FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

349 DAVIS ROAD

TOWN OF OAKVILLE
HALTON REGION

PREPARED FOR:

1539059 ONTARIO INC.

PREPARED BY:

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2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

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CROZIER
CONSULTING ENGINEERS

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by 1539059 Ontario Inc. to prepare a Functional Servicing and Preliminary Stormwater Management Report to support the Official Plan Amendment and the Zoning By-Law Amendment applications for the property located at 349 Davis Road (the Site) in the Town of Oakville, Region of Halton.

This report will demonstrate that the proposed development can be developed in accordance with the Town of Oakville (the Town), Region of Halton (the Region) and Ministry of Transportation (MTO) guidelines and standards from a fire and domestic water, wastewater, and stormwater management perspective.

The proposed development at 349 Davis Road involves demolishing the existing 1-storey commercial building and constructing a 58-storey mixed use commercial and residential building with an internal roadway and underground parking. Site access is proposed through Davis Road.

2.0 SITE DESCRIPTION

The 0.42 ha Site is in Midtown Oakville. The Midtown Oakville area is designated as an Urban Growth Centre and envisioned to be a vibrant, transit-supportive, mixed-use urban community and employment centre (Part E: Growth Areas, Special Policy Areas and Exceptions, Town of Oakville Official Plan, August 31, 2021). The existing property consists of an above ground parking lot, 1-storey commercial building and landscaped areas. A landscaped berm runs along part of the northwest property line and parallel with a municipal ditch in the South Service Road right-of-way.

The Site is bounded by the Queen Elizabeth Way highway and South Service Road to the north, an auto body shop to the east, Davis Road and an office building to the south, and South Service Road to the west.

3.0 WATER SERVICING

The following sections outline the existing and proposed fire and domestic water servicing for the Site.

3.1 Existing Water Servicing

According to the Sustainable Halton Water & Wastewater Master Plan (October 2011), the Site is in Pressure Zone O2 and adjacent to the Davis Road Pumping Station. The Davis Road Pumping station supplies water to Pressure Zone O2 which generally includes all lands in Oakville between elevations of 97.2 m and 133.7 m east of Bronte Creek.

Halton Region as-constructed drawings, O-14648 and O-14649 (Contract No. WS-2448-2007, June 15, 2010), identified the following watermains near the Site:

- 300 mm diameter PVC watermain beneath Davis Road
- 250 mm diameter Abandoned Ductile Iron watermain beneath Davis Road

3.2 Design Water Supply Demand

The design fire and domestic water demand for the proposed development was estimated using the following guidelines:

- Halton Region Water and Wastewater Linear Design Manual (October 2019, Version 5)
- Fire Underwriters Survey Method – Water Supply for Public Fire Protection (2020)

The domestic water demands were calculated using both the design population estimates from the Halton Region Water and Wastewater Linear Design Manual (Region of Halton Standards) and the proposed site-specific population from Corbett Land Strategies. The proposed site-specific population is 720 people, 561 more people than the population estimate using the Region of Halton's design standards. Therefore, the site-specific population from Corbett Land Strategies was used as the governing site statistic to estimate the domestic water demands. Table 1 summarizes the estimated domestic design water demand results and Appendix A contains detailed calculations using both Region of Halton population and proposed site-specific population estimates.

Table 1: Estimated Domestic Design Water Demand – Proposed Site-Specific Population

Standard[1]	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
Halton Region Water and Wastewater Linear Design Manual	2.29	5.16	8.84

Note: Domestic water demands were calculated using site-specific population statistics provided by Corbett Land Strategies, August 16, 2022.

Table 2 summarizes the estimated fire design water demand and Appendix A contains detailed calculations.

Table 2: Estimated Fire Design Water Demand

Method	Fire Demand Flow		Duration (hr)
	(L/s)	(gpm)	
Fire Underwriters Survey (2020)	100	1,584	2.00

Based on the Fire Underwriters Survey analysis, an estimated maximum fire flow of 100 L/s for a duration of 2 hours is required for the proposed building design. The design of the fire flow system is to be completed by others. Please note that the Fire Underwriters Survey value is a conservative estimate for comparison purposes only. The mechanical/sprinkler engineer for the proposed development will complete the required analyses for fire protection and the architect will design fire separation methods according to the determined fire flow rate to meet the regional watermain's available flows and pressures. The total estimated design water demand for the proposed development is approximately 108.84 L/s – the sum of the domestic water peak hour demand and maximum fire flow (8.84 L/s + 100 L/s).

Watermark Solutions Inc. conducted a hydrant flow test on May 18, 2022, on the existing 300 mm diameter PVC watermain beneath Davis Road. The hydrant flow test recorded a static pressure of 92 psi within the tested watermain and is acceptable according to the maximum pressures outlined in Section 2.5.5 of Halton Region's Water and Wastewater Linear Design Manual (October 2019, Version 5). Please note, a booster pump may be required to distribute water throughout the proposed 58-storey building based on the pressure distribution requirements determined with the mechanical engineer's design scope.

The hydrant flow test results project a minimum domestic water supply of 629 L/s available at the Site when the system is at 20 psi of residual pressure (Hydrant Flow Test Report, Watermark Solutions, May 18, 2022). Therefore, based on the hydrant flow test, the water supply available from the regional water distribution system is sufficient in meeting fire flow demands and maximum daily domestic water demands for the Site. Appendix A contains the results from the hydrant flow test.

3.3 Proposed Water Supply Servicing

The proposed water supply servicing for the development involves connecting a 200 mm diameter water service to the existing 300 mm diameter watermain beneath Davis Road. The proposed water service connection will be equipped with a property line valve and box. The 200 mm diameter water service will split into a 200 mm diameter fire line and a 100 mm diameter domestic water service as outlined Region Standard RH 409.010. The required check detector assembly, water meter and backflow preventor will be specified in the mechanical design and is proposed to be located within the proposed building. The proposed water service connection for the development will be located along the southeast property line, as shown in the Site Servicing Plan (Drawing C102).

4.0 SANITARY SERVICING

The following sections outline the existing and proposed sanitary servicing for the Site.

4.1 Existing Sanitary Servicing

Halton Region as-constructed drawings, O-14648 and O-14649 (Contract No. WS-2448-2007, June 15, 2010), identified the following sanitary sewers near the Site:

- 300 mm structurally lined cast iron sanitary sewer beneath Davis Road
- 300 mm trunk sanitary sewer beneath Trafalgar Road

Under existing conditions, the sanitary sewage from the Site is conveyed to the 300 mm diameter sanitary sewer beneath Davis Road through an existing sanitary service lateral. From the Davis Road sanitary sewer, the sanitary sewage is conveyed to the 300 mm trunk sanitary sewer beneath Trafalgar Road and is ultimately conveyed to the Oakville Southwest Wastewater Treatment Plant (Volume I Wastewater, Sustainable Halton Water and Wastewater Master Plan, AECOM, October 2011).

4.2 Design Sanitary Flow

The design sanitary sewage flow was estimated using Halton Region Water and Wastewater Linear Design Manual (October 2019, Version 5) and the Site Plan prepared by SVMA (No. 6 - Existing Site Plan w/ Proposed Building, August 10, 2022). The sanitary sewage design flow is calculated using the following formula:

$$Design\ flow = Total\ Dry\ Weather\ Sewage\ Flow \times Peaking\ Factor + Infiltration\ Flow$$

Like the domestic water demand calculations, the design sanitary sewage flows were calculated using both the design population estimates from the Halton Region Water and Wastewater Linear Design Manual (Region of Halton Standards) and the proposed site-specific population from Corbett Land Strategies. The proposed site-specific population is 720 people, 561 people more than the Region of Halton Standards and therefore was used as the governing site statistic to estimate the design sewage flows.

Table 3 summarizes the estimated sanitary sewage flow results and Appendix B contains detailed calculations using both Region of Halton population and proposed site-specific population estimates.

Table 3: Estimated Design Sanitary Sewage Flow - Proposed Site-Specific Population

Standard[1]	Population	Average Dry Weather Sewage Flow (L/s)	Peaking Factor	Peak Dry Weather Sewage Flow	Infiltration Flow (L/s)	Design Sewage Flow (L/s)
Halton Region Water and Wastewater Linear Design Manual	720	2.29	3.84	8.80	0.12	8.92

Note: Sanitary sewage flows were calculated using site-specific population statistics provided by Corbett Land Strategies, August 16, 2022.

The proposed sanitary service is sized to convey a design sewage flow of 8.92 L/s.

4.3 Proposed Sanitary Servicing

A 150 mm diameter PVC sanitary sewer lateral installed at 2% slope is proposed to connect to the 300 mm sanitary sewer beneath Davis Road from a property line maintenance hole in accordance with Region of Halton Standards. Details of the connection are shown in the Site Servicing Plan (Drawing C102). The proposed building's internal sanitary sewage collection system will be designed by the mechanical engineer to convey the wastewater to the proposed sanitary service lateral.

The existing 300 mm diameter sanitary sewer beneath Davis Road is shown to have a minimum slope of 0.30% (As-constructed Drawing O-14648, Region of Halton, June 15, 2010). A 300 mm diameter concrete sewer at a 0.30% slope has a full flow capacity of 50 L/s. Therefore, based on the estimated gross wastewater conveyance capacity of the 300 mm sewer pipe, the 8.92 L/s wastewater design flow from the proposed development should be accommodated by the sanitary sewer beneath Davis Road. From the Davis Road sanitary sewer, wastewater will be conveyed to the sanitary trunk sewer beneath Trafalgar Road and ultimately conveyed to the Oakville Southwest Wastewater Treatment Plant, consistent with existing conditions.

As described in the Region of Halton Master Wastewater Plan (October 2011), the Region has conducted wastewater infrastructure improvements to account for the anticipated population and employment growth of Midtown Oakville to 2031. In 2011, the Region planned to increase the trunk sewer conveyance capacity along Trafalgar Road and Randall/Rebecca Street (Region Project No. 6540/6541), which receives the wastewater flows from the Site.

Despite the proposed improvements, during the Second Pre-consultation meeting for the proposed development held on May 11, 2022, the Region indicated that the Trafalgar Road trunk sanitary sewer has downstream capacity constraints. The source of the capacity concerns and details of the capacity issues have not been provided by the Region. To address the Region's capacity concerns of the Trafalgar Road trunk sanitary sewer, a downstream sanitary sewer capacity analysis can be conducted if requested at a later submission, once a term of reference is established and additional information relating to the capacity constraints are provided from the Region.

5.0 Drainage Conditions

The following section outlines the existing and proposed stormwater drainage conditions.

5.1 Pre-Development Drainage Conditions

The Site consists of an above ground parking lot, a 1-storey commercial building and landscaped areas. The existing development does not currently have stormwater management controls.

According to the existing topographic survey (Genesis Land Surveying Inc., March 30, 2022), the existing topography of the Site splits the stormwater flows into the following catchments:

Catchment 101 (0.42 ha, 0.66 RC)

Runoff is uncontrolled and sheet flows overland to the municipal right-of-way to the west and south of the Site. The runoff that drains to the west right-of-way is captured by a catchbasin within the South Service Road ditch and conveyed to a 600 mm diameter storm sewer beneath Davis Road (Davis Road storm sewer). The runoff that drains to the south right-of-way is captured by municipal catchbasins within the Davis Road right-of-way and conveyed to the Davis Road storm sewer.

Catchment EXT1 (0.02 ha, 0.25 RC)

Runoff from the adjacent property flows uncontrolled onto the Site along the northeast property line. The runoff then flows south overland to the Davis Road municipal right-of-way and is conveyed into the Davis Road storm sewer consistent with Catchment 101's drainage pattern.

From the Davis Road storm sewer, the stormwater from the Site is conveyed through the municipal stormwater infrastructure and ultimately discharged into Lower Morrison Creek. The existing drainage conditions are illustrated on Figure 1 – Pre-Development Drainage Plan.

5.2 Post-Development Drainage Conditions

The proposed development includes the construction of a 58-storey mixed use commercial and residential building with an internal roadway and underground parking.

The proposed grading of the Site results in the following catchments:

Catchment 201 (0.42 ha, 0.78 RC)

Runoff is proposed to be contained within the internal roadway and captured in area drains throughout the Site. The area drains will convey stormwater runoff to a storage tank within the underground parking area. The underground storage tank will release the stormwater from the Site to the Davis Road storm sewer through a storm sewer lateral.

Stormwater runoff not captured in the area drains is proposed to flow overland to the Davis Road right-of-way through a grassed swale along the west property line or flow uncontrolled from the landscaped area along the south face of the proposed building, consistent with pre-development conditions. The runoff on Davis Road is captured by municipal catchbasins and conveyed to the Davis Road storm sewer. A capture analysis can be completed during detailed design to ensure the 100-year design storm event is captured by the proposed area drains. Major system drainage is conveyed overland towards the Davis Road right-of-way consistent with pre-development conditions.

