SERVICING AND 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

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CROZIER
CONSULTING ENGINEERS

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Rev.0	February 2022	Issued for First Submission (OPA & ZBA)
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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by ACLP – Dundas Street E to prepare a Servicing and Stormwater Management Report in support of the Official Plan Amendment, Zoning By-Law Amendment and Site Plan Application for the proposed mixed-use development at 60 Dundas Street East in the City of Mississauga, Region of Peel (the site). The purpose of this report is to demonstrate that the proposed development is feasible from a servicing and stormwater management perspective and conforms with the requirements of the City of Mississauga (City), Region of Peel (Region), and the Credit Valley Conservation Authority (Conservation Authority).

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

- Fire Underwriters Survey - Water Supply for Public Fire Protection (2020)
- 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)
- Credit Valley Conservation Low Impact Development Stormwater Management Planning and Design Guide (Version 1.0 dated 2010)
- Ministry of the Environment - Stormwater Management Planning and Design Manual (March 2003)
- Grounded Engineering Inc. - Hydrogeological Review Report (November 9, 2022)

This report has been prepared based on a revised Site Plan and site servicing strategy from the first submission of the Official Plan and Zoning By-Law Amendment package and to support the first submission of the Site Plan Application for the proposed development.

2.0 Site Description

The site encompasses an area of approximately 1.07 ha and currently consists of an existing commercial plaza and parking lot. Access to the existing commercial plaza is provided from two entrances on Shepard Avenue and one entrance from Dundas Street East. 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 (Revera King Gardens) to the south and Shepard Avenue to the west. A portion of the site lies within the Regulatory Floodplain of Cooksville Creek; therefore, this application is subject to review by the Credit Valley Conservation Authority.

According to the Site Plan prepared by Chamberlain Architect Services Limited, dated October 16, 2022, the elements envisioned for this development include the construction of three high-rise towers over two phases.

- Phase 1:
    - Tower A: 16-Storeys residential high-rise building standing over a 3-storey podium complete with retail, commercial office space, and amenity areas.
- Phase 2:
    - Tower B: 27-Storeys residential high-rise building
    - Tower C: 29-Storeys residential high-rise building
    - Both towers will be connected by a 14-storey podium with shared outdoor amenity areas, and residential units.
- A mixed-use development with 1,009 residential units distributed across three towers and townhouses.
- Five (5) levels of underground parking structure. Approximately, half of the underground parking structure will be constructed during Phase 1 with the other half being constructed during Phase 2 of the development.
- Two site entrances from Shepard Avenue and associated site amenity areas.

The existing commercial plaza and parking lot will be demolished to accommodate the proposed development. Additionally, all servicing infrastructure will be removed or decommissioned to the satisfaction of the Region of Peel. The existing services will be replaced by new water, sanitary, and storm sewer connections to each building face as the site is intended to be severed.

3.0 Equivalent Population

The persons per hectare from 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, were used to determine the equivalent population estimate for the site.

Table 1 outlines the proposed equivalent population for the development based on the provided PPU's.

Table 1: Equivalent Population Estimate

Phase	Unit Type	Number of Units/Area	Population Per Unit	Equivalent Population
One	Apartment 2+	87	3	261
	Apartment 1+	142	2	284
	Penthouse	4	3	16
	Studio	23	1	23
	Amenity/Retail (m^2)	4,537	50 persons/ha	23
	Total Tower A	**-**	**-**	**607**
Two	Apartment 2+	208	3	624
	Apartment 1+	450	2	900
	Townhouse	15	3	45
	Studio	80	1	80
	Amenity/Retail (m^2)	6423	50 persons/ha	32
	Total Tower B & C	**-**	**-**	**1681**
Total Phase One & Two	**-**	**-**	**-**	**2288**

Note: Unit breakdown provided by Chamberlain Architecture, based on the Site Plan dated December 5, 2022.

As outlined in Table 1, the proposed equivalent population for Phase 1 and Phase 2 of the proposed development are 607 persons and 1681 persons, respectively. The total population for the entirety of the site under post-development conditions was determined to be 2288 persons. The equivalent population for Phase 1 and Phase 2 was used to determine the water and sanitary demand for the proposed development. Appendix B contains the equivalent population calculations.

4.0 Water Servicing

The 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.

