FUNCTIONAL SERVICING AND PRELIMINARY STORMWATER MANAGEMENT REPORT

60 DUNDAS STREET EAST

CITY OF MISSISSAUGA
REGION OF PEEL

PREPARED FOR:

ACLP – DUNDAS STREET E

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

FEBRUARY 2022

CFCA FILE NO. 2234-6274

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev.0	February 2022	Issued for First Submission

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF FIGURES

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by ACLP – Dundas Street E to prepare a Functional Servicing and Stormwater Management Report. This report will support the applications for an Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) required to permit the mixed-use development at 60 Dundas Street East in the City of Mississauga, Region of Peel (the Site).

This report will demonstrate that the proposed site can be developed in accordance with the City of Mississauga and Region of Peel guidelines from a functional servicing and preliminary stormwater management perspective.

The reports and design standards referenced during the preparation of this report includes:

- Fire Underwriters Survey - Water Supply for Public Fire Protection (1999)
- Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March 2017)
- Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June 2010)
- City of Mississauga Development Requirements Manual (November 2020)
- Ministry of the Environment - Stormwater Management Planning and Design Manual (March 2003)

2.0 Site Description

The site is approximately 1.07 ha and currently consists of an existing commercial plaza and parking lot. The Site, located in a residential and commercial neighbourhood, is bounded by Dundas Street East to the north, Cooksville Creek to the east, an existing high-rise residential development to the south and Shepard Avenue to the west. A portion of the Site lies within the Regulatory Floodplain of Cooksville Creek.

According to the concept plan prepared by Chamberlain Architect Services Limited, dated January 13, 2022, the elements envisioned for this development include the construction of three high-rise towers over two phases.

- Phase 1:
    - Tower A: 36-Storeys standing over a 3-storey podium and retail space.
- Phase 2:
    - Tower B: 33-Storeys
    - Tower C: 29-Storeys
    - Both towers will be connected by a 5-storey podium.

- A mixed-use development with 1,224 residential units distributed across three towers and townhouses.
- 847 square metres of retail area on the ground floor.
- 5 levels of underground parking structure.

This Report considers the development in a full build-out scenario to represent the ultimate development conditions.

3.0 Water Servicing

Region of Peel is responsible for the operation and maintenance of the public water and treatment system in the City of Mississauga and all local systems must connect to the regional system. The existing and proposed water servicing is discussed in the following sections.

3.1 Existing Water Servicing

A review of Region of Peel as-built drawing No.32108-D dated October 2006 and drawing No.26042-D dated March 2001 indicate that:

- There is an existing 300 mm diameter watermain on the southern side of Dundas Street East, and an existing 150 mm diameter watermain on the northern side of Dundas Street East. Both connect to an existing 250 mm diameter watermain which runs along Shepard Avenue.
- There are two existing hydrants located north of the Site on Dundas Street East (HYD# 2020520) and west of the site on Shepard Avenue (HYD# 2018963).

3.2 Design Water Demand

The Region of Peel Linear Infrastructure Sanitary Sewer Manual (March 2017) and unit specific population per unit's (PPU's) provided by Chamberlain Architect Services Limited, was used to determine the equivalent population estimate for the Site. Table 1 outlines the equivalent population based on the provided PPU's. The detailed water demand calculations can be found in Appendix B.

Table 1: Equivalent Population Estimate

Unit Type	Number of Units	Population Per Unit	Equivalent Population
Apartment 2+	292	3	876
Apartment 1+	741	2	1482
Row	15	3	45
Single	176	1	176
Total Residential	**1224**	**--**	**2,579**
Amenity/Retail (m^2)	16,496	50 persons/ha	82
Total Building	**--**	**--**	**2,661**

Considering the unit breakdown for the Site, the total estimated population is 2,661 persons. The estimated domestic water demand for the proposed development was calculated with reference to Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June 2010) using an average daily water demand of 280 L/capita/day (300 L/capita/day for retail), a maximum day factor of 2.0 (1.4 for retail), a peak hour factor of 3.0, and the equivalent populations from Table 1.

Table 2 summarizes the estimated domestic water demand and Appendix B contains detailed water demand calculations.

Table 2: Estimated Domestic Design Water Demand

Standard	Population	Average Daily Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Residential	2,579	8.36	16.72	25.07
Retail/Amenity	82	0.29	0.40	0.86
Total	**2,661**	**8.64**	**17.12**	**25.93**

Note: References to Region of Peel design criteria are provided in Appendix B.

Using Region of Peel design criteria for domestic water demand, the domestic water service must convey a peak hour demand of 25.93 L/s.

3.3 Fire Flow Demand

The Fire Underwriters Survey method was used to estimate the fire flow demand for the proposed development. This calculation is used to estimate the size of the incoming fire line and does not provide a recommendation for fire protection. This calculation is based on the following assumptions:

- Buildings will use mainly concrete and steel construction materials and therefore a construction coefficient of 0.8 was applied to the fire flow calculations.
- The vertical openings and exterior vertical communications are properly protected (one-hour rating), therefore, the total floor area used in the calculation includes only the largest floor and 25% of each of the two immediately adjoining floors.
- It is assumed that the proposed buildings will have automatic sprinkler protection.

The proposed fire line is required to accommodate a fire flow of 133 L/s for a duration of 2.0 hours. Appendix C contains the Fire Underwriters Survey Calculations. Detailed fire flow calculations will be completed by the project Mechanical Engineer during detailed design.

3.4 Proposed Water Servicing

The development is proposed to be serviced by a 200 mm diameter PVC water service, extending from the existing 300 mm diameter watermain within Dundas Street East. The water service will split at property line into a 200 mm diameter fire line and a 100 mm diameter domestic service. The proposed towers are higher than 84 m and therefore require at least two sources of water from a public water system (OBC 3.2.9.7.4). Therefore, a second 200 mm diameter PVC water service will extend from the existing 300 mm diameter watermain within Dundas Street East to provide redundant water supply to the Site.

The internal water system of the building will be designed per the Mechanical Engineer's details and specifications.

A hydrant flow test has not been completed at this stage of the development since ambient temperatures are lower than Peel Region permits for such tests. EPAL was reviewed for existing hydrant flow test information, however, existing hydrant flow information was not available. A hydrant flow test will be required in the Spring to confirm the available flow and pressure from the existing 300 mm diameter watermain within Dundas Street East. The projected fire flow from the future hydrant flow test is required to meet or exceed the estimated fire flow demand of 133 L/s.

Refer to Figure 3 for the proposed preliminary servicing layout.

4.0 Sanitary Servicing

The Region of Peel is responsible for the operation and maintenance of the sanitary sewer network in the City of Mississauga. The existing and proposed sanitary servicing is outlined in the following sections.

4.1 Existing Sanitary Servicing

A review of Region of Peel as-built drawings No.32108-D dated October 2006 and drawing No.26042-D dated March 2001 indicate that:

- There is an existing 250 mm diameter sanitary sewer on Shepard Avenue.
- There is an existing 375 mm diameter sanitary sewer on Dundas Street East.

4.2 Design Sanitary Flow

The sanitary flow for the proposed development was calculated with reference to Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (March 2017) and the equivalent population estimate described in Section 3.2. Region of Peel design criteria unit sewage flow of 302.8 L/capita/day was used to determine the average daily flow. Infiltration flow into the sanitary sewer and a peaking factor were applied to the unit sewage flow to obtain the total estimated design sewage flow. A summary of the results is presented in Table 3 and detailed calculations are provided in Appendix B.

Table 3: Estimated Sanitary Design Flows

Standard[1]	Average Daily Flows (L/s)	Harmon Peaking Factor	Peak Flows (L/s)	Infiltration Flow (L/s)	Total Sanitary Flow[2] (L/s)
Region of Peel Public Works Design, Specification & Procedures Manual – Linear Infrastructure Sanitary Sewer Manual (March 2017)	9.33	3.49	32.5	0.21	32.7

1. References to Region of Peel design criteria are provided in Appendix B.
2. Total sanitary flow includes infiltration flow and peak flow.

The proposed sanitary service must convey a total design sanitary demand of 32.4 L/s.

4.3 Proposed Sanitary Servicing

Sanitary servicing will be provided by a 200 mm diameter sanitary lateral extending from the existing 375 mm diameter sanitary sewer within Dundas Street East (north of the Site). The pipe capacity for a 200 mm diameter lateral sloping at 2% is 46.38 L/s, which is greater than the total sanitary design flow of 32.4 L/s and therefore the proposed sanitary lateral has capacity to convey the design sanitary flow. The region is expected to confirm downstream capacity using their Region-wide system model following submission. The Preliminary Servicing Plan (Figure 2) illustrates the location of the sanitary lateral and the connection to the underground parking structure. The internal sanitary system of the building will be designed by the Mechanical Engineer's details and specifications.

Refer to Figure 3 for the proposed preliminary servicing layout.

5.0 Drainage Conditions

The drainage conditions for the Site in both the existing and proposed conditions are outlined in the following sections.

5.1 Existing Drainage Conditions

The Site currently consists of an existing commercial plaza and asphalt parking lot. The provided topographic survey for the Site (Askan Piller Corporation Ltd., February 4, 2022) to examine the existing drainage conditions and outlets. Figure 1 outlines the existing drainage catchment and overland flow routes. Stormwater generated within the site is collected by the existing catchbasins and assumed to outlet to the existing storm sewer within Dundas Street East (to be verified). Generally, overland flow from the Site outlets to Cooksville Creek from west to east of the Site. There is a small portion of the Site south of the existing building that appears to pond and spill to the adjacent Site.

A review of Region of Peel as-built drawing No.32108-D dated October 2006 and drawing No.26042-D dated March 2001 indicate that:

- A 600 mm diameter storm sewer within Dundas Street East.
- Twin 1,050 mm diameter storm sewers connecting to the 600 mm diameter storm sewer within Dundas Street East.

We assume there are no existing stormwater management controls within the Site considering its age. The pre-development drainage area is assumed to be the entire Site area of 1.07 ha. In accordance with City of Mississauga design criteria, a maximum pre-development RC of 0.50 was used for the existing commercial development.