Catchment EXT1 (0.02 ha, 0.25 RC)

Consistent with pre-development conditions, runoff from the adjacent property flows uncontrolled onto the Site along the northeast property line. The runoff is then contained within the internal roadway and conveyed to the internal storm infrastructure and follows Catchment 201's drainage path.

The ultimate outlet for runoff from Catchment 201 and EXT1 is Lower Morrison Creek and is consistent with pre-development conditions. The proposed drainage conditions are illustrated on Figure 2 – Post-Development Drainage Plan.

5.3 Floodplain Spill Hazard Mitigation

The Site is not located within a Conservation of Halton regulated area, however, Conservation Halton advised through email correspondence there are potential flood risks to the Site and the Midtown Oakville area due to a potential spill from north of the Site (RE: 349 Davis Road, Oakville - Floodplain Inquiry, April 29, 2022). In review of the Conservation of Halton Regulation Mapping (Planning & Permits Map, Conservation of Halton), flood spill arrows point south towards the Midtown Oakville area across the Queen Elizabeth Way highway. The extent of the flood risk is still unknown because Conservation Halton has not yet conducted a Flood Hazard Assessment for the Midtown Oakville area; therefore, they have recommended the proposed development be designed with flood mitigation strategies which include:

- Grading the Site to direct flood waters away from underground parking entrances and access points.

- Elevating the first-floor elevation 300 mm higher than the surrounding ground area.

As shown the Site Grading Plan (Drawing C101), to achieve the intent of Conservation Halton's flood mitigation strategies a 300 mm high berm along the north property line is proposed to direct stormwater away from the Site and towards the municipal ditch within the South Service Road right-of-way. Additionally, the grading is proposed to direct stormwater away from the building and underground parking entrances to the Davis Road right-of-way along the major overland flow path.

5.4 Groundwater Flows

During the Second Pre-consultation meeting for the proposed development held on May 11, 2022, the Town requested that the underground parking area be waterproofed. The waterproofing strategy is subject to mechanical, structural, and geotechnical design. The waterproofing design strategy and impacts on the stormwater management system can be further explored during detailed design.

6.0 STORMWATER MANAGEMENT

Stormwater management criteria for the Site must adhere to the following guidelines and criteria:

- Town of Oakville Development Engineering Procedures and Guidelines Manual, Town of Oakville Development Application Guidelines: Site Servicing, Grading, and Drainage Plan (Town of Oakville Guidelines)

- Appendix J: Midtown Oakville Transportation and Stormwater Municipal Class EA Final Report, Cole Engineering Group Ltd., June 2014 (Midtown Oakville EA)

- Stormwater Management Planning and Design Manual, Ministry of Environment, March 2003

Stormwater Quantity Control

According to the Town of Oakville Guidelines, the stormwater quantity control criteria are governed by the relevant subwatershed study requirements. The Site is located within the Lower Morrison Creek Watershed; the corresponding subwatershed study is included in the Midtown Oakville EA (June 2014).

The Midtown Oakville EA stipulates those future developments within the Midtown Oakville area require a minimum stormwater storage of 280.9 m^3/ha (Section 2.5.1, June 2014). Therefore, the 0.42 ha Site requires a minimum stormwater storage volume of 118 m^3. Furthermore, the target stormwater release rates for all new developments within the Lower Morrison Creek watersheds are to be controlled to 50% of pre-development stormwater release rates (Midtown Oakville EA, Section 2.2, June 2014).

Since the Site is located next to the Queen Elizabeth Way, a Ministry of Transportation (MTO) operated highway, the proposed stormwater quantity control strategy will also consider the relevant MTO stormwater management guidelines.

Stormwater Quality Control

The stormwater quality control criteria for the Site are also governed by Lower Morrison Creek's subwatershed study requirements. The Midtown Oakville EA (June 2014) outlines that the stormwater quality control criteria for future development in the Midtown Oakville area is to achieve Enhanced Level 1 Protection (80% removal of suspended solids from 90% of the runoff volume), as outlined in the MOE Stormwater Management Planning and Design Manual (March 2003).

Water Balance and Erosion Control

The Midtown Oakville EA (June 2014) outlines future development within Midtown Oakville must consider water balance by achieving the greater of either the two following requirements:

- Retain the stormwater volume of a 5 mm rainwater event over the entire area of the proposed development.

- Retain stormwater on-site to achieve an equivalent annual volume of infiltration as pre-development conditions, according to Section 3.2 of the MOE Stormwater Management Planning and Design Manual (March 2003)

The following sections describes how the stormwater management for the proposed development adheres to the above criteria.

6.1 Existing Servicing

Town of Oakville Proposed Construction of South Service Road drawings (R-83-72-3 – Sheet 3, October 22, 1976) and Halton Region as-constructed drawings, O-14648 and O-14649 (Contract No. WS-2448-2007, June 15, 2010), identify a 600 mm diameter storm sewer beneath Davis Road's south boulevard (Davis Road storm sewer).

Three municipal catchbasins that receive stormwater runoff from the Site under pre-development conditions convey the captured stormwater runoff to the Davis Road storm sewer.

Page 83 and Page 110 of the Town of Oakville's Storm Sewer Mapbook Information (provided via email by the Town of Oakville, April 27, 2022) indicate that the Davis Road storm sewer connects to an 1,800 mm diameter storm sewer near the Davis Road cul-de-sac to the west. The 1,800 mm diameter storm sewer is located within an approximately 200 m long storm sewer easement that travels through the lot located at 547 Trafalgar Road and terminates with a set of culverts that convey stormwater to Lower Morrison Creek beneath South Service Road and Canadian National Railway tracks.

6.2 Stormwater Quantity Control

The proposed development is required to provide a minimum of 118 m^3 of stormwater storage and control the stormwater release rates from the Site to 50% of the pre-development stormwater release rates.

The Rational Method was used to calculate the pre- and post-development peak stormwater flows generated by the Site's catchments that drain to the Davis Road trunk storm sewer. Calculations were completed using both the Town's and Ministry of Transportation's intensity-duration-frequency (IDF) data due to the Site's proximity to an MTO operated highway.

The Town of Oakville IDF data estimates greater uncontrolled peak stormwater flows and storage requirements for the proposed development than the MTO IDF data. Thus, the model developed using the Town of Oakville IDF data was used as the more conservative approach to develop the proposed development's stormwater quantity control strategies. The proposed stormwater release rates and storage requirements calculated using the Town's IDF data are summarized in Table 4 and Appendix C contains the detailed calculations using both the Town's and MTO's IDF data.

Table 4: Stormwater Release Rates and Storage Requirements – Town of Oakville Data

Return Period	External Drainage (EXT1) Peak Flow	Pre-Dev (101) Peak flow	Post-Dev (201) Uncontrolled Peak flow	Post-Dev Controlled Peak Flow	Storage Required	Storage Provided
	L/s	L/s	L/s	L/s	m3	m3
2-Year	1	64	75	30	27	119
5-Year	1	88	104	37	41	
10-Year	2	104	123	42	50	
25-Year	2	138	163	50	71	
50-Year	3	158	186	54	83	
100-Year	3	176	205	58	93	

Note: Runoff coefficients in pre- and post-development conditions are increased by 10%, 20% and 25% for 25, 50, and 100-year events respectively per MTO requirements.

The Site's stormwater release rates are proposed to be overcontrolled and less than the 50% pre-development release rates for the 2-year through to and including the 100-year design storms using a 135 mm diameter orifice within the underground stormwater storage tank – see Appendix C for orifice tube pipe specifications.

The storage tank is sized to a volume of 119 m^3 to satisfy the Midtown Oakville EA's minimum storage requirement of 118 m^3 and the proposed orifice is projected to control the 2-year through to and including the 100-year design storms. The storage tank is proposed to be in the southwest corner of the underground parking structure with a footprint of approximately 11.9 m x 5.7 m.

Please note, the orifice and storage tank layout may be subject to change in later design phases as the calculations depend on the proposed height of the underground parking area, the storm outlet invert, and the proposed finished floor elevations.

The 135 mm diameter orifice is proposed to connect to a property line maintenance hole which will convey stormwater from the storage tank to the proposed storm sewer lateral. The proposed storm sewer lateral is a 375 mm diameter storm sewer sloped at 0.5% and will convey stormwater from the property line maintenance hole to a proposed "Doghouse" maintenance hole installed over the 600 mm diameter storm sewer beneath Davis Road's south boulevard. Details of the connection are shown in the Site Servicing Plan (Drawing C102).

Stormwater draining from Catchment EXT1 outside of the Site is proposed be consistent with existing conditions. The stormwater from Catchment EXT1 is proposed to be captured within the internal roadway, then travel through the internal storm infrastructure to be ultimately conveyed to the Davis Road storm sewer. The stormwater peak flow from this 0.02 ha catchment is estimated to be a maximum of 3 L/s during the 100-year design storm. Note these flows are conveyed through the proposed stormwater management system and are not accounted for in the proposed development's stormwater quantity control design.

6.3 Stormwater Quality Control

Stormwater quality control is required to provide an Enhanced Level 1 Protection according to the MOE Stormwater Management Planning and Design Manual (March 2003). Enhanced water quality protection involves the removal of at least 80% of total suspended solids from 90% of the annual runoff volume.

A Jellyfish Filter or approved equivalent is proposed to provide the requisite stormwater quality control for Catchment 201. The Jellyfish Filter is proposed to be located "off-line" of the property line maintenance hole downstream of the proposed storage tank as illustrated in the Site Servicing Plan (Drawing C102). The size of the Jellyfish required to meet the stormwater quality criteria will be determined during detailed design. Additional water quality treatment opportunities can also be explored during detailed design such as enhanced grassed swales and infiltration trenches.

6.4 Water Balance

According to the Midtown Oakville EA (June 2014), the Site must retain the greater of the rainwater volume produced by a 5 mm rainfall event or the annual pre-development infiltration volume. It is anticipated the retention of the 5 mm rainfall event will be the governing criteria because the proposed development's total area is only 37% pervious in pre-development conditions.

According to the Site Plan prepared by SVMA (No. 6 - Existing Site Plan w/ Proposed Building, August 10, 2022), the Site has an area of approximately 0.42 ha resulting in 21.2 m^3 of stormwater retention required to satisfy the Town of Oakville's water balance criteria, as shown in Table 5.

Table 5: Water Balance Storage Requirement

Standard	Criteria	Site Area (ha)	Volume Required (m^3)
Midtown Oakville Transportation and Stormwater Municipal Class EA Final Report (June 2014) to achieve water balance	Retention of first 5 mm[1]	0.42	21.2

Note: The Midtown Oakville's water balance criteria to retain the rainwater volume produced by a 5 mm rainfall event is anticipated to be the governing criteria due to the limited pervious area in pre-development conditions. The annual pre-development infiltration volume can be calculated during detailed design for comparison purposes if required.

Low Impact Development (LID) techniques to meet the Town of Oakville's water balance criteria will be determined during detailed design and will aim to increase infiltration and evapotranspiration of runoff in post-development conditions. Potential LID strategies that may be applicable for the proposed development are explored in Section 6.5.

6.5 Sustainable Stormwater Management

Low Impact Development (LID) strategies will be considered for use throughout the proposed development during the detailed design stage. The LID strategies that may be applicable for the Site include:

- Rainwater Harvesting: With minimal pretreatment, captured rainwater can be used for outdoor non-potable water uses such as irrigation, or in the buildings as gray water. Gray water retention can be provided within the proposed stormwater storage tank as "dead storage". The current layout of stormwater storage tank can accommodate 21.2 m^3 of gray water required to meet the water balance criteria.

- Green Roofs: This method is beneficial due to its water quality, water balance, and peak flow control benefits. In addition to water resource management, green roofs improve energy efficiency, reduce urban heat island effects, and create greenspace for passive recreation.

- Enhanced Grass Swale and Bioretention: Enhanced grass swales are designed to convey, treat and attenuate stormwater runoff. This feature slows the water to allow sedimentation, filtration through the soil matrix and evapotranspiration. Bioretention methods, such as rain gardens and stormwater planters, allow to temporarily store and treat runoff. It is typically designed to capture small storm events.

- Enhanced Topsoil: Enhanced topsoil provides water quality benefits in addition to water balance storage which will reduce the infrastructure required to store the required water balance volume.

LID strategies and an overall treatment train approach, where possible, will be specified during the detailed design phase of this project.