4.1 Existing Water Servicing

The Region of Peel's External Peel Asset Locator (EPAL), associated as-constructed drawings, and Subsurface Utility Engineering Level B plan complete by Telecon were reviewed to determine the existing water servicing infrastructure close to the site. The existing water servicing infrastructure includes:

- An existing 300 mm diameter PVC (Polyvinyl Chloride) watermain on the southern side of Dundas Street East, and an existing 150 mm diameter DI (Ductile Iron) watermain on the northern side of Dundas Street East (Region of Peel as-constructed drawing 23086-D).
- An existing 250 mm diameter DI watermain on the western side of Shepard Avenue (Region of Peel as-constructed drawing 10284-D).
- 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).

Per review of EPAL the existing commercial building is serviced by two service laterals connecting to the existing 250 mm diameter DI watermain on the western side of Shepard Avenue. The location and size of the water services will need to be confirmed prior to construction.

The as-constructed drawings for Dundas Street East and Shepard Avenue have been included in Appendix A.

4.2 Design Water Demand

The Region of Peel Linear Infrastructure Watermain Design Criteria (June 2010) was used to determine the maximum domestic water demand generated under the proposed conditions for the site based on the equivalent population estimate in Section 3.0.

An average daily water demand of 280 L/cap/day was used for the proposed residential uses and an average daily water demand of 300 L/cap/day was used for the proposed amenity and commercial uses. Appropriate peaking factors were also applied to the average daily demand for the residential and commercial flows to determine the maximum daily and peak hour demand flows. **Error! Reference source not found.** summarizes the estimated design water demand for each phase within the development. Appendix B contains detailed water demand calculations.

Table 2: Estimated Domestic Design Water Demand

Phase	Use	Population	Average Daily Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
One	Residential	584	1.89	3.79	5.68
	Retail/Amenity	23	0.08	0.11	0.24
	Total	**607**	**1.97**	**3.90**	**5.91**
Two	Residential	1649	5.34	10.69	16.03
	Retail/Amenity	32	0.11	0.16	0.33
	Total	**1681**	**5.46**	**10.84**	**16.37**
Total Phase One & Two	**Total**	2288	7.43	14.74	22.28

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

Using Region of Peel design criteria and proposed population equivalent for the proposed development, the domestic water service for Phase 1 and Phase 2 must be designed to convey a peak hour demand flow of 5.91 L/s and 16.37, respectively. It is anticipated that the Region of Peel will complete water modelling for the proposed development and confirm if the site can be serviced by the 300 mm diameter watermain on Dundas Street East and the 250 mm diameter watermain on Shepard Avenue. Detailed water demand calculations will also be completed by the project's mechanical engineer during the detailed design and building permit stage.

4.3 Fire Flow Demand

The Fire Underwriters Survey (2020) 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 criteria which were verified by Chamberlain Architect Services Limited via email correspondence (December 12, 2022):

- 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 automated sprinkler system is to be designed by the Mechanical Engineer.

Table 3 summarizes the fire flow demand and duration of flow required for the proposed building.

Table 3: Estimated Fire Flow Demand

Phase	Method	Demand Flow (L/s)	Duration (h)
One	Water Supply for Public Fire Protection by Fire Underwriters Survey (2020)	100	2.0
Two		150	2.0

The proposed fire line for Phase 1 and Phase 2 are required to accommodate a fire flow of 100 L/s and 150 L/s, respectively for a duration of 2.0 hours. Detailed fire protection system design and calculations for buildings will be completed by the project Mechanical Engineer. Appendix C contains the Fire Underwriters Survey Calculations including the Region of Peel Water Demand Tables.

4.4 Proposed Water Servicing

Phase 1 (Building A) of the proposed development is proposed to be serviced by a 200 mm diameter PVC water service, extending from the existing 300 mm diameter PVC 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.

Phase 2 (Building B & C) of the proposed development is proposed to be serviced by a 200 mm diameter PVC water service, extending from the existing 250 mm diameter DI watermain within Shepard Avenue. 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 (B & C) are higher than 84 m and therefore require at least two sources of water from the public water system (OBC 3.2.9.7.4). A second 200 mm diameter PVC water service will extend from the existing 250 mm diameter watermain within Shepard Avenue to provide redundant water supply to the Phase 2.

The internal water system of the building will be designed per the Mechanical Engineer's details and specifications. We anticipate the water meters will be located within the mechanical room of the underground parking structure (within P1).

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.

Refer to the Site Servicing Plan (Drawing C103) for the proposed servicing layout.

5.0 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.

5.1 Existing Sanitary Servicing

The Region of Peel's External Peel Asset Locator (EPAL), associated as-constructed drawings, and Subsurface Utility Engineering Level B plan completed by Telecon were reviewed to determine the existing sanitary servicing infrastructure close to the site. The existing sanitary servicing infrastructure includes:

- An existing 375 mm diameter PVC sanitary sewer on Dundas Street East running west to east at 0.65% (Region of Peel as-constructed drawing 23042-D).
- An existing 250 mm diameter clay sanitary sewer on Shepard Avenue running north to south at 3.25% (Region of Peel as-constructed drawing 10284-D).