5.2 Proposed Drainage Conditions

The proposed development consists of 3 mixed-use high-rise buildings, 2 of which will be connected via a 5-storey podium, 5 levels of underground parking, and two accesses from Dundas Street East and Shepard Avenue, respectively (Site Plan - Chamberlain Architect Services Limited (January 13, 2022).

Minor system stormwater will be conveyed from the Site to the existing 600 mm diameter storm sewer within Dundas Street East through the storm piping system within the underground parking garage, consisting of catchbasins and area drains. Stormwater will be controlled using an orifice tube prior to being treated by a stormwater filter unit (i.e., Jellyfish system or equivalent). A quantity control tank will be provided within the underground parking garage to attenuate the required storage volume to meet the stormwater quantity control criteria. Following quality treatment, minor system stormwater will be conveyed through the proposed 450 mm diameter storm lateral to the existing 600 mm diameter storm sewer within Dundas Street East, located north of the Site.

The proposed site grading assumes one post-development drainage catchment area as shown on Figure 2. Catchment 201 (A = 1.07 ha; RC = 0.75) includes drainage from the proposed development, including the building area, parking lot and landscaped areas. The proposed design is anticipated to contain and convey the 100-year peak storm event to the extent feasible. There will be minor drainage areas that cannot be captured due to site grading constraints. All reasonable efforts will be made to contain the 100-year event.

6.0 Stormwater Management

Stormwater management design criteria were established using the City of Mississauga standards. The stormwater management criteria include:

Water Quantity Control

Control the 100-year post-development peak flow to 2-year pre-development peak flow in accordance with the Cooksville Creek design criteria.

Water Quality Control

Private stormwater discharging from the proposed development must achieve Ontario Ministry of the Environment, Conservation and Parks (MECP) Enhanced Level of protection (80% total suspended solids (TSS) removal) for water quality control prior to discharging to the City's storm sewer network.

Water Balance

Retention of the first 5 mm of rainfall for private development areas is required by the City of Mississauga Development Requirements Manual (November 2020) to achieve the water balance criteria.

6.1 Stormwater Quantity Control

6.1.1 Regional Flood Control

A portion of the Site experiences flooding during the Regional storm event. Crozier completed a Floodplain Study (February 2022) under separate cover, outlining the required flood proofing measures. The proposed Preliminary Site Grading and Drainage Figure (Figure 3), accommodates the flood proofing elevations and safe access requirements for the proposed development.

6.1.2 Site Stormwater Management Controls

Using the City of Mississauga intensity-duration-frequency (IDF) data, the Modified Rational Method was used to determine the pre- and post-development flows for the Site. The peak flows were then used to determine the required stormwater quantity control for the proposed development in accordance with the Cooksville Creek design criteria.

Table 4 outlines the Modified Rational Method results with detailed calculations provided in Appendix D.

Table 4: Summary of Peak Flow Rates and Required Storage Volume

Return Period @ Tc = 15 min	Pre-Dev RC	Post-Dev RC	Pre-Dev Q_{peak} (L/s)	Post-Dev Q_{peak} (L/s)	Post-Dev $Q_{release}$ (L/s)	Required Storage (m^3)
2-Year	0.50	0.75	89	134	89	40
5-Year	0.50	0.75	119	179		82
10-Year	0.50	0.75	147	221		119
25-Year	0.55	0.83	186	279		174
50-Year	0.60	0.90	226	340		237
100-Year	0.63	0.94	261	392		295

As presented in Table 4, approximately 295 m^3 of stormwater storage is required to achieve the stormwater quantity control criteria. The Cooksville Creek criteria was more stringent and therefore used to calculate required storage volume. A downstream storm sewer capacity analysis can be completed during detailed design, if required.

A stormwater tank located within the underground parking structure is proposed to provide the required 295 m^3 of on-site stormwater storage. The underground stormwater tank will be designed in accordance with the Architectural, Structural, and Mechanical building design details and specifications. An orifice tube downstream of the stormwater tank will attenuate peak flows from Catchment 201 such that the total 100-year peak stormwater flows from the Site is less than or equal to the 2-year pre-development peak flow, therefore, achieving the stormwater quantity control criteria. Appendix D contains detailed calculations of the stormwater peak flows and storage requirements.

6.2 Stormwater Quality Control

Stormwater quality controls for the Site must incorporate measures to provide an Enhanced Level of Protection (Level 1) according to the MECP (March 2003) guidelines. Enhanced water quality protection involved the removal of at least 80% of TSS from 90% of the annual runoff volume. Water quality control will be provided through an ETV verified stormwater filtration unit, such as a Jellyfish or Stormfilter system to provide 80% TSS removal. The appropriate unit will be sized during the design stages of the development.

A Stormceptor EFO6 will be provided downstream of the underground stormwater tank to provide quality control prior to discharging to the City's storm sewer network. Design of Low Impact Development (LID) features for the Site will be provided during detailed design.

6.3 Water Balance

As stated in the City of Mississauga Development Requirements Manual (November 2020), the minimum requirement to promote water balance is retention of the 5 mm rainfall event. The water balance retention volume was calculated considering initial abstraction of runoff based on impervious areas. To be conservative, the entire site area was considered at this stage to account for future changes to the Site Plan. The water balance calculation will be refined as required at the detailed design stage.

A total storage volume of 53 m^3 (1.07 ha x 5 mm) will be provided on-site to achieve the water balance criteria. The storage will be provided through a treatment train approach including green roof retention, or dead storage in the stormwater tank for grey-water reuse or irrigation. An appropriate water balance design will be evaluated during the development process to retain the 53 m^3 of stormwater.

6.4 Sustainable Stormwater Management

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

- Rainwater Harvesting:
  With minimal pretreatment, the captured rainwater within the underground storage tanks can be used for outdoor non-potable water uses such as irrigation, or in the buildings as gray water.

- 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, evapotranspiration, and infiltration into the underlying native soil. Bioretention methods, such as rain gardens and stormwater planters, allow to temporarily store, treat and infiltrate runoff. It is typically designed to capture small storm events. Where underground parking facilities exists, infiltration is not a feasible option.

- 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 detailed design.

7.0 Conclusion and Recommendations

We offer the following conclusions based on the information provided in this Report:

1. The estimated peak hourly domestic water demand for the fully developed site is 25.9 L/s. The site will be serviced with a 100 mm diameter domestic water services, a 200 mm diameter fire service, and an independent 200 mm diameter water service for redundancy. Each service will connect to the existing 300 mm diameter watermain within Dundas Street East.
2. The proposed water system within the development will be designed by the Project's Mechanical Engineer.
3. The estimated Site fire flow requirements are 133 L/s for a duration of 2 hours according to the Fire Underwriters Survey calculations. Detailed fire flow calculations will be completed by the project Mechanical Engineer during detailed design. A hydrant flow test will be completed in Spring 2022 to confirm available pressure and flow within the existing system.
4. The estimated sanitary flow generated from the site is 32.7 L/s. A 200 mm diameter sanitary sewer connection is proposed to connect to the existing 375 mm diameter sanitary sewer within Dundas Street East.
5. The Site stormwater quantity controls will retain and store the 100-year post-development peak flows to 2-year pre-development levels, based on City of Mississauga requirements. Our calculations show that the controlled discharge rate should be 89 L/s therefore require 295 m^3 of storage. Regional flood control is outlined in the Floodplain Study (Crozier, February 2022), under separate cover.
6. The Site stormwater quality controls will provide 80% TSS removal based on Ministry of Environment, Conservation and Parks 'Enhanced' requirements by a proposed filter system, such as a Jellyfish or Stormfilter system. The appropriate system will be selected during detailed design.
7. A storage volume of approximately 53 m^3 (equivalent to 5 mm across the site area) will be provided through green roof retention and dead storage in the stormwater tank to meet the water balance criteria. The appropriate system will be designed during detailed design.

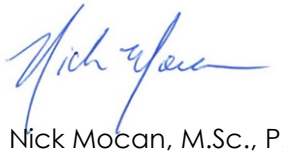
Based on the above conclusions, we recommend the approval of the Official Plan Amendment and Zoning By-Law Amendment for the proposed development from the perspective of functional servicing and preliminary stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Brendan Walton, P.Eng.
Project Manager

C.F. CROZIER & ASSOCIATES INC.