6.6 Stormwater Management Operation and Maintenance

As the proposed stormwater tank and filtration system are expected to collect sediment over time, regular maintenance is required to ensure full function over the lifetime of the proposed systems. An Operations Maintenance Manual will be developed for the Site during detailed design based on the final design requirements.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The proposed development located at 349 Davis Road in the Town of Oakville involves constructing a 58-storey mixed use commercial and residential building with an internal roadway and underground parking. The proposed development can be developed in accordance with the Town of Oakville, Region of Halton and Ministry of Transportation (MTO) guidelines and standards from a fire and domestic water, wastewater, and stormwater management perspective based on the information contained in this report and the following conclusions:

- Fire and domestic water supply demand for the Site is proposed to be provided using a 200 mm diameter fire line and 100 mm diameter domestic line extending from the 300 mm diameter watermain beneath Davis Road. The peak hour domestic and fire water supply demand for the proposed development is estimated to be 8.84 L/s and 100 L/s respectively.

- Sanitary servicing for the Site is proposed to be provided with a 150 mm diameter sanitary sewer lateral installed at a slope of 2% extending from a proposed property line maintenance hole to the 300 mm diameter sanitary sewer beneath Davis Road. The design sanitary sewage flow for the proposed development is estimated to be 8.92 L/s.

- Flood mitigation strategies will be implemented for the Site through the grading design. A north property line berm and a major overland flow path will direct stormwater away from the building and underground parking area to the Davis Road right-of-way.

- Stormwater runoff from the Site will be overcontrolled and less than the of 50% of pre-development stormwater release rates and is proposed to be captured using area drains throughout the Site. The captured stormwater is proposed to be conveyed from a property line maintenance hole through a 375 mm diameter storm sewer and connect to a "Doghouse" maintenance hole installed over the 600 mm diameter storm sewer beneath Davis Road's southeast boulevard.

- Total stormwater storage of 119 m^3 is proposed to be provided through a storage tank within the underground parking area to meet the minimum storage requirement of 118 m^3 for the Site.

- Stormwater quality control criteria for the proposed development is proposed to be met by a Jellyfish Filter to provide an enhanced level of protection as outlined by the MOE (80% removal of suspended solids from 90% of the runoff volume). The size and model of the Jellyfish will be determined during the detailed design phase of this project.

- Water balance criterion for the Site is proposed to be achieved using Low Impact Development techniques such as rainwater harvesting, green roofs, enhanced grassed swales, and enhanced topsoil. The overall water balance strategy will be determined during detailed design.

Based on the above conclusions, we support the proposed development application from the perspective of fire and domestic water supply, sanitary servicing, and stormwater management.

Respectfully submitted,

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APPENDIX A

Water Demand Calculations

SURVEYOR'S REAL PROPERTY REPORT AND TOPOGRAPHY OF PART OF LOT 12 CONCESSION 3 SOUTH OF DUNDAS STREET TOWN OF OAKVILLE

REGIONAL MUNICIPALITY OF HALTON

PARKING STATISTICS By-law 2014-14	
Above Ground Parking (AB) (3 Levels)	AB Level 1 = 23 parking spaces AB Level 2 = 23 parking spaces AB Level 3 = 23 parking spaces
Underground Parking (UG)	UG Levels 1 to 3 = 85 parking spaces
	UG Levels 4 & 5 = 97 parking spaces
	UG Level 6 = 99 parking spaces
Street Level Parking	5 spaces (including 2 barrier-free)
Loading Space Provided	1 space
Required Parking:	
Commercial (Ground)	1.0 per 18.0m² net floor area.
Office (1 Floor)	1.0 per 35.0m² net floor area.
Residential	a) 1.0 per dwelling where the unit has less than 75.0m² net floor area. b) 1.25 per dwelling for all other units. Visitor Parking: Of the total number of parking spaces required, 0.25 of the parking spaces required per dwelling shall be designed as visitors parking spaces.
Barrier-Free	3 to 25 spaces = 1 space 26 to 100 spaces = 4% 101 to 200 spaces = 1, plus 3% of the total no. of spaces 201 to 1000 spaces = 2, plus 2% of the total no. of spaces
TOTAL PARKING REQUIRED	575 (including 14 barrier-free)
TOTAL PARKING PROPOSED	622 Parking Spaces (including 14 barrier-free)
Min. No. of Bicycle Parking Spaces Required:	
Retail Uses: Office Uses: Residential Uses:	The greater of 2 or 1.0 per 1,000m² net floor area. The greater of 2 or 1.0 per 1,000m² net floor area. Apartment Building - 1.0 per dwelling. Visitor Spaces: Of the total number of bicycle parking spaces required, 0.25 of the parking spaces required per dwelling shall be designed as visitors bicycle parking.
Total Bicycle Parking Required:	392 bicycle parking spaces (racks)
Bicycle Parking Provided:	400 bicycle parking spaces (racks)

ZONING STATISTICS By-law 2014-14		
Zoned MTE - Midtown Transitional Employment		
Proposed MU4 Mixed Use Zone - Urban Core		
MTE REGULATIONS	REQUIRED	PROPOSED
Min. Lot Frontage	Shall be as legally existing as of the effective date of this By-law.	53.90m (existing)
Min. Lot Area		0.42 Ha (existing)
Max. Lot Coverage		37.02%
MU4 REGULATIONS		
Min. Front Yard	1,0m	5,0m (from 4.0m expr. line)
Max. Front Yard	5,0m	5,0m (from 4.0m expr. line)
Min. Interior Side Yard	0.0m	5.40m (W); 11.89m (E)
Min. Rear Yard	0.0m	32.23m
Min. No. of Storeys	8 storeys	58 storeys
Max. No. of Storeys	12 storeys	58 storeys
Min. First Storey Height	4.5m	4.5m
Min. Height	25.5m	175.5m
Max. Height	43.0m	175,5m
Max. Net Floor Area	1,400m²	1,570.84m²

UNIT BREAKDOWN / DENSITY	
Commercial Area GFA	**789.5m²**
Unit 1: Proposed Restaurant	214.18m²
Patio Area (For Unit 1)	34.98m²
Unit 2: Proposed Retail	87.31m²
Unit 3: Proposed Retail	67.75m²
Unit 4: Proposed Retail	69.36m²
Unit 5: Proposed Retail	128.25m²
Unit 6: Proposed Retail	114.81m²
Lobby (Ground Floor)	240.37m²
Office Area GFA	**1,470.41m²**
Total No. of Units	4 Units
Residential Area GFA	**33,633.21m²**
35 Floors (Medium Plate)	25,381.65m²
No. of Units per Floor	8 Units
No. of Units	280 Units
18 Floors (Small Plate)	8,251.56m²
No. of Units per Floor	6 Units
No. of Units	108 Units
Total No. of Residential Units	388 Units
TOTAL GFA (w/o Parking Levels)	36,674.46m²
TOTAL GFA (incl. Parking Levels)	**41,386.98m²**
Density	
Residential Units per Ha	106.67 uph
Floor Space Index	9.75

SITE STATISTICS Cont'd:

SITE AREA = 1.05 acre (0.42 ha)
4,243,25 m2 (45,673.96 sq.ft.)

PROPOSED BLDG. FOOTPRINT - (Mixed-Use)
AREA = 1,570.84 m2 (16,908.38 sq.ft.)

ABOVE GROUND PARKING FOOTPRINT - FLOOR LEVELS 2nd - 4th
AREA = 1,570.84 m2 (16,908.38 sq.ft.)

OFFICE FOOTPRINT - 5th FLOOR LEVEL
AREA = 1,470.41 m2 (15,827.36 sq.ft.)

RESIDENTIAL FOOTPRINT 1 - FLOOR LEVELS 6th - 40th
AREA = 725.19 m2 (7,805.88 sq.ft.)

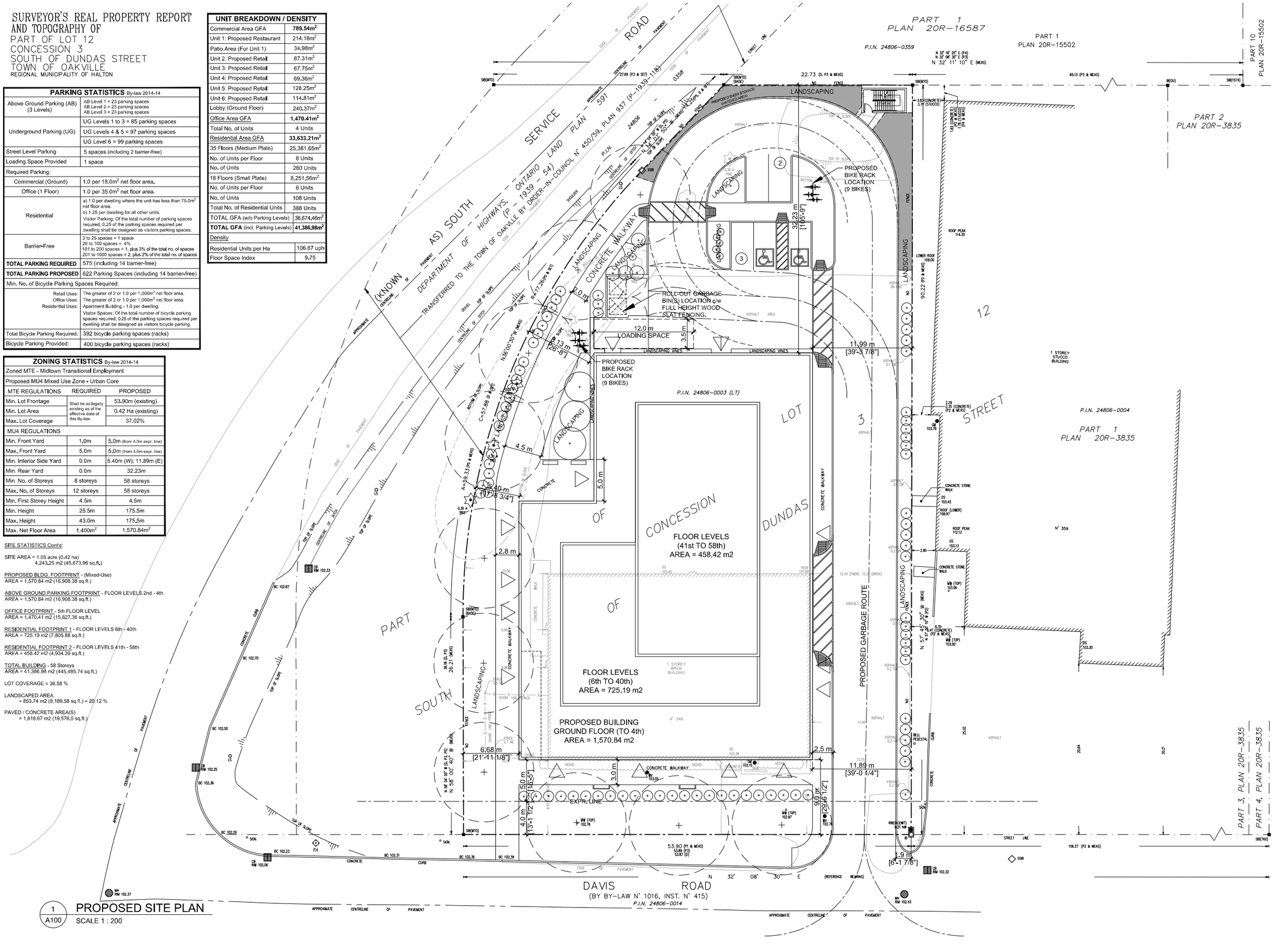
RESIDENTIAL FOOTPRINT 2 - FLOOR LEVELS 41th - 58th
AREA = 458.42 m2 (4,934.39 sq.ft.)

TOTAL BUILDING - 58 Storeys
AREA = 41,386.98 m2 (445,485.74 sq.ft.)

LOT COVERAGE = 36.58 %

LANDSCAPED AREA
= 853.74 m2 (9,189.58 sq.ft.) = 20.12 %

PAVED / CONCRETE AREA(S)
= 1,818.67 m2 (19,576.0 sq.ft.)



1 A100 PROPOSED SITE PLAN
SCALE 1 : 200

All material herein remains property of the architect noted below.

