61.17	114.01	0.0	0.00
230.0	17.5	0.004	61.52	0.000	3.62	61.52	116.55	0.0	0.00
235.0	17.2	0.004	61.86	0.000	3.64	61.86	119.08	0.0	0.00
240.0	16.9	0.004	62.19	0.000	3.66	62.19	121.61	0.0	0.00
245.0	16.7	0.004	62.52	0.000	3.68	62.52	124.15	0.0	0.00
250.0	16.4	0.004	62.84	0.000	3.70	62.84	126.68	0.0	0.00
255.0	16.2	0.004	63.15	0.000	3.71	63.15	129.21	0.0	0.00
260.0	16.0	0.004	63.47	0.000	3.73	63.47	131.75	0.0	0.00
265.0	15.7	0.004	63.77	0.000	3.75	63.77	134.28	0.0	0.00
270.0	15.5	0.004	64.07	0.000	3.77	64.07	136.81	0.0	0.00

Lithos

Orifice Design

2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road

File No. UD18-050

Date: September 2020

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

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

Towards Lakeshore Road

Orifice Equation for 75 mm Tube

$$Q = C \times A \times \sqrt{2 \times g \times h}$$

100 yr event			**5 yr event**			**2 yr event**		
d=	75	mm	d=	75	mm	d=	75	mm
C=	0.82		C=	0.82		C=	0.82	
A=	0.004	m^2	A=	0.004	m^2	A=	0.004	m^2
g=	9.81	m/s^2	g=	9.81	m/s^2	g=	9.81	m/s^2
h=	0.28	m	h=	0.15	m	h=	0.11	m
Q=	**8.4**	**L/s**	**Q=**	**6.2**	**L/s**	**Q=**	**5.3**	**L/s**

APPENDIX D
Sanitary Data Analysis

SANITARY SEWER DESIGN SHEET

2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road

CITY OF BURLINGTON

LOCATION	RESIDENTIAL					COMMERCIAL		FLOW								SEWER DESIGN				
	SECTION AREA	NUMBER OF UNITS			SECTION POP.	COMM AREA	SECTION POP. @ 90 ppha	TOTAL ACCUM. POP.	AVERAGE RESIDENTIAL FLOW '@' 275 L/c/d	HARMON PEAKING FACTOR	RES. PEAK FLOW	AVERAGE RETAIL FLOW @ 247.5 L/c/d	TOTAL ACCUM. AREA	INFILT. @ 0.286 L/s/ha.	TOTAL DESIGN FLOW	PIPE LENGTH	PIPE DIA.	SLOPE	FULL FLOW CAPACITY n = 0.013	% of DESIG CAPACITY
		Single Fam. Dwell. @ 55 ppha	Semi-detached, duplex and 4-plex @ 100 ppha	Apartment (over 6 stories high) @ 285 ppha																
	(ha.)				(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
Existing Condition																				
Mixed-Use Development	0.325	0.009	0	0	0	0.055	5	5	0.00	4.48	0.01	0.014	0.325	0.093	**0.11**					
Proposed Condition																				
Mixed-Use Development	0.325	0	0	2.26	644	0.043	4	648	2.05	3.92	8.02	0.011	0.325	0.093	**8.13**	11.2	200	2.0%	46.38	17%
													Total Net Flow		**8.01**					

Residential Flow Rate - 275 litres/capita/day
Retail Flow Rate - 247.5 litres/capita/day
Infiltration - 0.286 L/ha
Peaking Factor = 1 + [14 / (4 + $P^{0.5}$)], P=Population in thousands
Site Area: 0.325 Ha

Lithos

Prepared by: John Pasalidis, P.E., M.A.Sc.
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.
Date: September 2020

Project: 2093-2101 Old Lakeshore Road and 2096-2100 Lakeshore Road
Project: PUD18-050
City of Burlington

Sheet 1 OF 1

APPENDIX E
Water Data Analysis

WATER DEMAND

2093-2101 Old Lakeshore Road and
2096-2100 Lakeshore Road

File No: UD18-050

Date: September 2020

Prepared by: John Pasalidis, P.Eng., 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

= 0.6 fire resistive construction

A = total floor area in sq.m. excluding basements, includes garage*

			Area Applied
Level 2=	1463.3	m^2	100%
Level 1=	1214.9	m^2	25%
Level 3=	1384.5	m^2	25%
=	2,113	sq.m.	