Nick Mocan, M.Sc., P.Eng.
President

BW/cj

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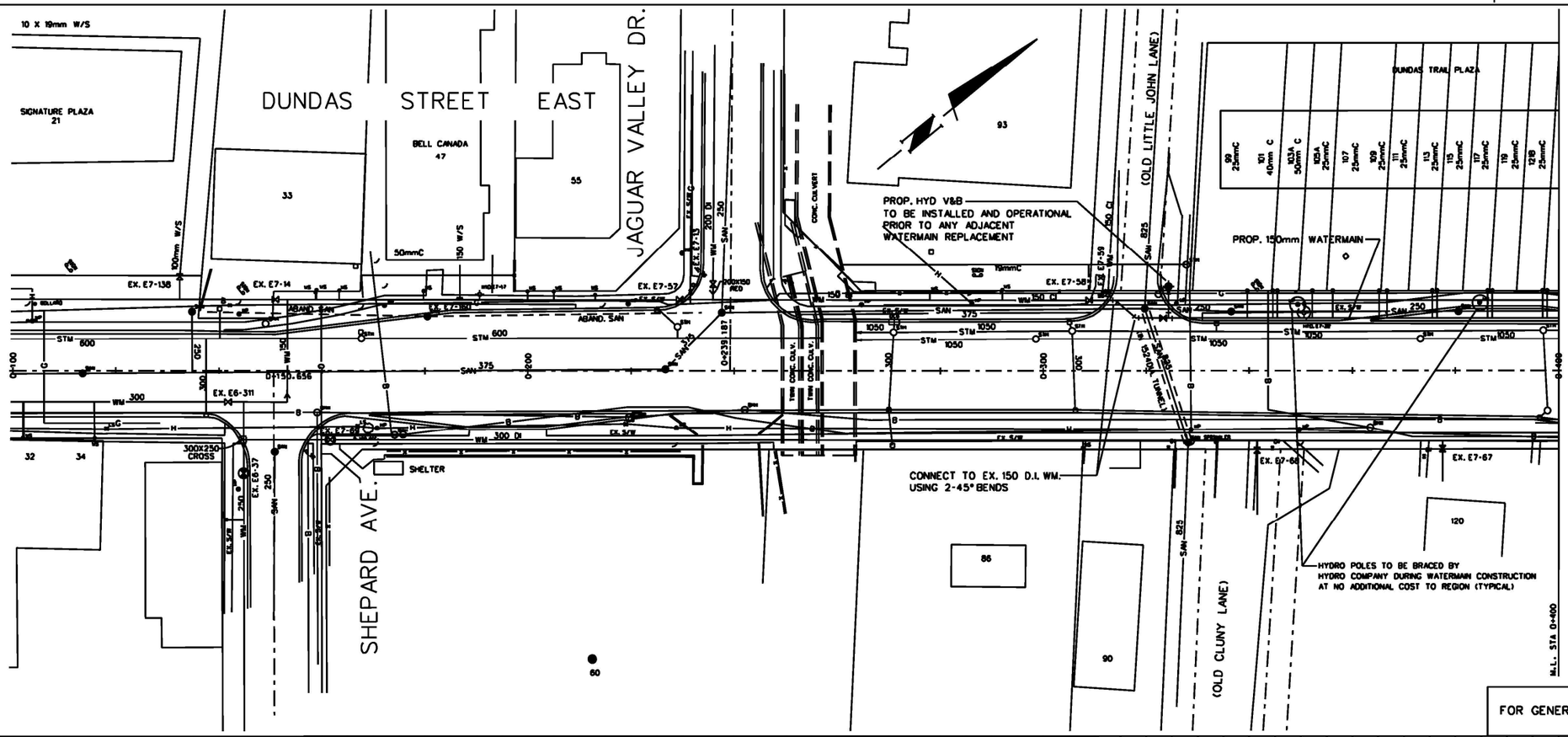
APPENDIX A

As-Builts



SERVICE DATA					
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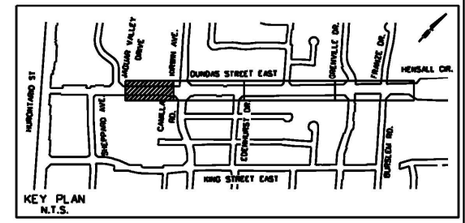
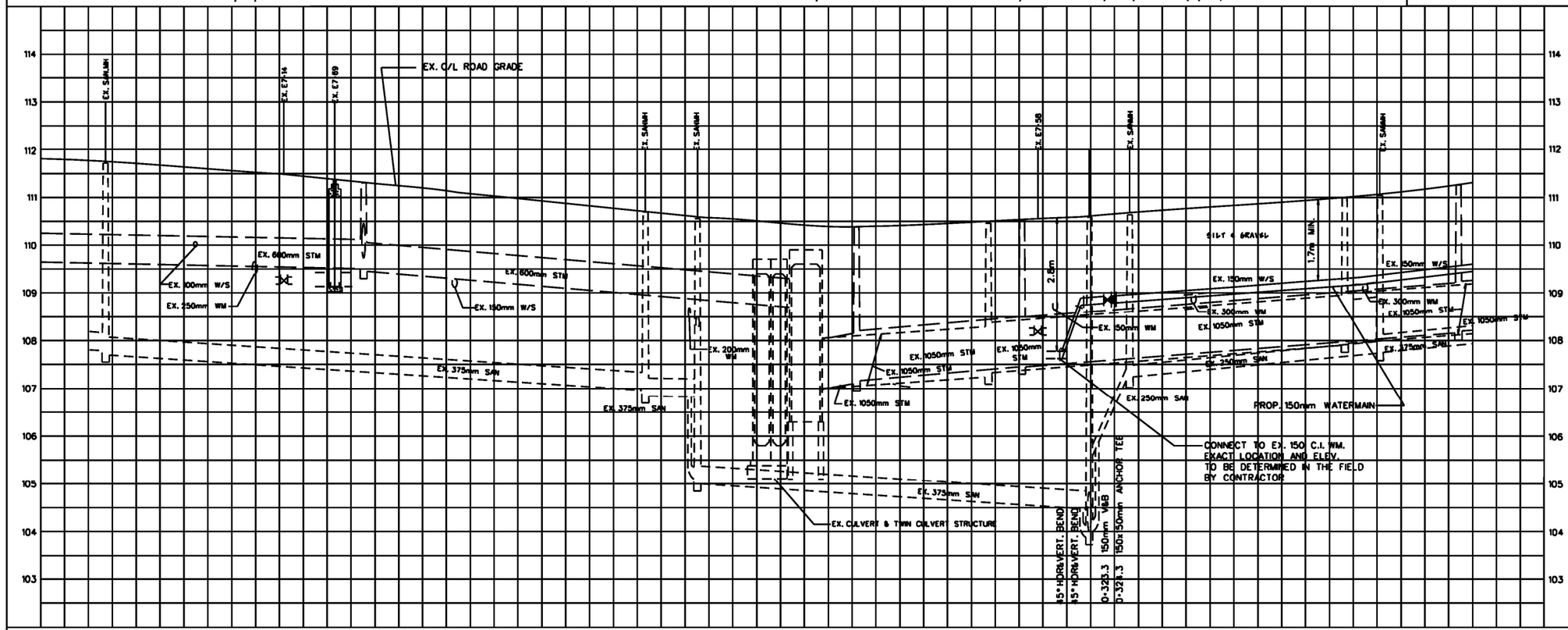
SAN SEWERS			GAS MAINS	JAN.24/00	J.P.
STORM SEWERS			BELL U/G CABLE	FEB.29/00	J.P.
WATERMAINS			HYDRO U/G CABLE	FEB.8/00	J.P.
TRANSIT	FEB.8/00	J.P.	ONT. HYDRO	FEB.1/00	J.P.
PARKS & REC.			CTV		
ONT. CLEAN WATER	FEB.3/00	J.P.			

REVISIONS		
DATE	DETAILS	INIT.
DEC. 2001	AS CONSTRUCTED	J.P.



SPECIAL NOTES FOR DUNDAS ST. ONLY:

THE CONTRACTOR IS TO NOTE THAT THERE ARE EXTENSIVE BELL CONDUITS, CABLES AND DUCT BANKS ON THE SOUTH SIDE OF DUNDAS ST. AND INSTALLATION MAY HAVE TO BE UNDERTAKEN BY SPECIAL MEANS SUCH AS VACTOR EXCAVATION. PRIOR TO CLOSING THE TENDER, THE REGION WILL REQUEST STAKE-OUTS FROM BELL CANADA, SO THAT CONTRACTOR CAN BE FULLY APPRIZED OF THE SEVERITY OF BELL PLANT SO THAT HE CAN BID ACCORDINGLY.



General Notes

- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN THE FIELD
- DENOTES BUILDING - NOT LOCATED
- DENOTES BUILDING LOCATED
- TYPE "B" BEDDING UNLESS OTHERWISE NOTED (SAN)

B.M. NO. ELEV.

THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION LOCATION OF EXISTING UTILITIES APPROXIMATE ONLY. TO BE VERIFIED IN FIELD BY CONTRACTOR.

DESIGNED BY | APPROVED BY

CHKD

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

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

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Public Works

DUNDAS STREET EAST

FROM EAST OF HURONTARIO ST. TO HENSALL CIR.

PROP. WATER SERVICES TRANSFER

Sta. 0+100 **To Sta.** 0+400

111.81	111.69	111.56	111.39	111.18	110.98	110.78	110.58	110.45	110.43	110.52	110.61	110.76	110.91	111.08	111.31	EX. C/L GRADE
0+100	0+120	0+140	0+160	0+180	0+200	0+220	0+240	0+260	0+280	0+300	0+320	0+340	0+360	0+380	0+400	ROAD CHAINAGE

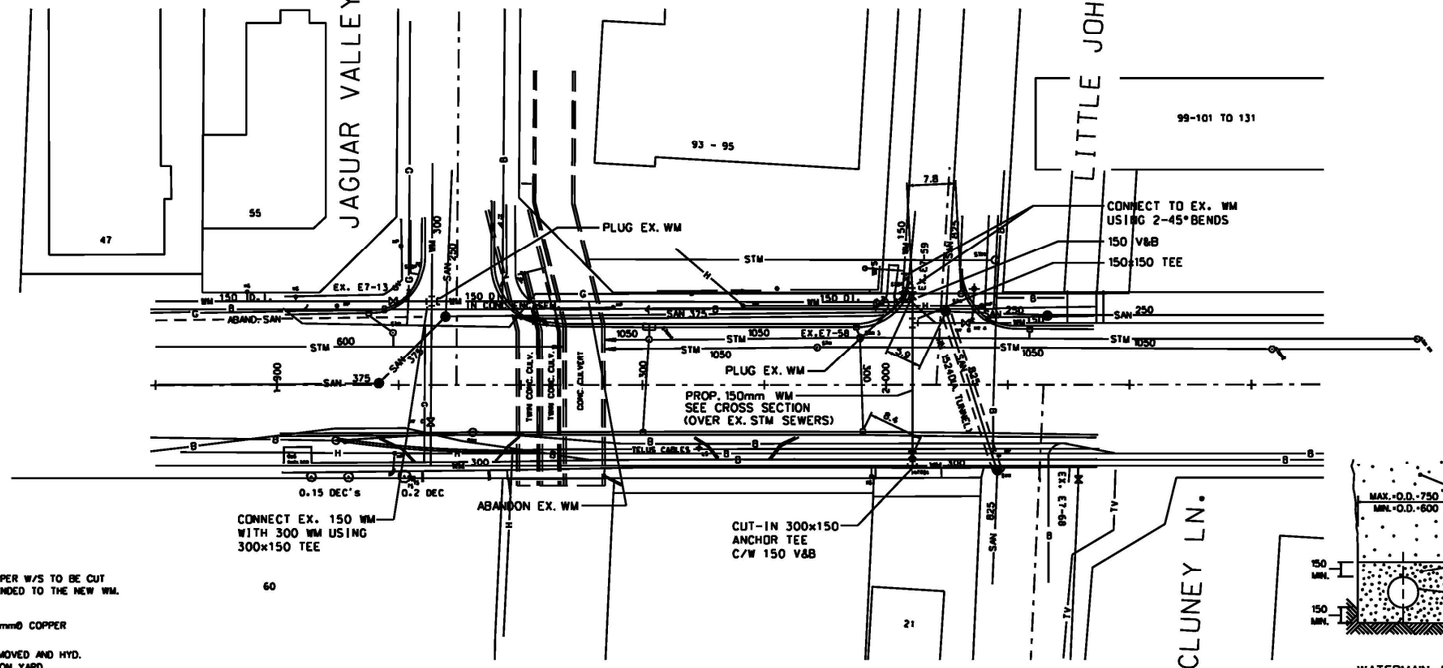
LOTS | AREA Z-14/21 | PROJECT NO. 00-1350
CHECKED BY | DRAWN BY J.P.
DATE MARCH,2001 | SHEET 1 OF 4 | PLAN NO. 26042-D