THE GENERAL CONTRACTOR SHALL REPORT AND VERIFY ALL DIMENSIONS AND REPORT ERRORS AND OMISSIONS TO THE ARCHITECT. DRAWINGS MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS COUNTERSIGNED BY:

Consultant: Surveyor
GENESIS Land Surveying Inc.
10 Four Seasons Place, 10th floor
Toronto, ON. M9B 6H7
Tel: (905) 499-2956

LEGEND

■	DENOTES	MONUMENT PLANTED
●		MONUMENT FOUND
WIT		WITNESS
IB		IRON BAR
RIB		ROUND IRON BAR
SIB		STANDARD IRON BAR
SSIB		SHORT STANDARD IRON BAR
P1		SURVEY BY TARASICK & McMILLAN O.L.S., DATED FEBRUARY 19TH, 2004
P2		PLAN 20R-3835
P3		EXPROPRIATION PLAN 1335
P4		PLAN 20R-16587
P5		EXPROPRIATION PLAN 591
MTO		MINISTRY OF TRANSPORTATION OF ONT.
OU		ORIGIN UNKNOWN
D		INST. No. 73476
P.I.N.		PROPERTY IDENTIFICATION NUMBER
N.S.E.W.		NORTH, SOUTH, EAST, WEST
MEAS		MEASURED
FNDN		FOUNDATION
UP		UTILITY POLE
O.H.W.		OVERHEAD UTILITY CABLES
CB		CATCH BASIN
MH		MAINTENANCE HOLE
DS/GS		DOOR/GARAGE SILL ELEVATION
TC/BC		TOP/BOTTOM OF CURB
GM		GAS METER
WV		WATER VALVE
ø		DIAMETER
MW		MONITORING WELL
LS		LIGHT STANDARD
FH		FIRE HYDRANT
FR-1		FIRE ROUTE SIGNS
⊕		BOLLARD

LEGEND

△ MAN DOOR

⚠ OVERHEAD LOADING DOOR

STUDIO
VERONICA MADONNA ARCHITECT
7 Colwyn Road, Toronto ON.
WorkCo., 39 Advance Road, Etobicoke ON.
416-937-8007

SVMA

True North

No.	Description	Date
1	**Issued for Review**	**APR. 08/22**
2	**Issued for Review**	**APR. 28/22**
3	**Issued for Pre-Consultation Meeting**	**MAY 06/22**
4	**Issued for Review / Coordination**	**MAY 30/22**
5	**Issued for Review / Coordination**	**July 05/22**
6	**Issued for Review / Coordination**	**Aug. 10/22**

Location
Mixed-Use 58-Storey Building
349 Davis Road
Oakville, Ontario L6J 2X2

Page Title
Existing Site Plan w/ Proposed Building

Project number	22003
Date	JAN.
Drawn by	D.D.
Checked by	V.M.

A100

Scale as noted

James Fletcher

From: Jonabelle T <jonabelle@corbettlandstrategies.ca>
Sent: August 16, 2022 4:31 PM
To: James Fletcher
Cc: Brendan Walton
Subject: Re: 349 Davis Road - Proposed Mixed Use Building

Categories: Filed to Sharepoint

Hi James,

My apologies for the late response. I thought that I did. According to the background study:

- High-density - 1.703 ppu
- 400 sq.ft. per employee for commercial/population-related; and
- 450 sq.ft. per employee for institutional employment

Proposed Development

- Apartment Units - 388 units
- Commercial - 789.54 sq.m
- Office - 1,470.41 sq.m

Population Yield

- Apartment units - 661 residents
- Commercial - 24 employees
- Office - 35 employees

I hope this helps.

Kind Regards,

Jonabelle Ceremuga, BES
Senior Associate Development Planner
Corbett Land Strategies
5045 South Service Road - Suite 301
Burlington, Ontario L7L 5Y7
Phone: (416) 939 - 2762
Email: Jonabelle@corbettlandstrategies.ca

> On Aug 16, 2022, at 11:52 AM, James Fletcher <jfletcher@cfcrozier.ca> wrote:
>
> Hi Jonabelle,
>
> I hope you are doing well!

I am just following up on the below email. Once we have the residential and commercial populations, we will be able to finalize our service demand calculations.

Thanks!

James

James Fletcher | Engineering Assistant
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

<Mail Attachment.jpeg>

Crozier Connections: <Mail Attachment.png> <Mail Attachment.png> <Mail Attachment.png> <Mail Attachment.png>

Read our latest news and announcements here.

CROZIER CONSULTING ENGINEERS

Project: 349 Davis Road **Created By:** JF **Date:** 8/19/2022
Project No.: 2259-6324 **Checked By:** BW **Updated:** -

Domestic Water Demand - Proposed Site-Specific Population

				Notes & References
Total Site Area =	0.42	ha		
Residential Apartment Population:				Proposed site-specific population provided by Planner through email correspondance, Re: 349 Davis Road - Proposed Mixed Use Building, Jonabelle Ceremuga (August 16, 2022)
Population =	661			
Commercial/Office Population:				
Population =	59			
Total Site Population =	720			
Design Parameters:				
Residential Average Daily Demand =	0.275	m3/capita/d		Average demand design criteria from Section 2.4 from the Region of Halton Water and Wastewater Linear Design Manual(Version 5, October 2019)
Commercial Average Daily Demand =	0.275	m3/capita/d		
Water Demand Residential:				
Average Daily Demand =		181,775	L/d	
=		**2.10**	**L/s**	
Peaking Factors (Residential)				Residential peaking factors from Section 2.4 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019)
Max Day =		2.25		
Peak Hour =		4.00		
Average Day =		**2.10**	**L/s**	
Max Day =		**4.73**	**L/s**	Max Day = Average Day Demand * Max Day
Peak Hour =		**8.42**	**L/s**	Peak Hour = Average Day Demand * Peak Hour
Water Demand Commercial:				
Average Daily Demand =		16,225	L/d	
=		**0.19**	**L/s**	
Peaking Factors (Commercial)				Commercial peaking factors from Section 2.4 from the Region of Halton Water and Wastewater Linear Design Manual (Version 5, October 2019)
Max Day =		2.25		
Peak Hour =		2.25		
Average Day =		**0.19**	**L/s**	
Max Day =		**0.42**	**L/s**	Max Day = Average Day Demand * Max Day
Peak Hour =		**0.42**	**L/s**	Peak Hour = Average Day Demand * Peak Hour

Water Demand Summary:

Development	Average Daily Water Demand (L/s)	Max Day Demand (L/s)	Peak Hourly Demand (L/s)
Residential	2.10	4.73	8.42
Commercial	0.19	0.42	0.42
Site Total	**2.29**	**5.16**	**8.84**

Hydrant Flow Test Report

Residual Hydrant Number _____

Operator: Colin Powell

Date: 18-May-22 Time: 8:00 AM

Witness: Halton Region

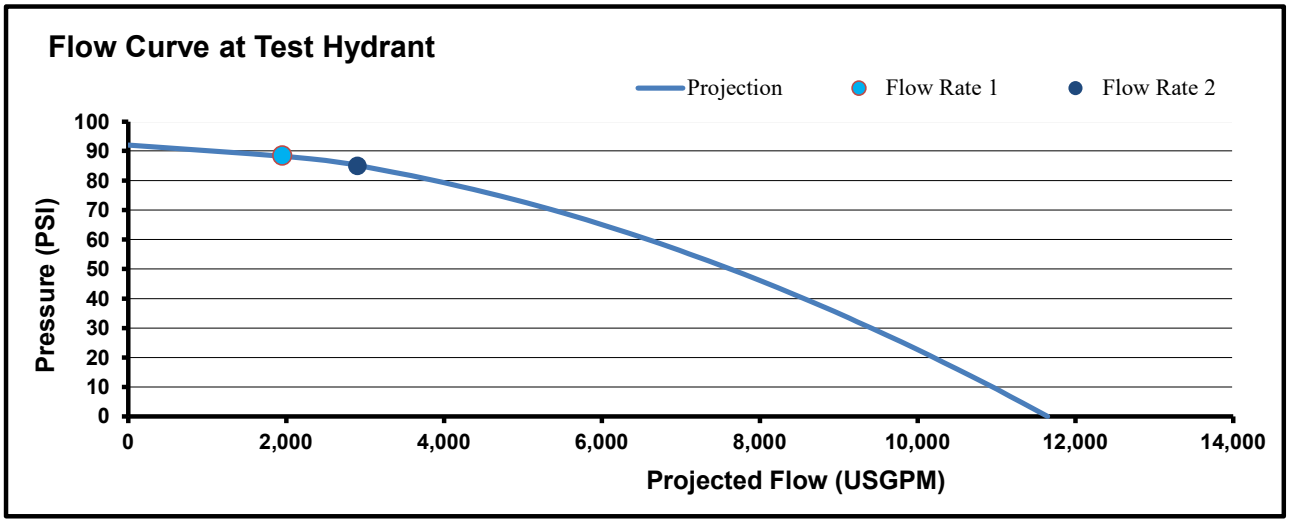
Residual Test Hydrant:	349 Davis Road (at South Service Rd E)		
Hydrant Number:		NFPA Colour Code:	**CLASS AA - BLUE**
Owner:			

STATIC PRESSURE:	92 psi	634 kPa	Pressure Drop
RESIDUAL PRESSURE 1:	88.5 psi	610 kPa	3.8%
RESIDUAL PRESSURE 2:	85 psi	586 kPa	7.6%

			Hydrant Number
Flow Hydrants:	A	359 Davis Road	
	B		
	C		

Hydrant No.	Flow Device	Outlet Dia. (in.)	Flow Rate 1 Reading (psi)	Flow Rate 1 (USGPM)	Flow Rate 2 Reading (psi)	Flow Rate 2 (USGPM)
A	Pitot	2.5	39	974	18	662
A	Pitot	2.5	39	974	18	662
A	HoseMonster	4"				1575
Total Flow (USGPM)			1948		2899	
Total Flow (L/second)			123		183	
Available Flow At Test Hydrant at 20 ps			9,974	USGPM	10,205	USGPM
			629	L/second	644	L/second

Average Projection at 20 PSI	10,089	USGPM



Comments/Discrepencies/Diagram:

Watermark Solutions Limited
(705) 250-0368 www.watermark.ca

James Fletcher

From: david@studiovma.com
Sent: August 17, 2022 10:41 AM
To: Brendan Walton
Cc: James Fletcher; 'Veronica Madonna'
Subject: RE: Fire Underwriter's Survey Inquiry - 349 Davis Road (2259-6324)

Categories: Filed to Sharepoint

Hi Brendan,

Hope you're doing well too.
For the proposed building, the construction can be noted as:
Type II – Non-combustible Construction
And
The building will have a complete automatic sprinkler system, satisfying the 3 criteria.

Best Regards,

David Di Biase, B.Arch.Sc.
Partner

STUDIO VERONICA MADONNA ARCHITECT

7 Colwyn Road, Toronto, ON. M8Z 3R8
WorkCo., 39 Advance Rd, Etobicoke ON. M8Z 2S6
416.908.9378
david@studiovma.com

studiovma.com

** Please consider the environment before printing this page. **

From: Brendan Walton <bwalton@cfcrozier.ca>
Sent: August 16, 2022 11:56 AM
To: Veronica Madonna <veronica@studiovma.com>; david@studiovma.com
Cc: James Fletcher <jfletcher@cfcrozier.ca>
Subject: Fire Underwriter's Survey Inquiry - 349 Davis Road (2259-6324)

Hi Veronica, David,

I hope you are doing well! We are estimating the fire flow required for the development using the Fire Underwriter's Survey Method (2020) (see attached) and have a couple items we would like to confirm about the proposed building before we proceed:

1. What type of construction is proposed for the building? For example, Type III – Ordinary Construction, Type II – Noncombustible Construction, Type III – Ordinary Construction, etc. The description of each construction type is included on page 20 – 21 of the attached.

2. Will the building have a complete automatic sprinkler system? If yes, we can reduce our required fire flow by 50%.

There are 3 separate criteria required to be satisfied to meet this classification – **i)** Automatic sprinkler protection design and installed in accordance with NFPA 13, **ii)** Water supply is standard for both the system and Fire Department hose lines, and **iii)** Fully supervised system. The details to meet each criterion is described on page 27 – 29 of the attached.

Thanks in advance for your help with this!

Kind regards,

Brendan

Brendan Walton, P.Eng. | Project Manager
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

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CONSULTING ENGINEERS

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Read our latest news and announcements here.

CROZIER CONSULTING ENGINEERS

349 DAVIS ROAD, TOWN OF OAKVILLE
Fire Protection Volume Calculation
CFCA File: 2259-6324

Date: 8/19/2022
Designed By: JF
Checked By: BW

Water Supply for Public Fire Protection (2020)
Fire Underwriters Survey
Assumptions:

1) Building construction assumed to be (Type II - Non-combustible construction, C = 0.8) with automatic sprinkler design system satisfying all 3 criterion based on email correspondence with Architect (RE: Fire Underwriter's Survey Inquiry - 349 Davis Road, August 17, 2022).
2) Vertical openings assumed to be unprotected to determine Total Effective Area (A).
3) High density mixed use building assumed to have both Residential (Group C) and Business (Group D) occupancies. Residential occupancy (Group C) is taken as governing occupancy to calculate Step 2's reduction factor.
4) Fire protection volume calculations and proposed site/building characteritics are based on Site Plan (No. 6) prepared by Studio Veronica Madonna Architect dated August 10, 2022.

Part II - Guide for Determination of Required Fire Flow (RFF)

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

Where:

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	0.8	for type IV-A mass timber construction
=	0.9	for type IV-B mass timber construction
=	1.0	for type IV-C mass timber construction
=	1.5	for type IV-D mass timber construction
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	**0.8**	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The largest floor area in square meters (plus the following percentages of the total areas of the other floors).