Per review of the Region of Peel as-constructed drawing for Shepard Avenue (10284-D) the existing commercial building is serviced by a service lateral connecting to the existing 250 mm diameter clay watermain on Shepard Avenue. The location and size of the existing sanitary service will need to be confirmed prior to construction.

The as-constructed drawings for Dundas Street East and Shepard Avenue have been included in Appendix A.

5.2 Design Sanitary Flow

The sanitary flow for the proposed development was calculated referencing the Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Watermain Design Criteria (March 2017) and the equivalent population estimate described in Section 3.0. The Region of Peel design criteria unit sewage flow of 302.8 L/capita/day was used to determine the average daily flow for the proposed development. Infiltration flow into the sanitary sewer and a peaking factor were applied to the average daily flow to obtain the total estimated design sewage flow for each Phase. A summary of the results is presented in Table 4, and detailed calculations are provided in Appendix B.

Table 4: Estimated Sanitary Design Flows

Phase	Use	Average Daily Flows (L/s)	Harmon Peaking Factor	Peak Flows (L/s)	Infiltration Flow (L/s)	Total Sanitary Flow[2] (L/s)
One	Residential	2.05	3.93	8.04	0.09	8.45
	Retail/Amenity	0.08		0.31		
Two	Residential	5.78	3.64	21.05	0.12	21.59
	Retail/Amenity	0.11		0.41		
Total Phase One & Two	Residential	7.83	-	29.10	0.21	30.03
	Retail/Amenity	0.19		0.72		

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

Using Region of Peel design criteria and proposed population equivalent for the proposed development, the sanitary service for Phase 1 and Phase 2 must be designed to convey a total sanitary flow of 8.45 L/s and 21.59, respectively. It is anticipated that the Region of Peel will complete sanitary sewer capacity modelling for the proposed development and confirm if the site can be serviced by the existing 375 mm diameter sanitary sewer on Dundas Street East and the 250 mm diameter sanitary sewer on Shepard Avenue. Detailed sanitary flow calculations will also be completed by the project's mechanical engineer during the detailed design and building permit stage.

5.3 Proposed Sanitary Servicing

Sanitary servicing for Phase 1 (Building A) will be provided by a 150 mm diameter sanitary lateral extending from the existing 375 mm diameter PVC sanitary sewer within Dundas Street East. The pipe capacity for a 150 mm diameter lateral sloping at 2% is 21.54 L/s, which is greater than the total sanitary design flow of 8.45 L/s and therefore the proposed sanitary lateral has sufficient capacity to convey the design sanitary flow.

Sanitary servicing for Phase 2 (Building B&C) will be provided by a 200 mm diameter sanitary lateral extending from the existing 250 mm diameter clay sanitary sewer within Shepard Avenue. 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 21.59 L/s and therefore the proposed sanitary lateral has sufficient capacity to convey the design sanitary flow.

The Region is expected to confirm the downstream capacity of the sanitary sewer on Dundas sStreet East and Shepard Avenue using their Region-wide system model. The Site Servicing Plan (Drawing C103) illustrates the location of the proposed sanitary laterals and the connection to the underground parking structure for each phase. The internal sanitary system of the building will be designed by the Mechanical Engineer's in accordance with their details and specifications.

6.0 Drainage Conditions

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

6.1 Existing Drainage Conditions

The site currently consists of an existing commercial plaza and asphalt parking lot. According to the topographic survey (Askan Piller Corporation Ltd., February 4, 2022) and locates (Mark It, April 11, 2022) stormwater runoff generated during the minor storm event within the site is collected by catchbasins which outlet directly to Cooksville Creek. The major storm event under existing conditions is directed from west to east via. overland flow where it outlets directly to Cooksville Creek. There is a small portion of the site south of the existing building that appears to pond and spill to the adjacent site. Figure 1 outlines the existing drainage catchment and overland flow routes.

The Region of Peel's External Peel Asset Locator (EPAL) and associated as-constructed drawings were reviewed to determine the existing storm servicing infrastructure close to the site. The existing storm servicing infrastructure includes:

- An existing 600 mm diameter storm sewer (material unknown) within Dundas Street East running west to east at approximately 2% (Region of Peel as-constructed drawing 23042-D).
- An existing 300 mm diameter concrete storm sewer within Shepard Avenue running north to south at approximately 0.8% (Region of Peel as-constructed drawing 23042-D).