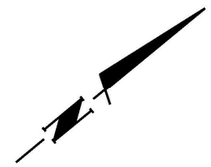
DUNDAS STREET EAST

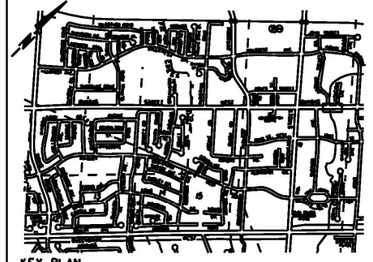
JAGUAR VALLEY DR.

LITTLE JOHN LN.

CLUNEY LN.







SERVICE DATA

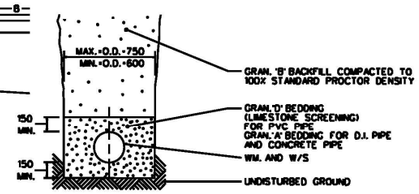
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS	V/24/05	J.P.
STORM SEWERS			BELL U/G CABLE	V/12/04	J.P.
WATERMAINS			HYDRO U/G CABLE	VII/12/04	J.P.
TRANSIT	VII/12/04	J.P.	HYDRO ONE NET.	V/05/05	J.P.
PARKS & REC.			CTV	VII/12/04	J.P.
ONT. CLEAN WATER	V/17/05	J.P.	COMUNNIC. CABLE	V/10/05	J.P.

REVISIONS

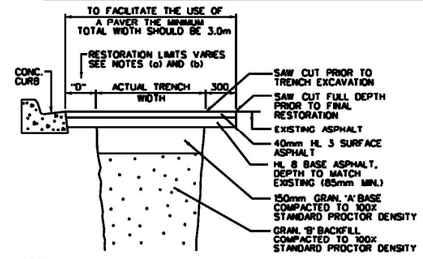
DATE	DETAILS	INIT.
MAY. 07	AS RECORDED	

LEGEND

- EX. 20mmØ & LARGER COPPER W/S TO BE CUT AND TRANSFERED OR EXTENDED TO THE NEW WM.
- REPLACE EX. W/S WITH 20mmØ COPPER
- EX. HYD. V. & B. TO BE REMOVED AND HYD. TO BE RETURNED TO REGION YARD VALVES TO BE DISPOSED OF OFF SITE.



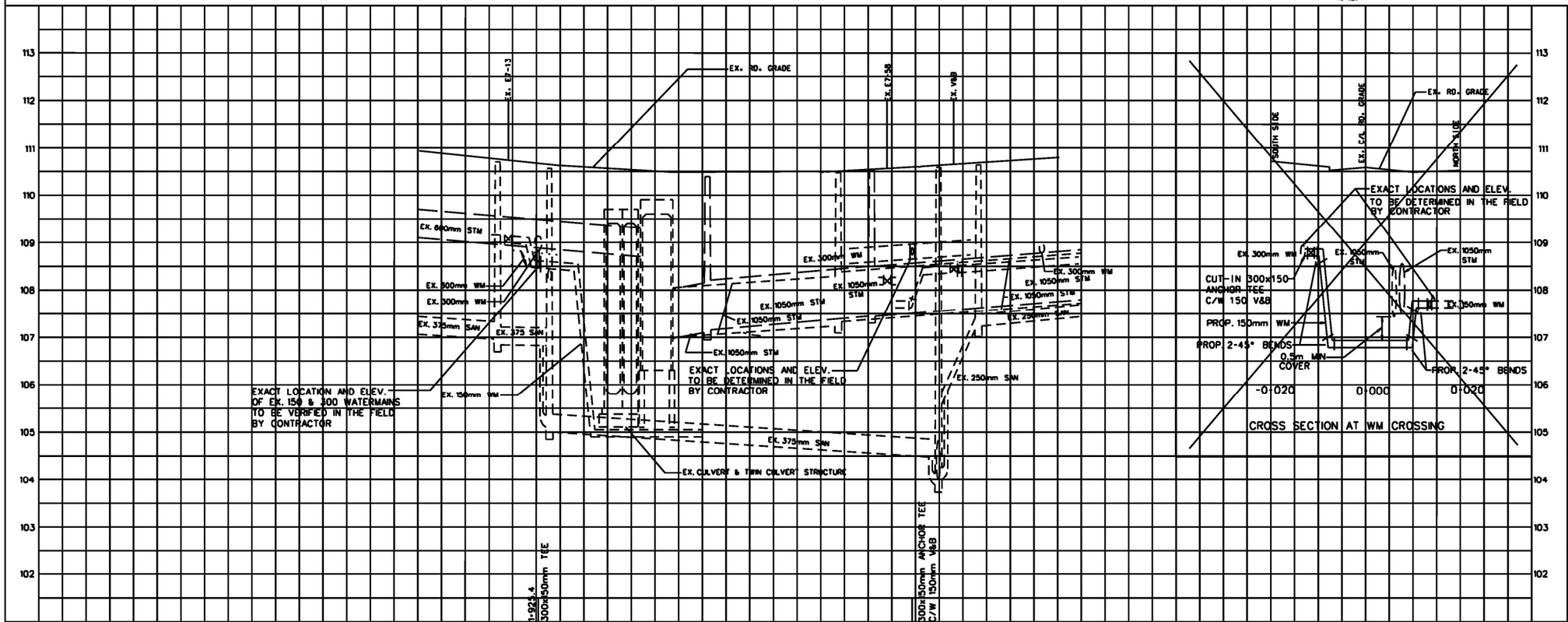
WATERMAIN AND WATERSERVICE BEDDING AND BACKFILL
N.T.S.



NOTES: (a) WHERE DISTANCE "D" FROM EDGE OF TRENCH TO CURB EXCEEDS 1.3m THEN SAW CUT FULL DEPTH 300mm BEYOND TRENCH WIDTH PRIOR TO FINAL RESTORATION

(b) WHERE DISTANCE "D" IS LESS THEN 1.3m THEN REMOVE ASPHALT FULL DEPTH BETWEEN CONCRETE CURB AND EDGE OF TRENCH PRIOR TO FINAL RESTORATION

REINSTATEMENT DETAIL
N.T.S.



	110.930	110.728	110.567	110.490	110.499	110.567	110.692	110.793			
EX. RD. GRADE											
ROAD CHAINAGE	1+900	1+920	1+940	1+960	1+980	2+000	2+020	2+040	2+060	+	+

General Notes

- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN THE FIELD
- DENOTES BUILDING - NOT LOCATED
- DENOTES BUILDING LOCATED
- TYPE 'B' BEDDING UNLESS OTHERWISE NOTED (SAN)

B.M. NO. ELEV.

THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION LOCATION OF EXISTING UTILITIES APPROXIMATE ONLY. TO BE VERIFIED IN FIELD BY CONTRACTOR.

DESIGNED BY — CHKD.

APPROVED BY

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL TELEPHONE COMPANY
CONSUMERS GAS COMPANY
MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ELECTRIC POWER COMN. OF ONTARIO
HYDRO ELECTRIC COMN. CITY OF MISSISSAUGA
HYDRO ELECTRIC COMN. CITY OF BRAMPTON
CABLE TELEVISION

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Public Works

DUNDAS STREET EAST

(FROM JAGUAR VALLEY DR. TO LITTLE JOHN LN.)

PROP. ABANDONMENT OF 150mm WATERMAIN AND RECONNECTION OF EX. WM's

Sta. 1+900 **To Sta.** 2+100

LOTS	AREA Z-14.21	PROJECT NO.	05-1390
CHECKED BY	DRAWN BY J.P.	PLAN NO.	32108-D
DATE OCT. 06	SHEET 1 OF 1		

32108_D.dgn 04/09/08 3:23:16 PM

APPENDIX B

Water & Sanitary Demand Calculations

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: AG
Checked By: BW
Date: 2022.02.18
Revised :

Site Statistics
60 Dundas Street East, Mississauga

SUMMARY OF UNIT BREAKDOWN

Site	1 BR	2 BR	Studio	Town	Total Units	Amentity Area m^2	Retail Area m^2
Phase 1	**256**	**96**	**64**	**0**	**416**	**5788**	**847**
Phase 2	**485**	**196**	**112**	**15**	**808**	**9861**	**0**
TOTAL	**741**	**292**	**176**	**15**	**1224**	**15649**	**847**

SUMMARY OF POPULATION

Site	1 BR	2 BR	Studio	Town	Amentity	Retail	Total Persons
Total	**1482**	**876**	**176**	**45**	**78**	**4**	**2661**

Notes:

1. The project statistics have been taken from the Site Plan by Chamberlain Architect Services Ltd. issued January 13, 2022.