For Construction Coefficient from 1.0 to 1.5:
= 100% of ALL Floor Areas
For Construction Coefficient below 1.0:
- Floors With Any Unprotected Vertical Openings in the Building
= two largest adjoining floors + 50% all floors immediately above (max 8 floors)
- Floors With Any Protected Vertical Openings and Protected Exterior Vertical Communications
= 25% each of two immediately adjoining floors

Proposed Buildings

Area:

A= 7,260.70 sq.m

C= 0.8

Therefore RFF = 14,997 L/min

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

Total Effective Area calculation based on areas provided by Site Plan (No. 6) prepared by Studio Veronica Madonna Architect dated August 10, 2022.

A = (Ground Floor Area+1st Floor Area)+0.5*(Sum of 2nd to 11th Floor Areas)

A = (1570.84+1570.84)+0.5*(1570.84+1570.84+1470.41+725.19 + 725.19 + 725.19 + 725.19 + 725.19)

A = 7260.70 m^2

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

*Non-Combustible	-25%	Free Burning	15%
Limited Combustible	**-15%**	Rapid Burning	25%
Combustible	0%		

Refer to Table 3 Recommended Occupancy/Contents Charges by Major Occupancy Examples.

Occupancy Type: Residential - C Reduction %: -15%

2,250 L/min reduction
Subtotal = 12,747 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above may be reduced by up to 50% for complete automatic sprinkler protection.

Automatic Sprinkler Design System	Credit to part of building with coverage
Automatic sprinkler protection designed and installed in accordance with NFPA 13.	**30%**
Water supply is standard for both the system and Fire Department hose lines.	**10%**
Fully supervised system.	**10%**

Reduction %: 50%

7,498 L/min reduction
Subtotal = 5,249 L/min

CROZIER CONSULTING ENGINEERS

349 DAVIS ROAD, TOWN OF OAKVILLE
Fire Protection Volume Calculation
CFCA File: 2259-6324

Date: 8/19/2022
Designed By: JF
Checked By: BW

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 30 meters by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	>30 m	0%
10.1 to 20 m	15%		

East building exposure surcharge reduced according to Table 6 - Exposure Adjustment Charges for Subject Building considering Construction types of Exposed Building Face.

Assuming:
- 16 m distance to exposure
- Type I-II^2 (unprotected) construction of exposed face
- Length - height factor of 31 (62m - 2 stories)

Exposed buildings

Name	Distance	Charge	Surcharge (L/min)
North	N/A - No Buildings	0%	0
South - Ex. Commercial	37 m	0%	0
East - Ex. Commercial	16 m	4%	600
West - Ex. Institutional	93 m	0%	0
Total Surcharge			**600**

Determine Required Fire Flow

No.1	14,997			
No. 2	2,250	reduction		
No. 3	7,498	reduction		
No. 4	600	surcharge		
Required Flow:	**5,849**	**L/min**		
Rounded to nearest 1000 L/min:	**6,000**	**L/min**	or	**100 L/s**
				1,584 USGPM

Note: USGPM = 0.264*(L/min)

Required Duration of Fire Flow	
Flow Required (L/min)	Duration (hours)
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	**2.00**
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

APPENDIX B

Sanitary Demand Calculations

CROZIER CONSULTING ENGINEERS

Project: 349 Davis Road | **Created By:** JF | **Date:** 8/19/2022
Project No.: 2259-6324 | **Checked By:** BW | **Updated:** -

Domestic Wastewater Design Flow - Proposed Site-Specific Population

Total Site Area =	0.42	ha
Residential GFA =	33,633.21	m^2
Commercial/Office GFA =	2,259.95	m^2

Residential Apartment Population:

Population =	661	

Commercial/Office Population:

Population =	59	
Total Site Population =	720	

Design Parameters:

Residential Dry Weather Flow =	0.275	m^3/capita/d
Commercial Dry Weather Flow =	0.275	m^3/capita/d

Residential Average Dry Weather Wastewater Flow:

Average Dry Weather Daily Flow =	181,775	L/d
=	**2.10**	L/s

Commercial Average Dry Weather Wastewater Flow:

Average Dry Weather Daily Flow =	16,225	L/d
=	**0.19**	L/s
Total Average Dry Weather Flow =	**2.29**	L/s

Modified Harmon Peak Factor:

K_{av} =	0.99	
M =	3.84	
Peak Dry Weather Flow =	**8.80**	L/s

Infiltration Flow:

Infiltration =	0.286	L/ha/s
Total Infiltration =	**0.12**	L/s
Total Peak Design Flow =	**8.92**	L/s

Summary Table:

Average Daily Flow (L/s)	Peaking Factor	Peak Dry Weather Flow (L/s)	Infiltration Flow (L/s)	Total Peak Design Flow (L/s)
2.29	3.84	8.80	0.12	8.92

Notes & References

Site Areas obtained from Site Plan (No. 6 - Existing Building w/ Proposed Building) prepared by Studio Veronica Madonna Architect (August 10, 2022)

Proposed site-specific population provided by Planner through email correspondance, Re: 349 Davis Road - Proposed Mixed Use Building, Jonabelle Ceremuga (August 16, 2022)

Residential and Commercial wastewater design flow criteria from Table 3-1 and 3-2 respectively from the Region of Halton Linear Design Manual (Version 5, October 2019)

Residential Average Dry Weather Daily Flow (L/s) = Average Dry Weather Flow (m^3/capita/day) * Population * 1000 / 86400

Commercial Average Dry Weather Daily Flow (L/s) = Average Dry Weather Flow (m^3/capita/day) * Population * 1000 / 86400

$$M = K_{av} \times \left(1 + \frac{14}{4 + \sqrt{P + P_e}}\right)$$

where, $$K_{av} = \frac{A_R + 0.80 \times (A_I + A_C)}{A_R + A_I + A_C}$$

and
M = ratio of peak flow to average flow*
P = tributary population in thousands
P_e = equivalent tributary population in thousands
A_R = residential land use area (ha)
A_I = industrial land use area (ha)
A_C = commercial land use area (ha)

Residential and Commercial/Office Ground Floor Areas (GFAs) used to calculate K_{av}

Peak Dry Weather Flow = Total Average Dry Sanitary Flow * M

Infiltration flow from Section 3.2.1 from the Region of Halton Linear Design Manual (Version 5, October 2019)

Total Peak Design Flow = Peak Dry Weather Flow + Total Infiltration

APPENDIX C

Stormwater Management Calculations

CROZIER
CONSULTING ENGINEERS

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: INPUT PARAMETERS

Storm Data: AES Toronto (Bloor Street) Gauge per Town of Oakville standards

Time of Concentration (Tc): 10 min

Return Period	A	B	C	i (mm/hr)
2-Year	725	4.8	0.808	82.2
5-Year	1170	5.8	0.843	114.2
10-Year	1400	5.8	0.848	134.8
25-Year	1680	5.6	0.851	162.2
50-Year	1960	5.8	0.861	182.1
100-Year	2150	5.7	0.861	200.8

EXTERNAL DRAINAGE WEIGHTED RUNOFF COEFFICIENT

Catchment EXT1 **Total Area =** **0.02 ha**

Land Use	Pervious	Impervious
RC	0.25	0.90
A (ha)	0.018	0.0
A*RC	0.004	0.0
Weighted RC	0.25	
Adjusted Weighted RC - 25 yr	0.28	
Adjusted Weighted RC - 50 yr	0.30	
Adjusted Weighted RC - 100 yr	0.31	

PRE-DEVELOPMENT WEIGHTED RUNOFF COEFFICIENT

Catchment 101 **Total Area =** **0.42 ha**

Land Use	Pervious	Impervious
RC	0.25	0.90
A (ha)	0.157	0.27
A*RC	0.039	0.239
Weighted RC	0.66	
Adjusted Weighted RC - 25 yr	0.72	
Adjusted Weighted RC - 50 yr	0.74	
Adjusted Weighted RC - 100 yr	0.74	

POST-DEVELOPMENT WEIGHTED RUNOFF COEFFICIENT

Catchment 201 (Controlled) **Total Area =** **0.42 ha**

Land Use	Pervious	Impervious
RC	0.25	0.90
A (ha)	0.080	0.34
A*RC	0.020	0.308
Weighted RC	0.78	
Adjusted Weighted RC - 25 yr	0.85	
Adjusted Weighted RC - 50 yr	0.87	
Adjusted Weighted RC - 100 yr	0.87	

PEAK STORMWATER FLOWS

Return Period	External Drainage (EXT1) Peak Flow Q (L/s)	Pre-Dev (101) Peak flow Q (L/s)	Post-Dev (201) Peak flow Q (L/s)	Target Peak Flow[2] Q (L/s)
2-Year	1	64	75	32
5-Year	1	88	104	44
10-Year	2	104	123	52
25-Year	2	138	163	69
50-Year	3	158	186	79
100-Year	3	176	205	88

References

1. Time of Concentration, Town of Oakville Development Enaineerina Standards.
2. Runoff Coefficients, MTO Drainage Mangement Manual (1997).
3. Midtown Oakville Transportation and Stormwater Municipal Class EA Final Report (June 2014).

Equations

i= Intensity (mm/hr)
Tc = time of concentration (hr)

$$i = \frac{A}{(T_c + B)^C}$$

Q = Flow Rate (L/s)
RC =Runoff Coefficient
i = Intensity (mm/hr)
A = Area (m^2)

$$Q = 2.78(RC)i_{Td}A$$

Notes

1. Runoff coefficients adjusted per Design Chart 1.07, MTO Drainage Mangement Manual (1997).

2. Target Peak Flows = 50% Pre-Dev Peak Flow per Section 2.5.1, Midtown Oakville Transportation and Stormwater Municipal Class EA Final Report (June 2014).

CROZIER
CONSULTING ENGINEERS

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: RESULTS SUMMARY

Return Period	External Drainage (EXT1) Peak Flow L/s	Pre-Dev (101) Peak flow L/s	Post-Dev (201) Uncontrolled Peak flow L/s	Controlled Peak Flow L/s	Storage Required m^3	Storage Provided m^3
2-Year	1	64	75	30	27	119
5-Year	1	88	104	37	41	
10-Year	2	104	123	42	50	
25-Year	2	138	163	50	71	
50-Year	3	158	186	54	83	
100-Year	3	176	205	58	93	

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: 100-YEAR STORM EVENT

Town of Oakville IDF 100-Year		Catchment EXT1[1]	Catchment 201	Site Requirements	
a=	2150	3 L/s	205 L/s	Controlled Release Rate at Outlet =	58 L/s
b=	5.7	0.02 ha	0.42 ha	Time of Concentration =	10 min
c=	0.861	0.31 RC	0.87 RC	Max. Storage Volume Required =	93 m3

Time (T_d) (minutes)	Intensity (i) (mm/hr)	Q_{Runoff} (L/s)	Q_{Runoff} (L/s)	$Q_{Release}$ (L/s)	Q_{Net} (L/s)	$V_{Storage}$ (m^3)
10	200.8	3	205	58	147	88
15	158.3	2	162	58	104	93
20	131.4	2	134	58	76	91
25	112.7	2	115	58	57	86
30	99.0	2	101	58	43	77
35	88.4	1	90	58	32	68
40	80.0	1	82	58	24	57
45	73.2	1	75	58	17	45
50	67.5	1	69	58	11	32
55	62.7	1	64	58	6	20
60	58.5	1	60	58	2	6
65	55.0	1	56	56	0	0
70	51.8	1	53	53	0	0
75	49.0	1	50	50	0	0
80	46.6	1	48	48	0	0
85	44.4	1	45	45	0	0
90	42.4	1	43	43	0	0
95	40.5	1	41	41	0	0
100	38.9	1	40	40	0	0
105	37.4	1	38	38	0	0
110	36.0	1	37	37	0	0
115	34.7	1	35	35	0	0
120	33.5	1	34	34	0	0
125	32.4	1	33	33	0	0
130	31.4	0	32	32	0	0
135	30.4	0	31	31	0	0
140	29.5	0	30	30	0	0
145	28.6	0	29	29	0	0
150	27.9	0	28	28	0	0
155	27.1	0	28	28	0	0
160	26.4	0	27	27	0	0
165	25.7	0	26	26	0	0