We assume there are no existing stormwater management controls within the site considering the site's age. The pre-development drainage area (Catchment 101) is assumed to be the entire site area of 1.07 ha as all runoff from the development is ultimately directed to Cooksville Creek. In accordance with City of Mississauga design criteria, a maximum pre-development runoff coefficient of 0.50 was used for the existing commercial development to model the stormwater quantity controls for the development.

6.2 Proposed Drainage Conditions

Based on the concept plan prepared by Chamberlain Architect Services Limited (October 16, 2022) the proposed development will consist of 3 mixed-use high-rise buildings, 2 of which will be connected via a 14-storey podium, five (5) levels of underground parking, and two access points from Shepard Avenue.

The proposed site grading divides the site into five (5) post-development catchment areas as shown on the Post-Development Drainage Plan (Figure 2):

- Catchment 201 (A = 0.29 ha, RC = 0.85) consists of drainage from proposed building 'A', internal roadway, and landscaped areas. All storm events up to and including the 100-year event for this catchment will be collected, controlled, and conveyed to the proposed underground stormwater management storage tank by the internal storm sewer system. The stormwater management tank will within the underground parking lot and outlet to the Shepard Avenue storm sewer after quantity and quality control. Storm events larger than the 100-year event will be conveyed overland to the Shepard Avenue right-of-way; ultimately draining to Cooksville Creek.

- Catchment 202 (A = 0.63 ha, RC = 0.76) consists of drainage from proposed building 'B and C', internal roadway, and landscaped areas. All storm events up to and including the 100-year event for this catchment will be collected, controlled, and conveyed to the proposed underground stormwater management storage tank by the internal storm sewer system. The stormwater management tank will be within the underground parking lot and outlet to the Shepard Avenue storm sewer after quantity and quality control. Storm events larger than the 100-year event will be conveyed overland to the Shepard Avenue right-of-way; ultimately draining to Cooksville Creek.

- Catchment UC1 (A = 0.04 ha, RC = 0.85) consists of uncontrolled drainage from the northern limits of the site along Dundas Street East. All storm events from this catchment are conveyed overland via sheets flow to the Dundas Street East right-of-way.

- Catchment UC2 (A = 0.04 ha, RC = 0.77) consists of uncontrolled drainage from the western limits of the site along Shepard Avenue. All storm events from this catchment are conveyed overland via sheets flow to the Shepard Avenue right-of-way.

- Catchment UC3 (A = 0.06 ha, RC = 0.59) consists of uncontrolled drainage from the north and east limits of the site along Dundas Street East and the eastern property limits. All storm events from this catchment are conveyed overland via sheets flow to Cooksville Creek.

Upon development, the minor system will be conveyed from the site to the proposed stormwater management storage tanks through the internal storm sewer network consisting of area drains and grassed swales. The stormwater management tanks will be provided within the underground parking garage within Phase 1 and Phase 2 to attenuate the storm events to meet the stormwater quantity control criteria. Following stormwater quantity and quality controls the stormwater will be conveyed to the existing storm sewer on Shepard Avenue.

The site is proposed to drain to the Shepard Avenue storm sewer system under proposed conditions to avoid new point outlets into Cooksville Creek. Outletting directly to Cooksville Creek was considered and is still viable; however, outletting to Shepard Avenue was ultimately chosen to avoid new point loaded outlets to Cooksville Creek and also reduce the chances of the storm sewer system backing up during a Regional storm event. A review of the downstream Regional Flood elevation indicates an elevation of approximately 108.11 m, which is above the proposed outlet invert of the stormwater tank, but below the top of tank elevation. Therefore, during a Regional Storm event, it is possible stormwater could back up into the stormwater management tank, but not beyond this point. Therefore, the proposed drainage system internal to the building will not experience backwater impacts.

As the site does not drain to the Shepard Avenue storm sewer under existing conditions, Crozier completed a downstream capacity assessment to identify possible capacity issues within the existing system. Ultimately, the Shepard Avenue storm sewer system outlets to the storm trunk system within King Street East, which then outlets to Cooksville Creek. Overall, the site will still have the same ultimate outlet of Cooksville Creek and the proposed drainage conditions will be improved over existing conditions by removing point loaded outlets and reducing backflow risk from a Regional storm event.