2. Based on the following PPU rates provided by Chamberlain Architect Services Ltd. (February 14, 2021)

Unit Type	Average PPU
Townhouse	3
Studio Unit	1
1 Bedroom Unit	2
2 Bedroom Unit	3
3 Bedroom Unit	4

3. Amenity area population based on 50persons/ha per Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) Section 2.1

4. Retail (Commercial) Area population based on 50persons/ha per Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) Section 2.2

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: AG
Checked By: BW
Date: 2022.02.18
Revised :

WATER DEMAND CALCULATIONS
60 Dundas Street East, Mississauga

SUMMARY OF WATER DEMAND

USES	Population	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
Residential	2579	8.36	16.72	25.07
Retail/Amenity	82	0.29	0.40	0.86
Total	**2661**	**8.64**	**17.12**	**25.93**

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: AG
Checked By: BW
Date: 2022.02.18
Revised :

WATER DEMAND CALCULATIONS_RESIDENTIAL
60 Dundas Street East, Mississauga

Average Residential Consumption	280	L/cap * day
Equivalent Residential Population	2,579	persons
Total Site Area	1.07	ha
Average Daily Demand	722,120	L/day
	8.36	**L/s**
Maximum Day Factor	2.0	
Peak Hour Factor	3.0	
Maximum Daily Flow	1,444,240	L/day
	16.72	**L/s**
Peak Hour Flow	2,166,360	L/day
	25.07	**L/s**

Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
8.36	**16.72**	**25.07**

References

The equivalent residential population has been calculated in the 'Site Statistics' sheet, using provided by information from Chamberlain Architect Services Ltd.

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June, 2010) - 2.3 Table #1

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: AG
Checked By: BW
Date: 2022.02.18
Revised :

WATER DEMAND CALCULATIONS_RETAIL
60 Dundas Street East, Mississauga

Average Residential Consumption	300	L/cap * day
Equivalent Residential Population	82	persons
Total Site Area	1.07	ha
Average Daily Demand	24,744	L/day
	0.29	**L/s**
Maximum Day Factor	1.4	
Peak Hour Factor	3.0	
Maximum Daily Flow	34,642	L/day
	0.40	**L/s**
Peak Hour Flow	74,232	L/day
	0.86	**L/s**

Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
0.29	**0.40**	**0.86**

References

The equivalent residential population has been calculated in the 'Site Statistics' sheet, using provided by information from Chamberlain Architect Services Ltd.

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (June, 2010) - 2.3 Table #1

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: AG
Checked By: BW
Date: 2022.02.18
Revised :

SANITARY FLOW CALCULATIONS
60 Dundas Street East, Mississauga

SUMMARY OF SANITARY FLOW

USES	Population	Average Daily Flow (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Sanitary Flow (L/s)
Residential & Commercial	2661	9.33	32.52	0.21	32.73
Total	**2661**	**9.33**	**32.52**	**0.21**	**32.73**

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: AG
Checked By: BW
Date: 2022.02.18
Revised :

SANITARY FLOW CALCULATIONS
60 Dundas Street East, Mississauga

Total Population	2661	persons
Total Site Area	1.07	ha
Average daily demand	302.8	L/person * day
Harmon Peaking Factor (M) M = 1+(14/(4+p^0.5))	3.49	
Average Daily Flow	805,896	L/day
	9.33	**L/s**
Peak Flow	2,809,401	L/day
	32.52	**L/s**
Infiltration	0.0002	cms/ha
	0.00021	cms
	0.21	**L/s**
Total Sanitary Flow	**32.73**	**L/s**

Harmon Peaking Factor	Average Daily Flow (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Sanitary Flow (L/s)
3.49	**9.33**	**32.52**	**0.21**	**32.73**

References:

The equivalent residential population has been calculated in the 'Site Statistics' sheet, using provided by information from Chamberlain Architect Services Ltd.

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) STD 2.9.2

APPENDIX C

Fire Underwriters Survey

CROZIER CONSULTING ENGINEERS

60 Dundas Street East
Fire Protection Volume Calculation

PROJECT: 60 Dundas Street East
PROJECT No.: 2234-6274
DATE: 2022.02.18
DESIGN: AG
CHECK: BW

SUMMARY OF FIRE DEMANDS

Phase	Base Fire Flow [L/min]	Building Material Reduction [L/min]	Sprinkler Reduction [L/min]	Surcharge for Surrounding Infrastructure [L/min]	Total Required Fire Flow [L/min]	Total Required Fire Flow [L/s]
1	9,635	0	4818	1,445	6,000	100
2	**10,021**	**0**	**5010.49**	**2,505**	**8,000**	**133**

Therefore, Phase 2 will be taken as the Requied Fire Flow for the site, since it has the greater required flow.

CROZIER CONSULTING ENGINEERS

2234-6274 60 Dundas Street
Phase 1 - Fire Protection Volume Calculation

PROJECT: 60 Dundas Street East
PROJECT No.: 2234-6274
DATE: 2022.02.18
DESIGN: AG
CHECK: BW

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part I - Guide for Determination of Required Fire Flow

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)
=	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 total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

A =	2,997	sq.m.		2046 sq.m	approximate area of largest floor
C =	0.8		for non-combustible construction (unprotected metal structural components)	951 sq.m	25% of each of the two immediately adjoining floors

Therefore F = 9,635 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

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% (No Change)		

Combustible	0%

0 L/min reduction
9,635 L/min

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

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Assume building will have complete automoatic sprinkler protection system.

4,818 L/min reduction

2234-6274 60 Dundas Street
Phase 1 - Fire Protection Volume Calculation

Water Supply for Public Fire Protection
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 45 metres 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%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		**Distance**		
Phase 2	High-rise	22m	10%	963.51
West	Ex. Building	30m	5%	481.75

1,445 L/min Surcharge

Determine Required Fire Flow

No.1	9,635		
No. 2	0	reduction	
No. 3	-4,818	reduction	
No. 4	1,445	surcharge	
Required Flow:	**6,263 L/min**		
Rounded to nearest 1000 L/min:	**6,000 L/min**	or	100.0 L/s
			1,585 USGPM

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	**2.0**
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

CROZIER CONSULTING ENGINEERS

60 Dundas Street East
Phase 2 - Fire Protection Volume Calculation

PROJECT: 60 Dundas Street East
PROJECT No.: 2234-6274
DATE: 2022.02.18
DESIGN: AG
CHECK: BW

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

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)
=	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 total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

A = 3,242 sq.m.
C = 0.8 for non-combustible construction (unprotected metal structural components)

2161 sq.m approximate area of largest floor
1081 sq.m 25% of each of the two immediately adjoining floors

Therefore F = 10,021 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

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% (No Change)		

Combustible	0%

0 L/min reduction
10,021 L/min

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

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Assume building will have complete automoatic sprinkler protection system.

5,010 L/min reduction

2234-6274 60 Dundas Street
Phase 2 - Fire Protection Volume Calculation

Water Supply for Public Fire Protection
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 45 metres 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%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		**Distance**		
South	Existing Appartment	21.5m	10%	1002.10
Phase 1	High-Rise	22.3m	10%	1002.10
West	Ex. Building	30m	5%	501.05

2,505 L/min Surcharge

Determine Required Fire Flow

No.1	10,021		
No. 2	0	reduction	
No. 3	-5,010	reduction	
No. 4	2,505	surcharge	
Required Flow:	**7,516 L/min**		
Rounded to nearest 1000 L/min:	**8,000 L/min**	or	133.3 L/s
			2,113 USGPM

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	**2.0**
9,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

PROJECT: 60 Dundas Street East
PROJECT No.: 2234-6274
DATE: 2022.02.18
DESIGN: AG
CHECK: BW

Water Demand Table (Region of Peel)

Connection Demand Table - Phase 1					
Water Connection					
Connection point					
Dundas Street East					
Pressure zone of connection point				2	*from EPAL hydrant # 2020520*
Total equivalent population to be serviced				2661	
Total lands to be serviced				1.067	
Hydrant flow test					
Hydrant flow test location:					
	TBD				
		Pressure (kPa)	Flow (in l/s)	Time	
Dundas Street East					
Minimum water pressure		TBD	TBD	TBD	
Maximum water pressure		TBD	TBD	TBD	

No.	Water Demands			
		Demand (in l/s)		
	Demand Type	Domestic	Use 2	Total
1	Average day flow	8.64		8.64
2	Maximum day flow	17.12		17.12
3	Peak hour flow	25.93		25.93
4	Fire flow	133		133.3333
Analysis				
5	Maximum day plus fire flow	150		150

WASTEWATER CONNECTION			**Total**
Connection Point	Dundas Street East		
Total equivalent population to be serviced	2661		2661
Total lands to be serviced	1.07		1.07
6 Wastewater sewer effluent (L/s)	32.73		32.73

1 Please refer to design criteria for population equivalencies
2 Please reference the Fire Underwriters Survey Document
3 Please specify the connection point ID
4 Please specify the connection point (wastewater line or manhole ID)
Also, the "total equivalent population to be serviced" and the "total lands to be serviced" should reference the connection point. (The FSR should contain one copy of Site Servicing Plan)
5 Please complete as many uses are necessary for the development
(Please specify each use)
6 A hydrant flow test will be conducted prior to detailed design

Please include the graphs associated with the hydrant flow test information table.
Please provide Professional Engineer's signature and stamp on the demand table.
All required calculations must be submitted with the demand table submission.