Notes

1. External catchment (EXT1) runoff is not accounted for in storage calculations.

Equations

$Q = 2.78(RC)i_{Td}A$ $\quad V = Q_{net}T_d$

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: 50-YEAR STORM EVENT

Town of Oakville IDF 50-Year		Catchment EXT1[1]	Catchment 201	Site Requirements		
a=	1960	3 L/s	186 L/s	Controlled Release Rate at Outlet =		54 L/s
b=	5.8	0.02 ha	0.42 ha	Time of Concentration =		10 min
c=	0.861	0.30 RC	0.87 RC	Max. Storage Volume Required =		83 m3
Time (T_d) (minutes)	**Intensity (i)** (mm/hr)	**Q_{Runoff}** (L/s)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Q_{Net}** (L/s)	**$V_{Storage}$** (m^3)
10	182.1	3	186	54	131	79
15	143.7	2	146	54	92	83
20	119.4	2	122	54	67	81
25	102.5	2	104	54	50	75
30	90.0	1	92	54	37	67
35	80.4	1	82	54	28	58
40	72.8	1	74	54	20	47
45	66.6	1	68	54	13	36
50	61.4	1	63	54	8	25
55	57.1	1	58	54	4	12
60	53.3	1	54	54	0	0
65	50.0	1	51	51	0	0
70	47.2	1	48	48	0	0
75	44.7	1	46	46	0	0
80	42.4	1	43	43	0	0
85	40.4	1	41	41	0	0
90	38.6	1	39	39	0	0
95	36.9	1	38	38	0	0
100	35.4	1	36	36	0	0
105	34.0	1	35	35	0	0
110	32.8	0	33	33	0	0
115	31.6	0	32	32	0	0
120	30.5	0	31	31	0	0
125	29.5	0	30	30	0	0
130	28.6	0	29	29	0	0
135	27.7	0	28	28	0	0
140	26.9	0	27	27	0	0
145	26.1	0	27	27	0	0
150	25.4	0	26	26	0	0
155	24.7	0	25	25	0	0
160	24.1	0	25	25	0	0
165	23.4	0	24	24	0	0

Notes

1. External catchment (EXT1) runoff is not accounted for in storage calculations.

Equations

$Q = 2.78(RC)i_{Td}A$ $\quad V = Q_{net}T_d$

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: 25-YEAR STORM EVENT

Town of Oakville IDF 25-Year		Catchment EXT1[1]	Catchment 201	Site Requirements		
a=	1680	2 L/s	163 L/s	Controlled Release Rate at Outlet =		50 L/s
b=	5.6	0.02 ha	0.42 ha	Time of Concentration =		10 min
c=	0.851	0.28 RC	0.85 RC	Max. Storage Volume Required =		71 m3
Time (T_d) (minutes)	**Intensity (i)** (mm/hr)	**Q_{Runoff}** (L/s)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Q_{Net}** (L/s)	**$V_{Storage}$** (m^3)
10	162.2	2	163	50	113	68
15	128.0	2	129	50	78	71
20	106.4	1	107	50	57	68
25	91.4	1	92	50	42	62
30	80.4	1	81	50	31	55
35	71.9	1	72	50	22	46
40	65.1	1	65	50	15	37
45	59.6	1	60	50	10	26
50	55.0	1	55	50	5	15
55	51.1	1	51	50	1	4
60	47.8	1	48	48	0	0
65	44.9	1	45	45	0	0
70	42.3	1	43	43	0	0
75	40.1	1	40	40	0	0
80	38.1	1	38	38	0	0
85	36.3	0	36	36	0	0
90	34.7	0	35	35	0	0
95	33.2	0	33	33	0	0
100	31.9	0	32	32	0	0
105	30.6	0	31	31	0	0
110	29.5	0	30	30	0	0
115	28.5	0	29	29	0	0
120	27.5	0	28	28	0	0
125	26.6	0	27	27	0	0
130	25.7	0	26	26	0	0
135	25.0	0	25	25	0	0
140	24.2	0	24	24	0	0
145	23.5	0	24	24	0	0
150	22.9	0	23	23	0	0
155	22.3	0	22	22	0	0
160	21.7	0	22	22	0	0
165	21.2	0	21	21	0	0

Notes

1. External catchment (EXT1) runoff is not accounted for in storage calculations.

Equations

$Q = 2.78(RC)i_{Td}A$ $\quad V = Q_{net}T_d$

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: 10-YEAR STORM EVENT

Town of Oakville IDF 10-Year		Catchment EXT1[1]	Catchment 201	Site Requirements		
a=	1400	2 L/s	123 L/s	Controlled Release Rate at Outlet =		42 L/s
b=	5.8	0.02 ha	0.42 ha	Time of Concentration =		10 min
c=	0.848	0.25 RC	0.78 RC	Max. Storage Volume Required =		50 m3
Time (T_d) (minutes)	**Intensity (i)** (mm/hr)	**Q_{Runoff}** (L/s)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Q_{Net}** (L/s)	**$V_{Storage}$** (m^3)
10	134.8	2	123	42	81	49
15	106.8	1	97	42	56	50
20	88.9	1	81	42	39	47
25	76.5	1	70	42	28	42
30	67.4	1	62	42	20	36
35	60.3	1	55	42	13	28
40	54.7	1	50	42	8	20
45	50.1	1	46	42	4	11
50	46.2	1	42	42	0	1
55	43.0	1	39	39	0	0
60	40.2	0	37	37	0	0
65	37.8	0	34	34	0	0
70	35.7	0	33	33	0	0
75	33.8	0	31	31	0	0
80	32.1	0	29	29	0	0
85	30.6	0	28	28	0	0
90	29.2	0	27	27	0	0
95	28.0	0	26	26	0	0
100	26.9	0	25	25	0	0
105	25.8	0	24	24	0	0
110	24.9	0	23	23	0	0
115	24.0	0	22	22	0	0
120	23.2	0	21	21	0	0
125	22.5	0	20	20	0	0
130	21.7	0	20	20	0	0
135	21.1	0	19	19	0	0
140	20.5	0	19	19	0	0
145	19.9	0	18	18	0	0
150	19.4	0	18	18	0	0
155	18.8	0	17	17	0	0
160	18.4	0	17	17	0	0
165	17.9	0	16	16	0	0

Notes

1. External catchment (EXT1) runoff is not accounted for in storage calculations.

Equations

$Q = 2.78(RC)i_{Td}A$ $\quad V = Q_{net}T_d$

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: 5-YEAR STORM EVENT

Town of Oakville IDF 5-Year		Catchment EXT1[1]	Catchment 201	Site Requirements		
a=	1170	1 L/s	104 L/s	Controlled Release Rate at Outlet =		37 L/s
b=	5.8	0.02 ha	0.42 ha	Time of Concentration =		10 min
c=	0.843	0.25 RC	0.78 RC	Max. Storage Volume Required =		41 m3
Time (T_d) (minutes)	**Intensity (i)** (mm/hr)	**Q_{Runoff}** (L/s)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Q_{Net}** (L/s)	**$V_{Storage}$** (m^3)
10	114.2	1	104	37	67	40
15	90.6	1	83	37	45	41
20	75.5	1	69	37	32	38
25	65.1	1	59	37	22	33
30	57.3	1	52	37	15	27
35	51.3	1	47	37	10	20
40	46.6	1	43	37	5	13
45	42.7	1	39	37	2	5
50	39.4	0	36	36	0	0
55	36.7	0	33	33	0	0
60	34.3	0	31	31	0	0
65	32.3	0	29	29	0	0
70	30.5	0	28	28	0	0
75	28.9	0	26	26	0	0
80	27.4	0	25	25	0	0
85	26.2	0	24	24	0	0
90	25.0	0	23	23	0	0
95	23.9	0	22	22	0	0
100	23.0	0	21	21	0	0
105	22.1	0	20	20	0	0
110	21.3	0	19	19	0	0
115	20.6	0	19	19	0	0
120	19.9	0	18	18	0	0
125	19.2	0	18	18	0	0
130	18.6	0	17	17	0	0
135	18.1	0	16	16	0	0
140	17.5	0	16	16	0	0
145	17.1	0	16	16	0	0
150	16.6	0	15	15	0	0
155	16.2	0	15	15	0	0
160	15.7	0	14	14	0	0
165	15.4	0	14	14	0	0

Notes

1. External catchment (EXT1) runoff is not accounted for in storage calculations.

Equations

$Q = 2.78(RC)i_{Td}A$ $\quad V = Q_{net}T_d$

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD - TOWN OF OAKVILLE STANDARDS
MODIFIED RATIONAL METHOD CALCULATIONS: 2-YEAR STORM EVENT

Town of Oakville IDF 2-Year		Catchment EXT1[1]	Catchment 201	Site Requirements		
a=	725	1 L/s	75 L/s	Controlled Release Rate at Outlet =		30 L/s
b=	4.8	0.02 ha	0.42 ha	Time of Concentration =		10 min
c=	0.808	0.25 RC	0.78 RC	Max. Storage Volume Required =		27 m3
Time (T_d) (minutes)	**Intensity (i)** (mm/hr)	**Q_{Runoff}** (L/s)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Q_{Net}** (L/s)	**$V_{Storage}$** (m^3)
10	82.2	1	75	30	45	27
15	65.0	1	59	30	30	27
20	54.2	1	49	30	20	24
25	46.7	1	43	30	13	20
30	41.2	1	38	30	8	14
35	37.0	0	34	30	4	9
40	33.6	0	31	30	1	3
45	30.8	0	28	28	0	0
50	28.5	0	26	26	0	0
55	26.6	0	24	24	0	0
60	24.9	0	23	23	0	0
65	23.5	0	21	21	0	0
70	22.2	0	20	20	0	0
75	21.1	0	19	19	0	0
80	20.1	0	18	18	0	0
85	19.1	0	17	17	0	0
90	18.3	0	17	17	0	0
95	17.6	0	16	16	0	0
100	16.9	0	15	15	0	0
105	16.3	0	15	15	0	0
110	15.7	0	14	14	0	0
115	15.2	0	14	14	0	0
120	14.7	0	13	13	0	0
125	14.2	0	13	13	0	0
130	13.8	0	13	13	0	0
135	13.4	0	12	12	0	0
140	13.0	0	12	12	0	0
145	12.7	0	12	12	0	0
150	12.3	0	11	11	0	0
155	12.0	0	11	11	0	0
160	11.7	0	11	11	0	0
165	11.4	0	10	10	0	0

Notes

1. External catchment (EXT1) runoff is not accounted for in storage calculations.

Equations

$Q = 2.78(RC)i_{Td}A$ $\quad V = Q_{net}T_d$

Project: 349 Davis Road
Project No: 2259-6324
Created By: CM/JKF
Checked By: BW
Date: 19/Aug/2022

349 DAVIS ROAD
ORIFICE DESIGN SUMMARY

System Parameters	Symbol	Value	Units
Diameter of Orifice	d	135	mm
Area of Orifice	A_o	0.014	m^2
Orifice Coefficient	C_d	0.80	-
Bottom of Tank	-	100.88	m
Orifice Type	-	Tube	-
Invert Elevation	-	100.88	m

Pressure Head on Orifice	Symbol	Value	Units
Centroid Elevation	-	100.95	m
Water Elevation	-	102.64	m
Upstream Head[1]	h	1.69	m

Storage Requirements	Symbol	Value	Units
Storage Requirement per EA[2]	-	280.9	m^3 / ha
Site area	A_S	0.42	ha
Minimum Storage Required	S_R	118.8	m^3
Storage Provided	S_P	119.0	m^3

Maximum Orifice Controlled Discharge	**Q**	**66.0**	**L/s**

Equations

$$Q = C_d A_o \sqrt{2gh}$$

Notes

1. Upstream head is based upon the orifice area at orifice face, not the smallest flow cross section (Vena Contracta).

2. Minimum storage requirements based on Appendix J: Midtown Oakville Transportation and Municipal Class EA Final Report (Cole Engineering Group Ltd., June 2014).