6.3 External Capacity Analysis

External storm sewer design sheets were prepared to determine the downstream capacity of the existing storm sewer system on Shepard Avenue and King Street East to determine if any downstream capacity constraints exist for the runoff generated from the proposed development. The external capacity analysis was completed for the storm sewer stretch from Shepard Avenue to King Street East where the storm sewer ultimately outlets to the existing Cooksville Creek box culvert on King Street East. The City of Mississauga Development Requirements Manual (November 2020) was used to estimate the existing and proposed stormwater flows outletting to the existing sewer system. A runoff coefficient of 0.90 was utilized for all existing residential and commercial development catchments and it was assumed that all existing development did not have stormwater management quantity controls implemented. Refer to Appendix D for the capacity analysis drainage figure.

The results of the external storm sewer capacity analysis show the existing 300 mm diameter storm sewer on Shepard Avenue surcharges under free flow conditions during the 5-year and 10-year storm events under existing and proposed conditions. It should be noted the existing 300 mm diameter storm sewer on Shepard Avenue drains into an 825 mm diameter storm sewer at the southern limits of the site and that this sewer has sufficient capacity. Therefore, the 300 mm diameter sewer may be undersized and may require upgrades to alleviate existing and proposed capacity concerns for the proposed development. The calculations and results of the external capacity analysis have been included in Appendix D. Additional investigations may be required to confirm if external storm sewer upgrades will be necessary.

7.0 Stormwater Management

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

Water Quantity Contro

Control the 100-year post-development peak flow to 2-year pre-development peak flow in accordance with the Cooksville Creek design criteria (City of Mississauga Development Requirements Manual, November 2020). The maximum pre-development runoff coefficient to be used for the redeveloped site cannot exceed 0.50.

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) by way of infiltration, reuse, or evapotranspiration to achieve the water balance criteria. Filtration may be considered if options are not feasible.

7.1 Stormwater Quantity Control

7.1.1 Regional Flood Control

A portion of the site experiences flooding during the Regional storm event under the existing pre-development conditions. During the Regional storm event water overtops the twin – 3 m x 3.6 m box culverts crossing Dundas Street East and spills into the development under existing conditions. The stormwater spill that enters the development under existing conditions is conveyed via. sheet flow approximately 35 meters downstream of the twin box culverts. A spillway is proposed to convey the spill through the site under post-development conditions to direct the spill 35 meters downstream of the twin box culverts consistent with the pre-development outlet.

Crozier completed a Floodplain Study (February 2022) under separate cover, outlining the required flood proofing measures. The proposed Site Grading Plan and Post-Development Drainage Plan (Drawing C102 and Figure 2), accommodates the flood proofing elevations and safe access requirements for the proposed development. Since this Report, Crozier and the proponent have engaged the City and Credit Valley Conservation in several meetings to review and discuss potential floodplain management resolutions.

The ultimate floodproofing design is subject to additional coordination and correspondence with the City and Credit Valley Conservation. Crozier and the proponent are actively involved with each party to explore feasible floodproofing requirements from a local and provincial policy level. This report and associated engineering design will be updated to reflect the ultimate floodplain design solution once confirmed. All floodplain materials will be completed and submitted under separate cover in the following months to advance the development application in parallel to achieve the proponents and City's development objectives.

7.1.2 Site Stormwater Management Controls

As discussed in Section 7.0, stormwater quantity control requirements for the site include controlling the 100-year post-development peak flow to 2-year pre-development peak flow in accordance with the Cooksville Creek design criteria. 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.

Based on the City of Mississauga's guidelines, a maximum pre-development runoff coefficient of 0.50 must be used in the Modified Rational Method calculation even if the site in existing conditions has a higher runoff coefficient than 0.50. In pre-development conditions, most of the site has a runoff coefficient of 0.90 in consideration of the existing land use (i.e., commercial and paved parking areas). The City of Mississauga also requires that the runoff coefficient be adjusted for major storm event return periods (25-year to 100-year events).

Table 5 below summarizes the pre-development peak flow rates from site directed to the Cooksville Creek using a pre-development runoff coefficient of 0.50 and 0.90. Detailed calculations are provided in Appendix D.

Table 5: Summary of Pre-Development Peak Flows

Catchment 101 (Pre-development)					
Return Period @ Tc = 15 min	**Runoff Coefficient**	**Q** (L/s)	**Return Period @ Tc = 15 min**	**Runoff Coefficient**	**Q** (L/s)
2-Year	0.5	89	2-Year	0.9	161
5-Year		120	5-Year		216
10-Year		148	10-Year		266
25-Year		187	25-Year		336
50-Year		228	50-Year		410
100-Year		262	100-Year		472

As presented in Table 5, the site under post-development conditions must be controlled to a 2-year pre-development flow rate of 89 L/s.