APPENDIX D

Modified Rational Calculations

Project:	60 Dundas Appartments
Project No.:	2234-6274
Created By:	AG
Checked By:	RA
Date:	2022.02.17
Updated:	-

Modified Rational Calculations: Input Parameters
60 Dundas Appartments

Storm Data: City of Mississauga

City of Mississauga Development Requirements Manual (November 2020)

Storm Duration (T_d) **15** **min**

Return Period	A	B	C	Intensity (i) (mm/hr)
2 Year	610.0	4.6	0.78	59.9
5 Year	820.0	4.6	0.78	80.5
10 Year	1010.0	4.6	0.78	99.2
25 Year	1160.0	4.6	0.78	113.9
50 Year	1300.0	4.7	0.78	127.1
100 Year	1450.0	4.9	0.78	140.7

Pre-Development				
Catchment ID	**Pervious Area** (m^2)	**Impervious Area** (m^2)	**Total Area** (m^2)	**Weighted Runoff Coefficient**
RC	0.50	0.50	-	-
101	0	10670	10670	0.50
Total Site Area	0	10670	**10670**	**0.50**

Post-Development				
Catchment ID	**Pervious Area** (m^2)	**Impervious Area** (m^2)	**Total Area** (m^2)	**Weighted Runoff Coefficient**
RC	0.50	0.90	-	-
201	3960	6710	10670	0.75
Total Site Area	3960	6710	**10670**	**0.75**

Equations:

$$Intensity\ i(t_d) = \frac{A}{(t_d + B)^C} \qquad Weighted\ RC = \frac{\sum_{i=1}^{n} A_i \times RC_i + \ldots A_n \times RC_n}{\sum_{i=1}^{n} A_i + \ldots A_n}$$

Project:	60 Dundas Appartments
Project No.:	2234-6274
Created By:	AG
Checked By:	RA
Date:	2022.02.10
Updated:	-

Modified Rational Calculations: Peak Flow Summary
60 Dundas St Towers

Reference: *City of Mississauga Development Requirements Manual (November 2020)*

Note: *Adjustment factors of 1.10, 1.20, and 1.25 have been applied to the 25-, 50-, and 100-year storms respectively.*

Catchment 101 (Pre-development)				
Return Period @ Tc = 15 min	**Area** (ha)	**RC**	**Adjusted RC**	**Q** (L/s)
2 Year	1.07	0.50	0.50	89
5 Year	1.07	0.50	0.50	119
10 Year	1.07	0.50	0.50	147
25 Year	1.07	0.50	0.55	186
50 Year	1.07	0.50	0.60	226
100 Year	1.07	0.50	0.63	261

Catchment 202 (Post-development)						
Return Period @ Tc = 15 min	**Area** (ha)	**RC**	**Adjusted RC**	**Q_{runoff}** (L/s)	**$Q_{release}$** (L/s)	**Required Storage** (m^3)
2 Year	1.07	0.75	0.75	134	89	40
5 Year	1.07	0.75	0.75	179	119	82
10 Year	1.07	0.75	0.75	221	147	119
25 Year	1.07	0.75	0.83	279	186	174
50 Year	1.07	0.75	0.90	340	226	237
100 Year	1.07	0.75	0.94	392	261	295

Equations:

$Design\ Flow\ (Q) = 0.002778\ CIA$

Modified Rational Calculations: 2 Year Year Storm Event

Adjustment Factor: NA

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

City of Mississauga	
Storm IDF	**2 Year**
a=	610.0
b=	4.6
c=	0.780

POST-DEV	
201	
Characteristics:	
Drainage Area ID =	101
Drainage Area =	1.07 ha
Runoff Coefficient =	0.75
Storage	
Storage Required =	40.2 m3
Storage Provided =	0 m3
Controlled Release Rate =	**88.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	59.9	133.5	88.8	40.2
20.0	50.2	111.8	88.8	27.6
25.0	43.4	96.8	88.8	12.0
30.0	38.4	85.7	85.7	0.0
35.0	34.6	77.1	77.1	0.0
40.0	31.5	70.3	70.3	0.0
45.0	29.0	64.7	64.7	0.0
50.0	26.9	60.0	60.0	0.0
55.0	25.2	56.1	56.1	0.0
60.0	23.6	52.7	52.7	0.0
65.0	22.3	49.7	49.7	0.0
70.0	21.1	47.1	47.1	0.0
75.0	20.1	44.7	44.7	0.0
80.0	19.1	42.7	42.7	0.0
85.0	18.3	40.8	40.8	0.0
90.0	17.5	39.1	39.1	0.0
95.0	16.9	37.6	37.6	0.0
100.0	16.2	36.2	36.2	0.0

Reference: *City of Mississauga Development Requirements Manual (November 2020)*

Note: *Ca factors of 1.10, 1.20, and 1.25 have been applied to the 25 year, 50 year, and 100 year storms respectively.*

Equations:

$$Intensity\ i(t_d) = \frac{A}{(t_d + B)^C} \qquad Design\ Flow\ (Q) = 0.002778\ CIA$$

Modified Rational Calculations: 5 Year Year Storm Event

Adjustment Factor: NA

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

City of Mississauga	
Storm IDF	**5 Year**
a=	820.0
b=	4.6
c=	0.780

POST-DEV	
201	
Characteristics:	
Drainage Area ID =	101
Drainage Area =	1.07 ha
Runoff Coefficient =	0.75
Storage	
Storage Required =	81.6 m3
Storage Provided =	0 m3
Controlled Release Rate =	**88.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	80.5	179.5	88.8	81.6
20.0	67.4	150.3	88.8	73.8
25.0	58.4	130.1	88.8	61.9
30.0	51.7	115.2	88.8	47.5
35.0	46.5	103.7	88.8	31.2
40.0	42.4	94.5	88.8	13.6
45.0	39.0	87.0	87.0	0.0
50.0	36.2	80.7	80.7	0.0
55.0	33.8	75.4	75.4	0.0
60.0	31.8	70.8	70.8	0.0
65.0	30.0	66.8	66.8	0.0
70.0	28.4	63.3	63.3	0.0
75.0	27.0	60.2	60.2	0.0
80.0	25.7	57.4	57.4	0.0
85.0	24.6	54.9	54.9	0.0
90.0	23.6	52.6	52.6	0.0
95.0	22.7	50.5	50.5	0.0
100.0	21.8	48.6	48.6	0.0

Reference: *City of Mississauga Development Requirements Manual (November 2020)*

Note: *Ca factors of 1.10, 1.20, and 1.25 have been applied to the 25 year, 50 year, and 100 year storms respectively.*

Equations:

$$Intensity\ i(t_d) = \frac{A}{(t_d + B)^C} \qquad Design\ Flow\ (Q) = 0.002778\ CIA$$

Modified Rational Calculations: 10 Year Year Storm Event

Adjustment Factor: NA

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

City of Mississauga	
Storm IDF	**10 Year**
a=	1010.0
b=	4.6
c=	0.780

POST-DEV	
201	
Characteristics:	
Drainage Area ID =	101
Drainage Area =	1.07 ha
Runoff Coefficient =	0.75
Storage	
Storage Required =	119.0 m3
Storage Provided =	0 m3
Controlled Release Rate =	**88.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	99.2	221.1	88.8	119.0
20.0	83.1	185.2	88.8	115.6
25.0	71.9	160.3	88.8	107.2
30.0	63.7	141.9	88.8	95.5
35.0	57.3	127.7	88.8	81.7
40.0	52.2	116.4	88.8	66.2
45.0	48.1	107.2	88.8	49.5
50.0	44.6	99.4	88.8	31.8
55.0	41.7	92.9	88.8	13.3
60.0	39.1	87.2	87.2	0.0
65.0	36.9	82.3	82.3	0.0
70.0	35.0	77.9	77.9	0.0
75.0	33.2	74.1	74.1	0.0
80.0	31.7	70.7	70.7	0.0
85.0	30.3	67.6	67.6	0.0
90.0	29.0	64.8	64.8	0.0
95.0	27.9	62.2	62.2	0.0
100.0	26.9	59.9	59.9	0.0

Reference: *City of Mississauga Development Requirements Manual (November 2020)*

Note: *Ca factors of 1.10, 1.20, and 1.25 have been applied to the 25 year, 50 year, and 100 year storms respectively.*

Equations:

$$Intensity\ i(t_d) = \frac{A}{(t_d + B)^C} \qquad Design\ Flow\ (Q) = 0.002778\ CIA$$

Modified Rational Calculations: 25 Year Year Storm Event

Adjustment Factor: 1.1

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

City of Mississauga	
Storm IDF	**25 Year**
a=	1160.0
b=	4.6
c=	0.780

POST-DEV	
201	
Characteristics:	
Drainage Area ID =	101
Drainage Area =	1.07 ha
Runoff Coefficient =	0.75
Adjusted RC =	0.83
Storage	
Storage Required =	174.1 m3
Storage Provided =	0 m3
Controlled Release Rate =	**88.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	113.9	279.3	88.8	171.4
20.0	95.4	233.9	88.8	174.1
25.0	82.6	202.5	88.8	170.5
30.0	73.1	179.3	88.8	162.8
35.0	65.8	161.4	88.8	152.3
40.0	60.0	147.1	88.8	139.8
45.0	55.2	135.4	88.8	125.7
50.0	51.2	125.6	88.8	110.3
55.0	47.8	117.3	88.8	94.0
60.0	44.9	110.2	88.8	76.8
65.0	42.4	103.9	88.8	58.9
70.0	40.2	98.5	88.8	40.5
75.0	38.2	93.6	88.8	21.5
80.0	36.4	89.3	88.8	2.1
85.0	34.8	85.4	85.4	0.0
90.0	33.4	81.8	81.8	0.0
95.0	32.0	78.6	78.6	0.0
100.0	30.8	75.6	75.6	0.0

Reference: *City of Mississauga Development Requirements Manual (November 2020)*

Note: *Ca factors of 1.10, 1.20, and 1.25 have been applied to the 25 year, 50 year, and 100 year storms respectively.*

Equations:

$$Intensity\ i(t_d) = \frac{A}{(t_d + B)^C} \qquad Design\ Flow\ (Q) = 0.002778\ CIA$$

Modified Rational Calculations: 50 Year Year Storm Event

Adjustment Factor: 1.2

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

City of Mississauga	
Storm IDF	**50 Year**
a=	1300.0
b=	4.7
c=	0.780

POST-DEV	
201	
Characteristics:	
Drainage Area ID =	101
Drainage Area =	1.07 ha
Runoff Coefficient =	0.75
Adjusted RC =	0.90
Storage	
Storage Required =	237.1 m3
Storage Provided =	0 m3
Controlled Release Rate =	**88.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	127.1	340.1	88.8	226.1
20.0	106.6	285.1	88.8	235.5
25.0	92.3	246.9	88.8	237.1
30.0	81.7	218.7	88.8	233.8
35.0	73.6	196.9	88.8	226.9
40.0	67.1	179.5	88.8	217.6
45.0	61.8	165.2	88.8	206.3
50.0	57.3	153.3	88.8	193.5
55.0	53.5	143.2	88.8	179.5
60.0	50.3	134.5	88.8	164.5
65.0	47.4	126.9	88.8	148.6
70.0	45.0	120.3	88.8	132.0
75.0	42.7	114.3	88.8	114.7
80.0	40.8	109.0	88.8	97.0
85.0	39.0	104.3	88.8	78.7
90.0	37.4	99.9	88.8	60.0
95.0	35.9	96.0	88.8	40.9
100.0	34.5	92.4	88.8	21.5