Note 1: The levels indicated, reference the floors with the largest areas (refer to building stats).

F = 6,067.91 L/min *F(No.1) = 220C √A*

F = 6,000 L/min *F(No.1) Round to nearest 1000 l/min*

2 Occupancy Reduction

25% reduction for non-combustible occupancy

F = 4500 L/min *F(No.2) = F(No.1) x occupancy reduction/charge(%)*

3 Sprinkler Reduction

30% Reduction for NFPA Sprinkler System

F = 3150 l/min *F(No.3) = F(No.2) x sprinkler reduction(%)*

4 Separation Charge

10%	East	20.1m to 30m
0%	North	Road
0%	South	Road
0%	West	Parking
10%	Total Separation Charge	

F = 450 L/min *F (No.4) = F(No.2) x separation charge(%)*

F = 3,600.00 L/min *F (tot) = F(No.3) + F(No.4)*

F = 4,000 L/min *F(tot) Round to nearest 1000 l/min*

66.67 L/s

F = 1057 US GPM

Domestic Flow Calculations

Residential Population = 644 from Sanitary Design Sheet

Commercial Population= 4 from Sanitary Design Sheet

Average Day Demand = 275 L/cap/day 1 US Gallon=3.785 L

= 2.06 L/s

= 33 US GPM 1 US GPM=15.852L/s

Max. Daily Demand Peaking Factor = 2.25

Max. Daily Demand = 4.64 L/s = 74 US GPM

or

Residential Max. Hourly Demand Peaking Factor = 4.00

Max. Hourly Demand = 8.25 L/s = 131 US GPM

Commercial Max. Hourly Demand Peaking Factor = 2.25

Max. Hourly Demand = 4.64 L/s

Max Daily Demand = 4.64 L/s

Fire Flow = 66.67 L/s

Required 'Design' Flow = 71.31 L/s

1130 US GPM

Note: Required 'Design' Flow is the maximum of either:

1) Fire Flow + Maximum Daily Demand
2) Maximum Hourly Demand

Lithos

WATER DEMAND

2093-2101 Old Lakeshore Road and
2096-2100 Lakeshore Road

File No: UD18-050

Date: September 2020

Prepared by: John Pasalidis, P.Eng., M.A.Sc.

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

Pressure Losses

Hazen-Williams Formula

$V = kCR_h^{0.63} x S^{0.54}$

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_W for partially flow)

Fire Fighting and Domestic Head Loss

Flow Requirements=	71.31	L/s
Diameter=	200	mm
Area=	3.14E-02	m^2
L=	4.90	m
V=	2.27	m/s
S=	2.16E-02	
R_h=	0.05	
H_f=	0.11	m
=	0.15	psi

Flow Test *(dated: November 28, 2018)*

when:	Static Pressure =	70	psi	Flow =	0	GPM	=	0.00 L/s
	Residual Pressure =	64	psi	Flow =	1462	GPM	=	92.23 L/s

Pressure (psi)	***Flow (L/s)***
70	0.00
64	92.23
65.4	***71.31***

Based on the Pressure/Flow relationship, we have to confirm that the flow requirement of 71.31 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 **20.45** psi (20.3+Hf)

Since the flow of 71.31 L/s required for the proposed development is provided in the existing watermain at 65.4 psi (which is more than the minimum of 20.45 psi), we anticipate that the existing watermain infrastructure can support the proposed development.

Flow available at 20psi = 4594 gpm = 289.84 L/s

$$Q_{avail} @ 20psi = Q_T ((P_S-P_A)/(P_S-P_R))^{0.54}$$
$$= 1462 \times ((70-20) / (70-64))^{0.54}$$
$$= 4594 \text{ gpm}$$

HYDRANT FLOW TEST FORM

Project No: 2018-0574 Date: 2018-11-28

Site Location: 2100 Lakeshore Rd Hydrants Opened by: Halton Public works

Burlington, ON Tested By: Glen.R, Mark.B

1) Required photos:

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

2) Test Data

Time of Test: 10:05 am

Location of Test: (Flow) First hydrant East of 2100 Lakeshore Rd Burlington

(Residual) On grass at 2100 Lakeshore Rd. Burlington ON

Main Size: —

Static Pressure: 70PSI

	Number of Outlets & Orifice Size	Pitot Pressure	Flow (USGPM)	Residual Pressure
1	1 x 2.5"	20	750	66
2	2 x 2.5"	19	1462	64
3				
4				