Phase 1 – Catchment 201, UC1, and UC3

The drainage from Catchment 201 consists of runoff from Building 'A', internal roadway, and landscaped areas from the northern extents of the development. Stormwater runoff from Catchment 201 will be capture, conveyed, and controlled by the internal storm sewer network prior to outletting towards the existing storm sewer on Shepard Avenue. The modified rational method was used to quantify the pre-development flows, post-development flows, and storage requirements from Phase 1. The peak flow target for Phase 1 is based on controlling the post-development stormwater flows to the 2-year pre-development flow for the Phase 1 development area (0.40 ha).

The pre-development and post-development flow rates and the storage requirements for Phase 1 are summarized in Table 6.

Table 6: Summary of Phase 1 Post-Development Peak Flows and Storage Requirements

Phase 1 - Catchment 201 and UC1 & UC3						
Return Period @ Tc = 15 min	Q_{runoff} Uncontrolled (L/s)	Q_{runoff} Uncontrolled (L/s)	Q_{runoff} Uncontrolled (L/s)	$Q_{release}$ Controlled (L/s)	$Q_{release}$ Controlled Total (L/s)	**Required Storage** (m^3)
	Pre-Development	**Post-Development**				
Catchment	**101***	**201**	**UC1+UC3**	**201**	**201+UC1+UC3**	**Phase 1**
2-Year	33	42	12	23	35	17
5-Year		56	16		39	30
10-Year		69	20		43	42
25-Year		87	25		48	60
50-Year		106	31		54	79
100-Year		122	36		59	92

*Phase 1 area weighted flows from Catchment 101 (approximately 0.40 ha).

As shown in Table 6, the post-development 100-year storm event is controlled to 59 L/s which is 26 L/s more flow than the 2-year pre-development storm event using a pre-development runoff coefficient of 0.50. Utilizing a more realistic pre-development runoff coefficient of 0.90 the pre-development area weighted 100-year peak flow from Phase 1 is 60 L/s which is larger than the post-development-controlled flow rates.

Based on the modified rational calculations and a 75mm diameter orifice tube will control the post-development Phase 1 flows to a constant flow rate of 23 L/s, requiring a total storage volume of 92 m^3. An underground storage tank with a volume of 126 m^3 has been provided within the P1 underground parking level to provide the necessary storage requirements. Upon attenuation the stormwater flows will be directed to the existing 300 mm diameter storm sewer on Shepard Avenue via a proposed 250 mm diameter storm service connection.

Catchment UC1 and UC3 will consist of hardscaped and landscaped areas. Catchment UC1 will flow uncontrolled to the Dundas Street right-of-way and Catchment UC3 will flow uncontrolled to Cooksville Creek. Catchment UC1 and UC3 have a combined drainage area of 0.1 ha and will contribute minor uncontrolled runoff to their respective outlets. Appendix D contains detailed calculations of the stormwater peak flows and storage requirements.

Phase 2 – Catchment 202 and UC2

The drainage from Catchment 202 consists of runoff from Building 'B and C', internal roadway, and landscaped areas from the southern extents of the development. Stormwater runoff from Catchment 202 will be captured, conveyed, and controlled by the internal storm sewer network prior to outletting towards the existing storm sewer on Shepard Avenue. The Modified Rational Method was used to determine the pre-development flows, post-development flows, and storage requirements from Phase 2. The peak flow target for the Phase 2 is based on the controlling the post-development flow rates to the 2-year pre-development flow rate for the Phase 2 development area (0.67 ha).

The pre-development and post-development flow rates and the storage requirements for Phase 2 are summarized in Table 7.

Table 7: Summary of Phase 2 Post-Development Peak Flows and Storage Requirements

Phase 2 - Catchment 202 and UC2 (Post-development)						
Return Period @ Tc = 15 min	**Q_{runoff} Uncontrolled** (L/s)	**Q_{runoff} Uncontrolled** (L/s)	**Q_{runoff} Uncontrolled** (L/s)	**$Q_{release}$ Controlled** (L/s)	**$Q_{release}$ Controlled Total** (L/s)	**Required Storage** (m^3)
	Pre-Development	**Post-Development**				
Catchment	**101**	**202**	**UC2**	**202**	**202+UC2**	**Phase 2**
2-Year	56	80	6	38	43	38
5-Year		108	8		45	63
10-Year		133	9		47	88
25-Year		168	12		49	126
50-Year		204	14		52	169
100-Year		235	17		54	209

*Phase 2 weighted area flows from Catchment 101 (approximately 0.67 ha)

As shown in Table 7, the post-development 100-year storm event is controlled to 54 L/s which is 2 L/s less flow than the 2-year pre-development storm event using a pre-development runoff coefficient of 0.50. Utilizing a more realistic pre-development runoff coefficient of 0.90 the pre-development 100-year peak flow from Phase 2 is 101 L/s which is larger than the post-development-controlled flow rates.