Reference: *City of Mississauga Development Requirements Manual (November 2020)*

Note: *Ca factors of 1.10, 1.20, and 1.25 have been applied to the 25 year, 50 year, and 100 year storms respectively.*

Equations:

$$Intensity\ i(t_d) = \frac{A}{(t_d + B)^C} \qquad Design\ Flow\ (Q) = 0.002778\ CIA$$

Modified Rational Calculations: 100 Year Year Storm Event

Adjustment Factor: 1.25

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

City of Mississauga	
Storm IDF	**100 Year**
a=	1450.0
b=	4.9
c=	0.780

POST-DEV	
201	
Characteristics:	
Drainage Area ID =	101
Drainage Area =	1.07 ha
Runoff Coefficient =	0.75
Adjusted RC =	0.94
Storage	
Storage Required =	295.4 m3
Storage Provided =	0 m3
Controlled Release Rate =	**88.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	140.7	392.0	88.8	272.9
20.0	118.1	329.2	88.8	288.4
25.0	102.4	285.4	88.8	294.8
30.0	90.8	253.0	88.8	295.4
35.0	81.8	227.9	88.8	292.0
40.0	74.6	207.8	88.8	285.6
45.0	68.7	191.4	88.8	276.9
50.0	63.8	177.7	88.8	266.5
55.0	59.6	166.0	88.8	254.6
60.0	56.0	155.9	88.8	241.5
65.0	52.8	147.1	88.8	227.4
70.0	50.0	139.4	88.8	212.5
75.0	47.6	132.6	88.8	196.9
80.0	45.4	126.4	88.8	180.6
85.0	43.4	120.9	88.8	163.7
90.0	41.6	115.9	88.8	146.3
95.0	40.0	111.4	88.8	128.5
100.0	38.5	107.2	88.8	110.3

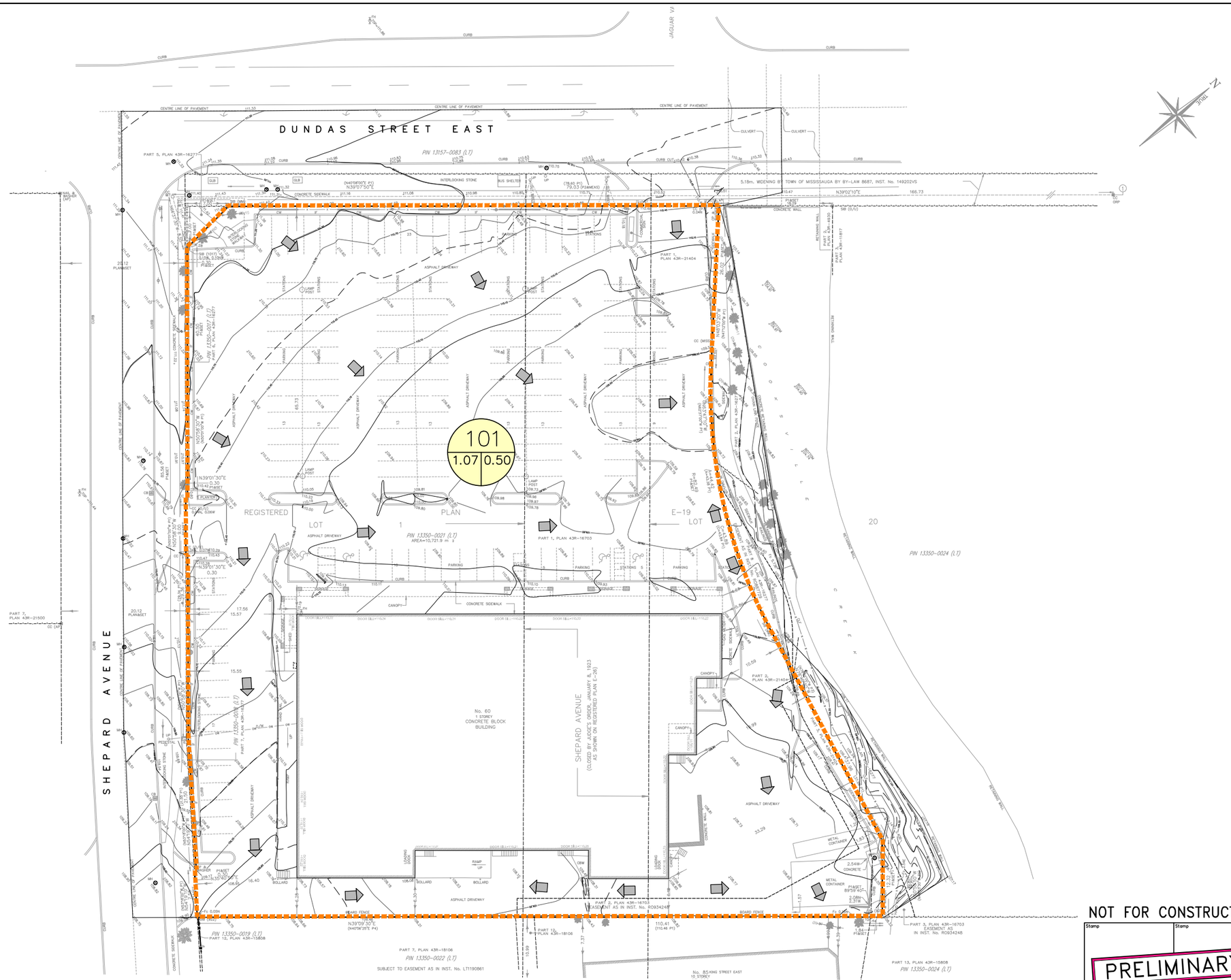
Reference: *City of Mississauga Development Requirements Manual (November 2020)*

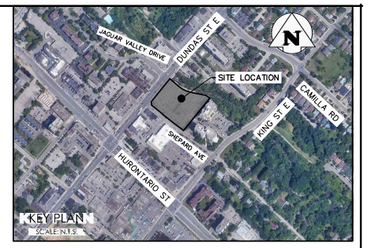
Note: *Ca factors of 1.10, 1.20, and 1.25 have been applied to the 25 year, 50 year, and 100 year storms respectively.*

Equations:

$$Intensity\ i(t_d) = \frac{A}{(t_d + B)^C} \qquad Design\ Flow\ (Q) = 0.002778\ CIA$$

FIGURES





LEGEND

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

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION (ZBA)	2022/FEB/22

ELEVATION NOTE:

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE DERIVED FROM THE CITY OF MISSISSAUGA BENCHMARK 793, ELEVATION=110.995.
DESCRIPTION: ON THE NORTH FACE AT THE EAST CORNER OF CONCRETE END POST OF BOX CULVERT UNDER DUNDAS STREET EAST, ON SOUTH SIDE OF DUNDAS STREET EAST, 15.0m EAST OF JAGUAR VALLEY DRIVE.

SURVEY NOTES:

TOPOGRAPHIC INFORMATION BASED ON PLAN BY ASKAN PILLER CORPORATION LTD. DATED APRIL 5, 2021 AND UPDATED ON FEBRUARY 4, 2022.
REFERENCE No.: 20-21-14108-00.

BEARINGS ARE UTM GRID, DERIVED FROM GNSS OBSERVATIONS, USING REAL TIME KINEMATIC SERVICE, ON MONUMENTS 1 & 2, HAVING A BEARING OF N 39°02'10"E, AND ARE REFERRED TO THE CENTRAL MERIDIAN OF UTM ZONE 17 (81°00' WEST LONGITUDE) NAD83 (CRCS) (2010). (EXCEPT COMPARISONS)

SITE PLAN NOTES:

SITE PLAN INFORMATION BASED ON PLANS BY CHAMBERLAIN ARCHITECT SERVICES LIMITED, DATED 2022-01-13, REVISION 3.
PROJECT No. 121022, DRAWING No. 102

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.