3. Orifice Tube Pipe Specifications provided in Appendix C of FSRSWM Report.

MUNICIPAL

Gasketed Sewer Pipe

Storm and Sanitary Pipe for Use with Gasketed Sewer Fittings

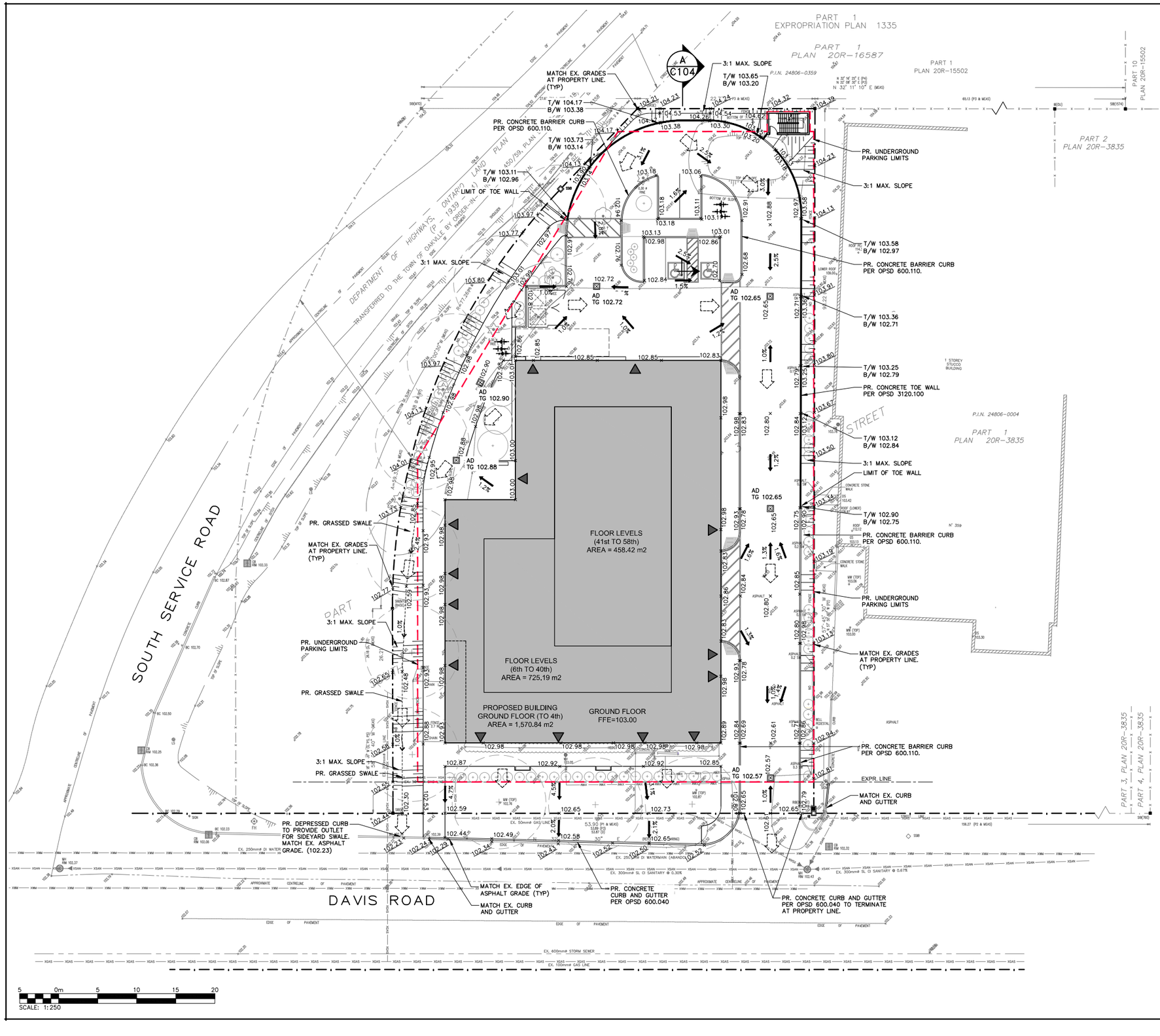
Westlake Pipe & Fittings

Dimensions				
Standard Dimension Ratio (SDR)	Nominal Size mm (in)	Average Inside Diameter, mm (in)	Average Wall Thickness, mm (in)	Average Outside Diameter
SDR28	100 (4)	99 (3.899)	4 (0.171)	107 (4.215)
	135 (5)	133 (5.128)	5 (0.211)	143 (5.640)
	150 (6)	147 (5.799)	6 (0.253)	159 (6.275)
SDR35	100 (4)	101 (3.957)	3 (0.129)	107 (4.215)
	135 (5)	135 (5.298)	4 (0.171)	143 (5.640)
	150 (6)	150 (5.893)	5 (0.191)	159 (6.275)
	200 (8)	201 (7.894)	6 (0.253)	213 (8.400)
	250 (10)	251 (9.866)	8 (0.317)	267 (10.500)
	300 (12)	298 (11.740)	10 (0.380)	318 (12.500)
	375 (15)	365 (14.378)	12 (0.461)	389 (15.300)
	450 (18)	446 (17.573)	14 (0.564)	475 (18.701)
	525 (21)	526 (20.713	17 (0.667)	560 (22.047)
	600 (24)	592 (23.303)	19 (0.750)	630 (24.803)
	675 (27)	667 (26.263)	21 (0.845)	710 (27.953)
SDR26	100 (4)	99 (3.873)	4 (0.171)	107 (4.215)
	150 (6)	147 (5.769	6 (0.253)	159 (6.275)
	200 (8)	195 (7.716)	9 (0.342)	213 (8.400)
	250 (10)	245 (9.652)	11 (0.424)	267 (10.500)
	300 (12)	292 (11.488)	13 (0.506)	318 (12.500)
	375 (15)	359 (14.392)	15 (0.604)	389 (15.300)
	450 (18)	437 (17.205)	19 (0.748)	475 (18.701)

Westlake
Pipe & Fittings

www.westlakepipe.com

DRAWINGS



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- ×215.00 EXISTING GRADE
- ×215.00 PROPOSED GRADE
- ×215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- 2.0% PROPOSED GRASSED SWALE
- PROPOSED EXTENTS OF SURFACE PONDING
- PROPOSED SNOW STORAGE AREA
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- BUILDING ENTRANCE (PERSONNEL DOOR)

5 0m 5 10 15 20
SCALE: 1:250

NOT FOR CONSTRUCTION

Stamp

FOR REVIEW

Stamp

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR OPA AND ZBA	2022/AUG/31

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO TOWN OF OAKVILLE BENCHMARK No. 37 WITH A PUBLISHED ELEVATION OF 94.327 METRES.

ALL FUTURE GRADE WORK ON SITE TO BE BASED ON SITE BENCHMARK. ANY ELEVATION DISCREPANCIES TO BE REPORTED TO GENESIS LAND SURVEYING INC.

SURVEY NOTES:

SURVEY COMPLETED BY GENESIS LAND SURVEYING INC. (2022/MAR/24)
PROJECT No. GLS-1253
BEARINGS ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF DAVIS ROAD HAVING A BEARING OF N 32° 08' 30" E AS SHOWN ON PLAN 20R-3835.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY STUDIO-VERONICA MADONNA ARCHITECT.
DRAWING No.: A100
PROJECT No.: 22003 REV.6 (2022/AUG/10)

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

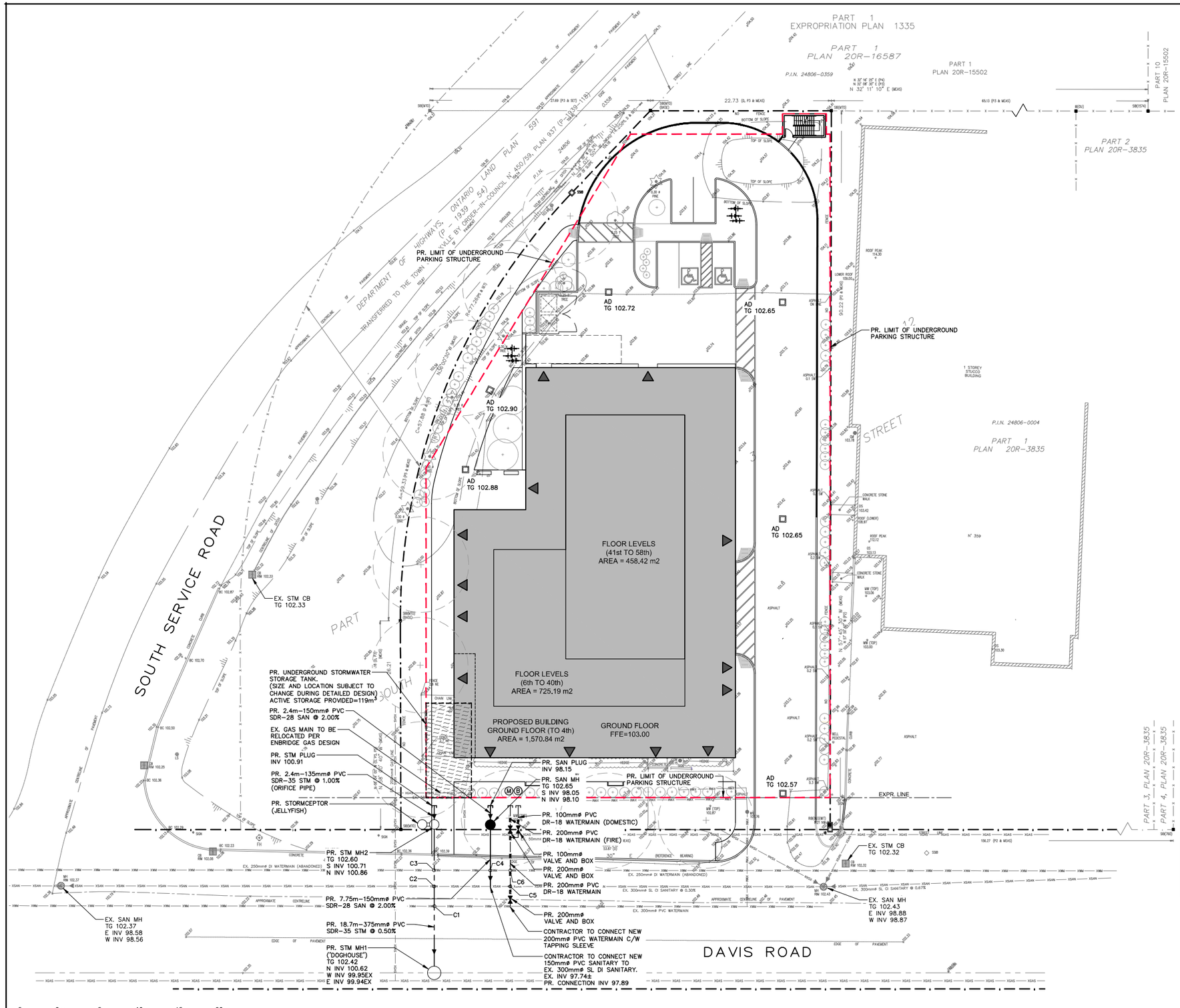
349 DAVIS ROAD
OAKVILLE, ONTARIO

Drawing

SITE GRADING PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	M.I.M.	Project No.	2259-6324
Check	S.C.	Check	B.W.	Scale	1:250
				Dwg.	C101



LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE CONNECTION
- (M) PROPOSED WATER METER (BY OTHERS)
- (B) PROPOSED BACKFLOW PREVENTOR (BY OTHERS)
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE

CROSSING TABLE		
CROSSING I.D.	UPPER	LOWER
C1	STM INV 100.67	EX. W/M OBV 100.16
C2	STM INV 100.68	EX. SAN OBV 99.00
C3	STM INV 100.69	EX. W/M OBV 100.16
C4	EX. W/M INV 99.91	SAN OBV 98.13
C5	W/M INV 99.76	EX. SAN OBV 99.03
C6	EX. W/M INV 99.91	W/M OBV 99.41

NOTE:

1. CONTRACTOR TO ENSURE A MINIMUM 0.50m VERTICAL SEPARATION BETWEEN THE WATERMAIN AND ALL SEWER CROSSINGS DURING CONSTRUCTION.
2. TRENCH DRAIN INVERTS AND ROOF DRAINS/DOWNSPOUTS PER MECHANICAL DESIGN AND SPECIFICATIONS.

NOT FOR CONSTRUCTION

Stamp

FOR REVIEW

Stamp

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR OPA AND ZBA	2022/AUG/31

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO TOWN OF OAKVILLE BENCHMARK No. 37 WITH A PUBLISHED ELEVATION OF 94.327 METRES.

ALL FUTURE GRADE WORK ON SITE TO BE BASED ON SITE BENCHMARK. ANY ELEVATION DISCREPANCIES TO BE REPORTED TO GENESIS LAND SURVEYING INC.