Based on the modified rational calculations, a 100mm diameter orifice tube will control the post-development Phase 2 stormwater flows to a constant flow rate of 38 L/s, requiring a total storage volume of 209 m^3. An underground storage tank with a volume of 240 m^3 has been provided within the P1 underground parking level to provide the necessary storage requirements. Upon attenuation the stormwater flows will be directed to the existing 300 mm diameter storm sewer on Shepard Avenue via a proposed 300 mm diameter storm service connection.

Catchment UC2 will consist of hardscaped and landscaped area. Catchment UC2 will flow uncontrolled to the Shepard Avenue right-of-way. Catchment UC2 is relatively small (0.4 ha) and will contribute minor uncontrolled runoff to Shepard Avenue right-of-way. Appendix D contains detailed calculations of the stormwater peak flows and storage requirements.

7.2 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 involves 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.

Two Jellyfish JF-6's units are proposed for Phase 1 and Phase 2 to provide the required enhanced level of water quality control prior to discharging to the City's storm sewer network. Refer to Appendix D for the Jellyfish sizing reports for each Phase.

7.3 Water Balance

As stated in the City of Mississauga Development Requirements Manual (November 2020), the first 5 mm of stormwater runoff shall be retained on-site and managed by way of infiltration, evapotranspiration or re-use. The water balance retention volume was calculated considering initial abstraction of runoff based on impervious areas. Note that the landscape areas above the underground parking structure were considered pervious as the parking structure will have approximately 600-800 mm of landscaping between the transfer slab and grade; therefore, the landscaping will retain the first 5 mm of rainfall.

A total storage volume of 37 m^3 (0.73 ha (impervious) x 5 mm) will be provided on-site to achieve the water balance criteria. The storage will be provided through the implementation of an infiltration trench located east of proposed Building B and C.

Table 8 below summarizes the design parameters used to determine the minimum footprint required for the infiltration area.

Table 8: Infiltration Trench Footprint Sizing Summary

Parameter	Required	Provided
Void Space Ratio	0.40	0.40
Drawdown Time	48-hr preferred: 24-hr minimum	48-hr
Percolation Rate	15 mm/hr	14 mm/hr
Depth of Overlay	-	0.3m
Stone Reservoir Depth	1.8 m (max)	0.5 m
Footprint Required*	139.9 sq.m.	144.5 sq.m.

*Footprint required for a drawdown time of 48hrs per infiltration parameters

The void space ratio and drawdown time included in Table 8 were based on the recommended value for the gravel storage layer per the Credit Valley Conservation Authority LID Stormwater Management Planning and Design Guide (2010). Based on the parameters outlined in Table 9 the infiltration trench footprint was determined to be 139.9 m^3 to capture the first 5 mm of runoff from the impervious surfaces within the proposed development. A total footprint of 144 m^3 is provided with a total storage volume of 46.2 m^3 therefore meeting the water balance requirements for the site. Additional water balance and infiltration trench sizing calculations can be referenced in Appendix D and the location and makeup of the infiltration trench can be reference on the Site Servicing Plan (Drawing C103).

Per review of the Hydrogeological Review Report prepared by Grounded Engineering Inc. dated November 9, 2022, the existing soil within the location of the proposed infiltration trench is fill material consisting of sand, some silt, and trace gravel. The hydraulic conductivity of the soil was determined to be 1.0×10^{-5} m/s based on estimated published values. Additionally, the seasonally high groundwater in the proposed infiltration trench area is at an elevation of 105.1 meters above sea level; therefore, adequate separation will be provided between the bottom of trench and groundwater table. Based on the above location specific hydraulic conductivity and groundwater levels implementation of the proposed infiltration trench is feasible.

7.4 Sustainable Stormwater Management

Low Impact Development (LID) techniques will be incorporated into the grading and drainage design of the site in the form of an underground storage tank, green roof features, enhanced grassed swales, an infiltration trench, and enhanced topsoil. These techniques have been specified with reference to the CVC/TRCA guidelines on Low Impact Development Stormwater Management Planning & Design Guide (Version 1.0, 2010) as described below.

Underground Storage Tanks

An underground stormwater tank is proposed within each building (Phase 1 and Phase 2) to capture runoff volume from the site, where stormwater is intended, in part, for re-use (irrigation) in satisfaction with the water balance objectives for the site. Stormwater collected and stored within the underground storage tank will be pre-treated within the parking garage, if required. A filtration system or by-pass system will be considered in collaboration with the project's mechanical engineer to ensure the stored water is suitable for irrigation purposes.