NOT FOR CONSTRUCTION

Stamp

PRELIMINARY

Stamp

Project

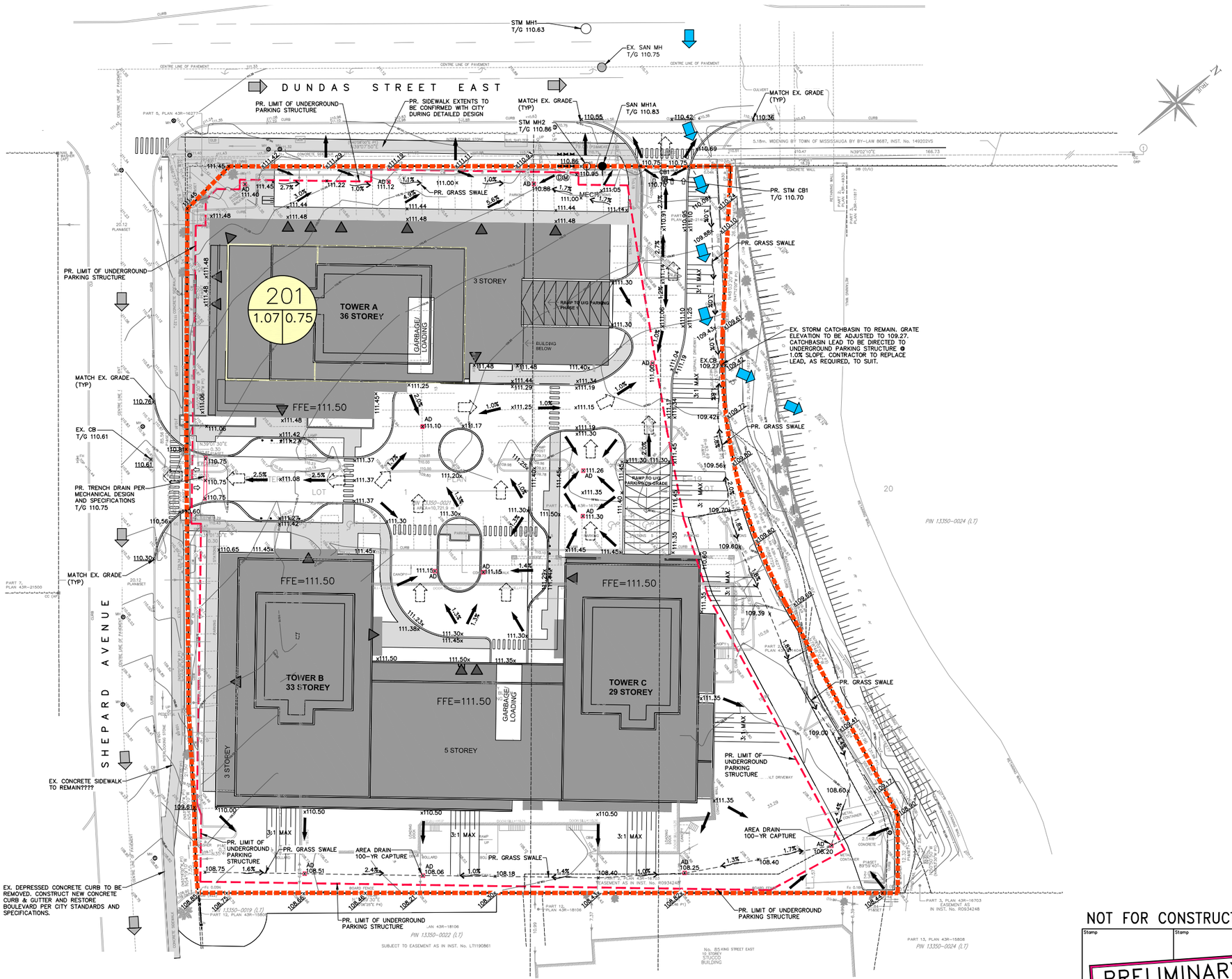
60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

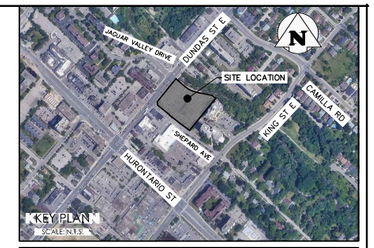
Drawing

PRE-DEVELOPMENT
STORM DRAINAGE 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.
N.K./M.I.M.	M.I.M./B.W.	2234-6274
Check	Check	Scale / Dwg.
B.W.	B.W.	1:300 / FIG. 1





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING FENCE
- x215.00 EXISTING GRADE
- x215.00 PROPOSED GRADE
- x215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- 2.0% PROPOSED GRASSED SWALE
- PROPOSED SLOPE (3:1 MAX.)
- BUILDING ENTRANCE (PERSONNEL DOOR)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- REGIONAL OVERLAND FLOW DIRECTION
- AD □ PROPOSED AREA DRAIN PER MECHANICAL DESIGN AND SPECIFICATIONS
- PROPOSED STORM CATCHBASIN
- STORM DRAINAGE CATCHMENT
- ID / A|RC CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT
- PROPOSED WATER VALVE
- Ⓓ PROPOSED DETECTOR CHECK VALVE & CHAMBER
- Ⓜ PROPOSED WATER METER

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION (ZBA)	2022/FEB/22

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SURVEY NOTES:

TOPOGRAPHIC INFORMATION BASED ON PLAN BY ASKAN PILLER CORPORATION LTD. DATED APRIL 5, 2021 AND UPDATED ON FEBRUARY 4, 2022. REFERENCE No. 20-21-14108-00.

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SITE PLAN NOTES:

SITE PLAN INFORMATION BASED ON PLANS BY CHAMBERLAIN ARCHITECT SERVICES LIMITED, DATED 2022-01-13, REVISION 3. PROJECT No. 121022, DRAWING No. 102

DRAWING NOTES:

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Project

60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing

PRELIMINARY SITE GRADING AND DRAINAGE FIGURE

NOT FOR CONSTRUCTION

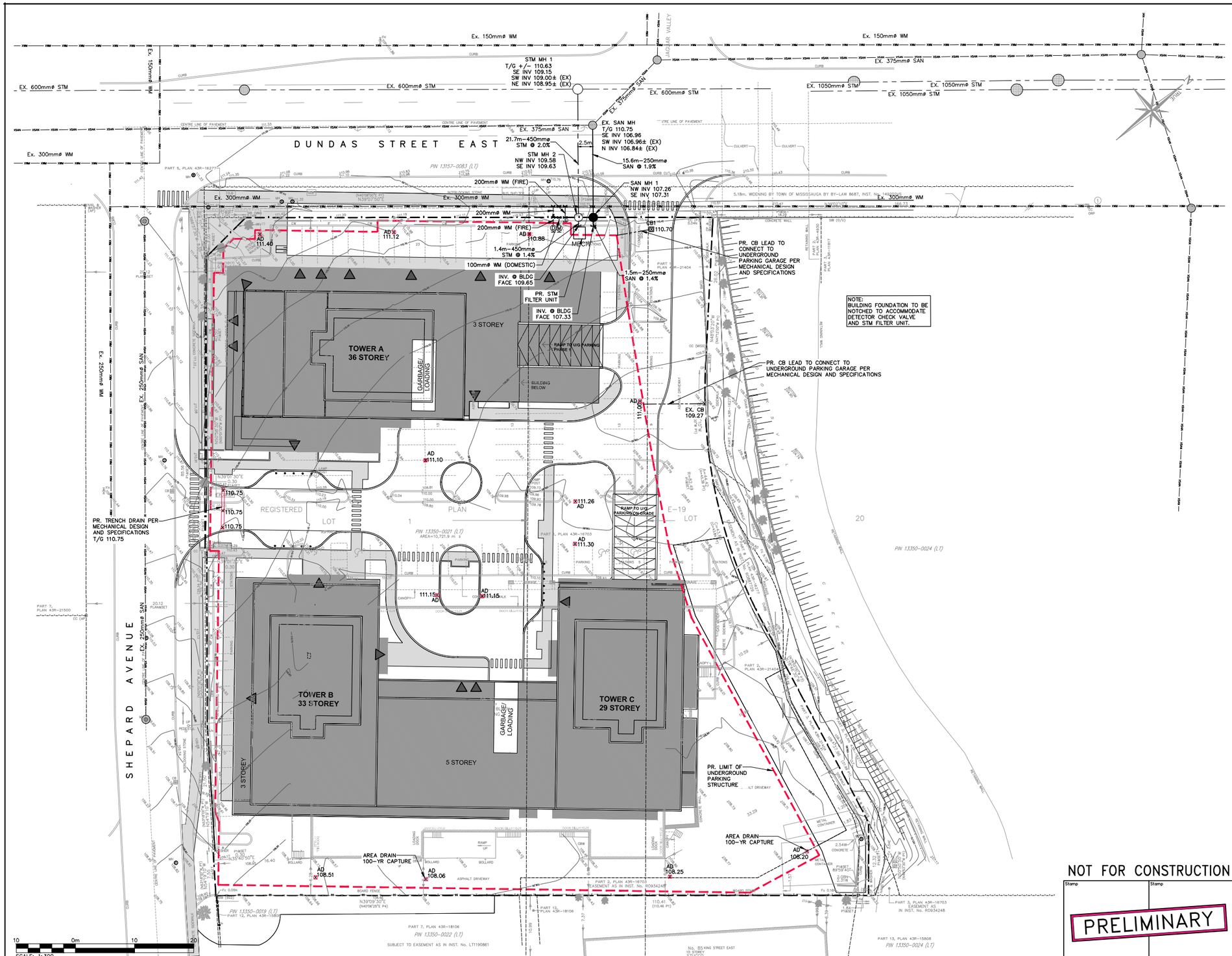
Stamp

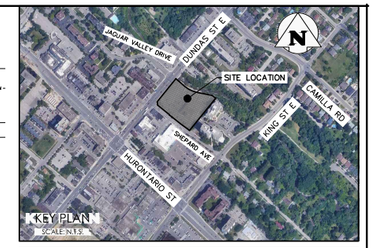
PRELIMINARY

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.	
N.K./M.I.M.	M.I.M./B.W.	2234-6274	
Check	Check	Scale	Dwg.
B.W.	B.W.	1:300	FIG. 2





LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED WATER SERVICE LATERAL (XXmmø)
- EXISTING FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE CONNECTION
- PROPOSED WATER METER
- PROPOSED BACKFLOW PREVENTOR
- PROPOSED DETECTOR CHECK VALVE
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE
- BUILDING ENTRANCE (PERSONNEL DOOR)
- BUILDING ENTRANCE (OVERHEAD DOOR)
- PROPOSED RETAINING WALL
- PROPOSED ELECTRICAL TRANSFORMER
- AD □ PROPOSED AREA DRAIN PER MECHANICAL DESIGN AND SPECIFICATIONS
- PROPOSED STORM CATCHBASIN
- LIMITS OF UNDERGROUND

NOT FOR CONSTRUCTION

Stamp: PRELIMINARY

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION (ZBA)	2022/FEB/22

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SURVEY NOTES:

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SITE PLAN NOTES:

SITE PLAN INFORMATION BASED ON PLANS BY CHAMBERLAIN ARCHITECT SERVICES LIMITED, DATED 2022–01–13, REVISION 3. PROJECT No. 121022, DRAWING No. 102

DRAWING NOTES:

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Project: 60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing: PRELIMINARY SITE SERVICING FIGURE

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.	
N.K./M.I.M.	M.I.M./B.W.	2234–6274	
Check	Check	Scale	Dwg.
B.W.	B.W.	1:300	FIG. 3