3) Calculations

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

$Q = (29.83)(0.9)(2.5^2)\sqrt{20}$

$= 750.410$

$Q = \sim 750\ USGPM$

$Q_T = 2(29.83)(0.9)(2.5^2)\sqrt{19}$

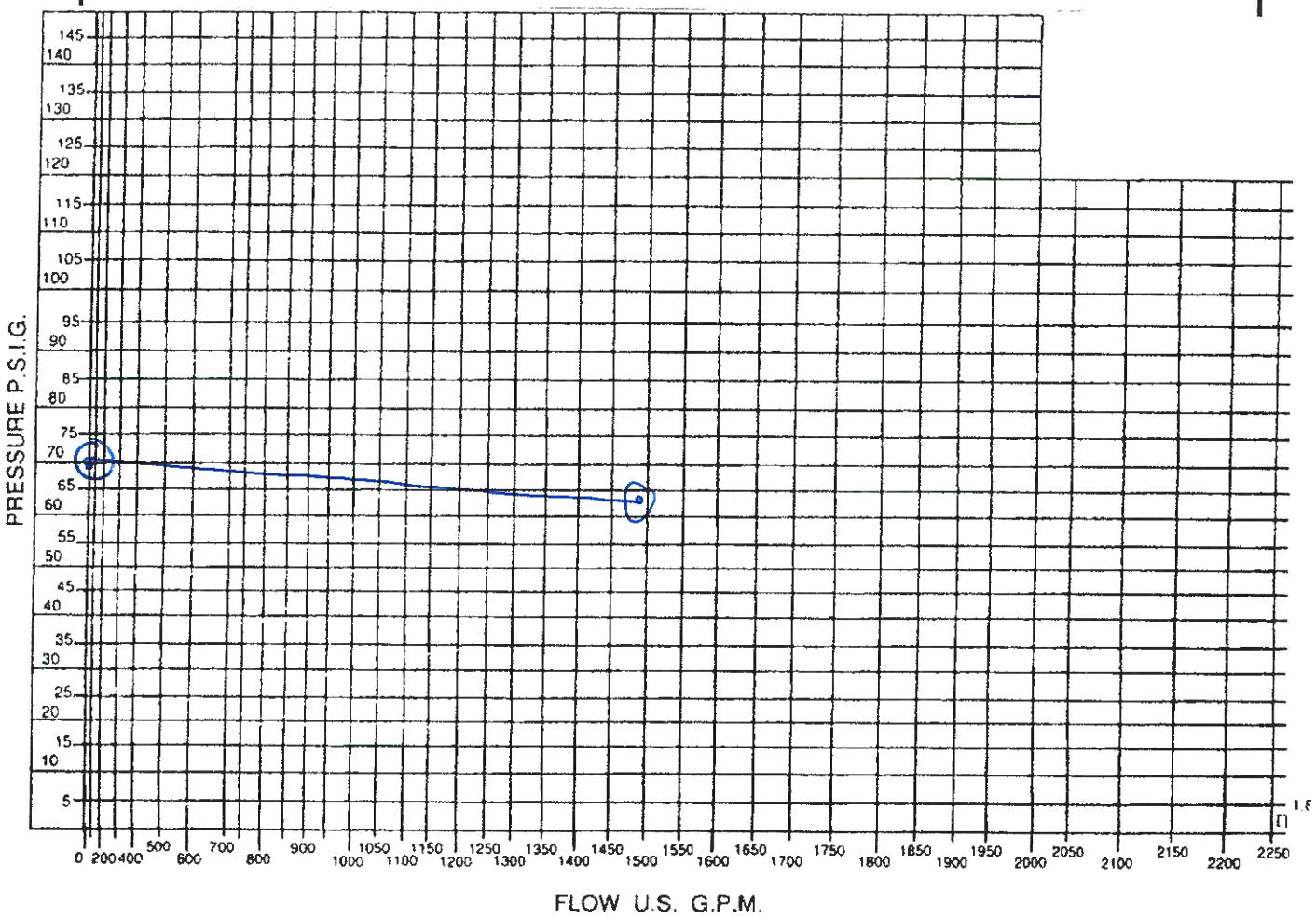
$= 1462.79$

$Q_T = \sim 1500\ USGPM$

Where c- cofficient 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



5) Site sketch & Comments