SURVEY NOTES:

SURVEY COMPLETED BY GENESIS LAND SURVEYING INC. (2022/MAR/24)
PROJECT No. GLS–1253
BEARINGS ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF DAVIS ROAD HAVING A BEARING OF N 32° 08' 30" E AS SHOWN ON PLAN 20R–3835.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY STUDIO–VERONICA MADONNA ARCHITECT.
DRAWING No.: A100
PROJECT No.: 22003 REV.6 (2022/AUG/10)

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

349 DAVIS ROAD
OAKVILLE, ONTARIO

Drawing

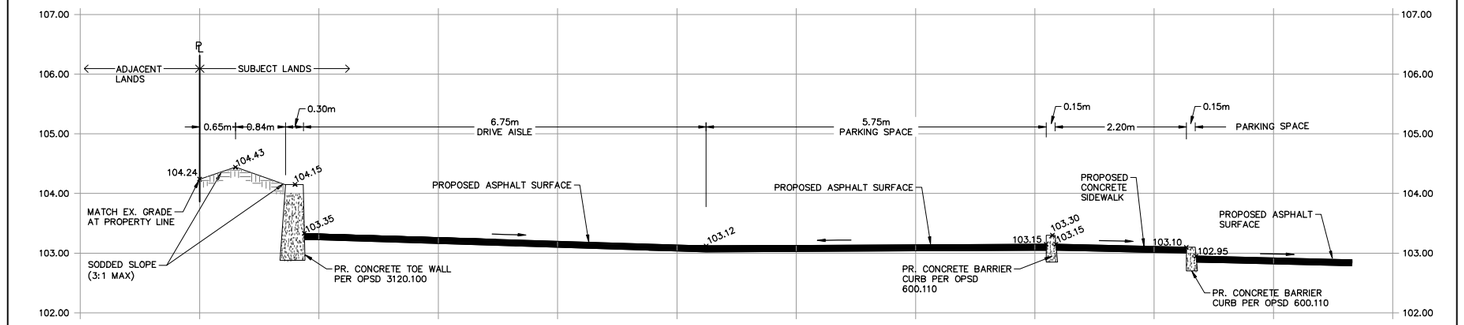
SITE SERVICING PLAN

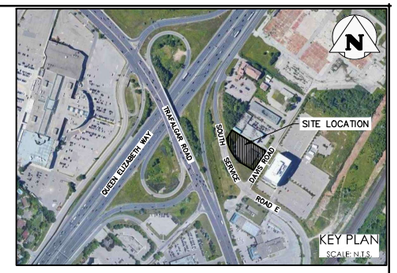
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905.875.0026 T
905.875.4915 F
WWW.CFCROZIER.CA

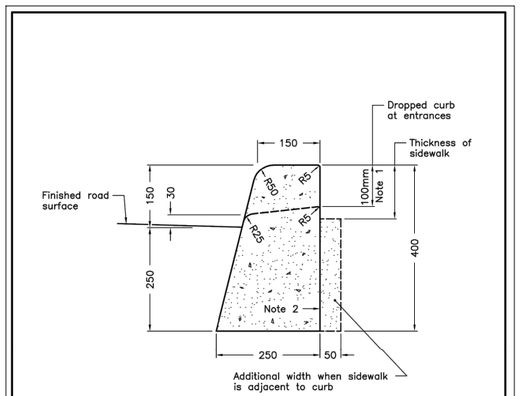
Drawn	Design	Project No.	
M.I.M.	M.I.M.	2259–6324	
Check	Check	Scale	Dwg.
S.C.	B.W.	1: 250	C102

SECTION A–A

SCALE: HOR: 1:50
VER: 1:50



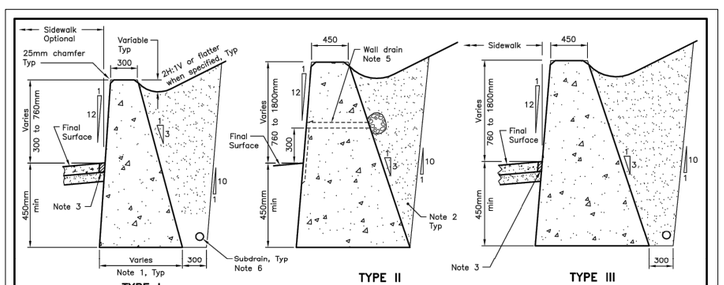




NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.

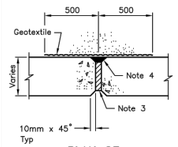
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
CONCRETE BARRIER CURB		OPSD 600.110



NOTES:
1 Walls shall be founded on undisturbed soil having a minimum bearing capacity at ultimate limit states of 200kPa for Type I and 300kPa for Type II and Type III.
2 Excavation for toe walls shall be backfilled with free draining granular material.
3 10mm preformed joint filler, Type A, non-extruding and resilient bituminous type as specified.
4 Cold applied rubber asphalt joint sealing compound.
5 Where specified, wall drains shall be installed as per OPSD 3190.100.
6 150mm dia perforated pipe subdrain wrapped in geotextile.

A Maximum height of slope above top of wall is 4m.
B Concrete for toe walls shall be 30MPa.
C All dimensions are in millimetres unless otherwise shown.



PLAN OF JOINT DETAIL IN CONCRETE TOE WALLS AT 3.0m SPACING

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2010	Rev 2
WALLS RETAINING CONCRETE TOE WALL		OPSD 3120.100

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR OPA AND ZBA	2022/AUG/31

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DRAWING No.: A100
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Project

349 DAVIS ROAD
OAKVILLE, ONTARIO

Drawing

SECTIONS AND DETAILS

NOT FOR CONSTRUCTION

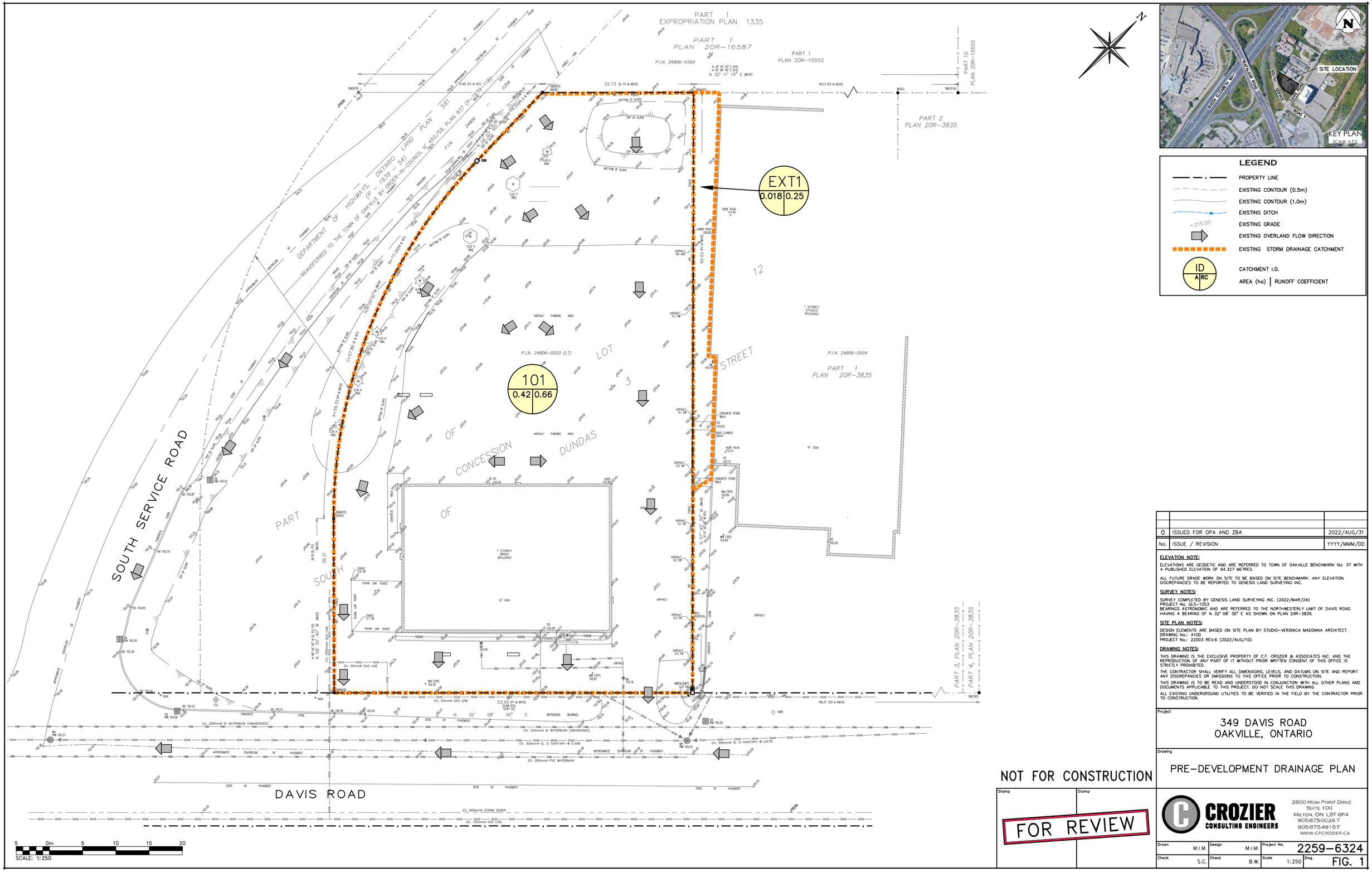
Stamp

FOR REVIEW

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-675-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
M.I.M.	M.I.M.		2259-6324
Check	Check	Scale	Dwg.
S.C.	B.W.	1: 250	C103



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE (×215.00)
- EXISTING OVERLAND FLOW DIRECTION
- EXISTING STORM DRAINAGE CATCHMENT
- ID / A | RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR OPA AND ZBA	2022/AUG/31

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Project

349 DAVIS ROAD
OAKVILLE, ONTARIO

Drawing

PRE-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

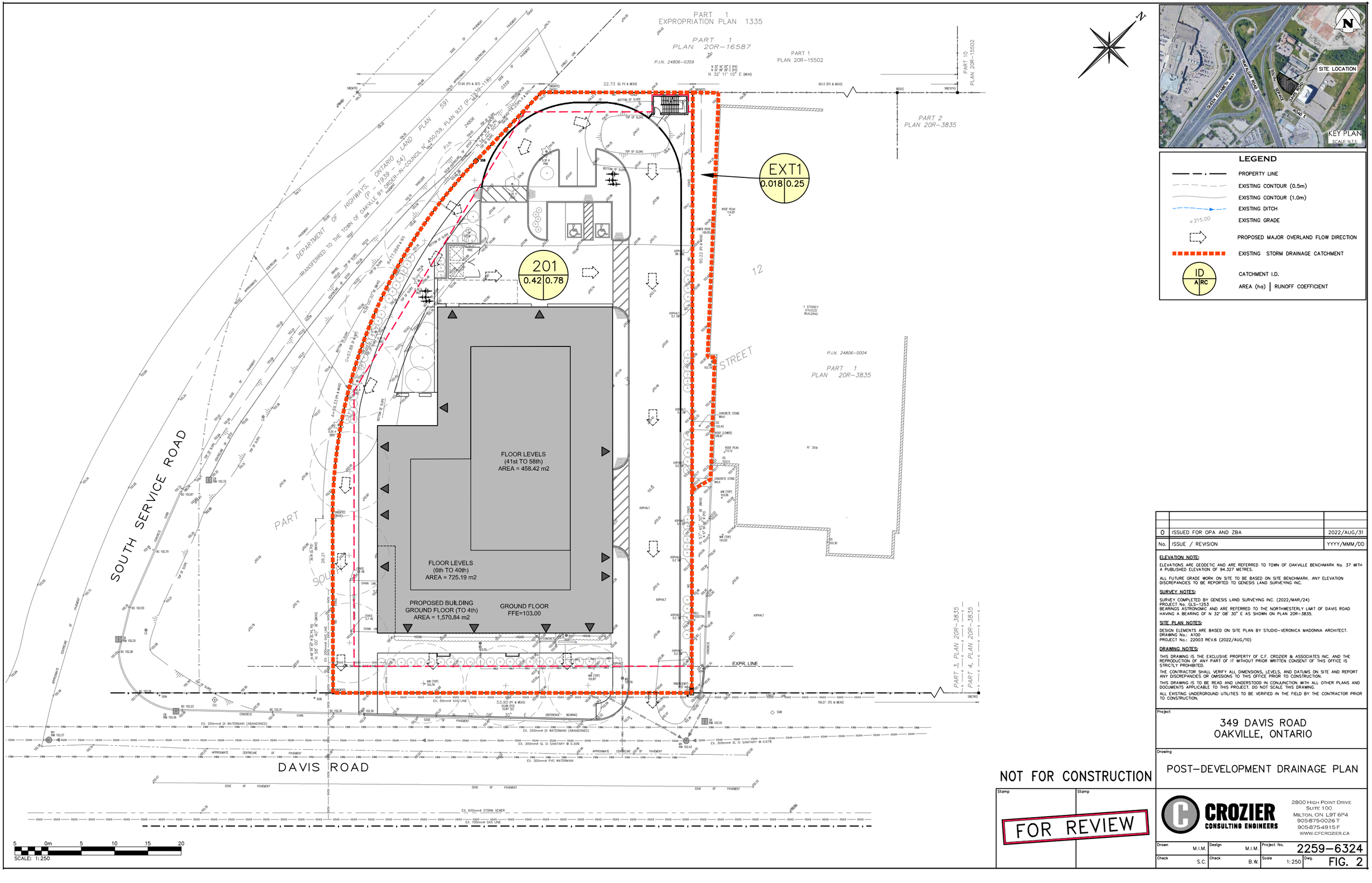
Stamp

FOR REVIEW

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905.875.0026 T
905.875.4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.
M.I.M.	M.I.M.	2259-6324
Check	Check	Scale / Dwg.
S.C.	B.W.	1:250 / FIG. 1



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Project

349 DAVIS ROAD
OAKVILLE, ONTARIO

Drawing

POST-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

Stamp

FOR REVIEW

Stamp

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.
M.I.M.	M.I.M.	2259-6324
Check	Check	Scale / Dwg.
S.C.	B.W.	1:250 / FIG. 2