Crozier coordinated the irrigation requirements with the project's landscape architect to confirm the required storage volume within the tank. The calculations indicate a total of 14.5 m^3 is required as dead-storage within the proposed storage tanks for irrigation purposes. This storage volume can be accommodated within the underground parking garage and will be detailed by the projects mechanical engineer.

Additional details of the proposed irrigation system are provided by others under separate cover.

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.

Several areas of each proposed building are designated for green roof use by the landscape architect. Refer to their plans for green roof locations and their locations.

Enhanced Grass Swale

Enhanced grass swales are designed to convey, treat, and attenuate stormwater runoff. Enhanced grass swales slow stormwater runoff to allow sedimentation, filtration through the soil matrix, evapotranspiration, and infiltration into the underlying native soil. These swales are proposed along the southern and eastern portions of the proposed development and will intercept stormwater runoff from landscaped areas of the site. They will provide pre-treatment prior to discharging to the proposed stormwater management tanks within each building.

Infiltration Trench

An infiltration trench is proposed to temporarily store, treat, and infiltrate runoff stormwater runoff from the southeastern portion of the site. The infiltration trench has been designed to capture and infiltrate 37 m^3 of stormwater runoff to meet the water balance requirements for the site.

7.5 Long Term Permanent Dewatering

According to the Hydrogeological Review Report prepared by Grounded Engineering Inc. (November 9, 2022) the daily water takings for the site due to permanent groundwater seepage and infiltration will be approximately 111,000 L/day or approximately 1.3 L/s. Groundwater samples were collected and analyzed by an accredited laboratory and it was determined that the groundwater exceeded the City of Mississauga Storm Sewer quality requirements for total suspended solids, copper, magnesium, and zinc. Due to this exceedance, the groundwater requires treatment prior to outletting to the municipal storm infrastructure. The treatment system will be design by the site mechanical engineer and will be implemented within the underground parking structure of the development.

Following treatment, the permanent groundwater flows will be directed to the existing storm sewer on Shepard Avenue. It is noted that the permanent groundwater dewatering flows (1.3 L/s) are minor in comparison to the overall stormwater discharge from the development.

8.0 Erosion and Sediment Controls During Construction

The design of the erosion and sediment controls can be referenced on the Erosion, Sediment Control, and Removals Plan (Drawing C101). The erosion and sediment controls will be required to be installed prior to the beginning of any construction activities. They will be maintained until the site is stabilized or as directed by the Site Engineer and/or City of Mississauga. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

Light Duty Silt Fencing

Light duty silt fencing will be installed on the perimeter of the site to intercept sheet flow. Additional silt fencing may be added based on field decisions by the Site Engineer and Owner, prior to, during, and following construction.

Rock Mud Mat

A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto surrounding lands and the perimeter roadway network. All construction traffic will be restricted to this access only.

Silt sacks in Catchbasins

A silt sack will be installed in each new catch basin as they are installed. The silt sack will provide sediment control to prevent silt and sediment from entering the storm water system. Silt sacks will also be installed on the existing catchbasins during construction to prevent sediment from entering the existing storm sewer pipe.

9.0 Conclusion and Recommendations

This report was prepared in support of the Official Plan Amendment, Zoning By-Law Amendment, and Site Plan Application for the property located at 60 Dundas Street East in the City of Mississauga. The proposed development can be serviced for water, sanitary and stormwater management in accordance with the City, Region, and Conservation Authority requirements and standards. Our conclusions and recommendations include:

Phase 1

1. The estimated peak hourly domestic water demand for Phase 1 is 5.91 L/s. The site will be serviced with a 100 mm diameter domestic water services and a 200 mm diameter fire service connecting to the existing 300 mm diameter watermain within Dundas Street East.

2. The estimated fire flow requirements for Phase 1 are 100 L/s for a duration of 2 hours according to the Fire Underwriters Survey calculations.

3. The proposed water system and detailed fire protection system design and flow calculations within the development will be designed by the Project's Mechanical Engineer.

4. The estimated sanitary flow generated from the Phase 1 is 8.45 L/s. A 150 mm diameter sanitary sewer connection is proposed to connect to the existing 375 mm diameter sanitary sewer within Dundas Street East.

5. Phase 1 stormwater quantity controls will be achieved through the implementation of a 126 m^3 underground storage tank complete with a 75 mm orifice tube to attenuate the 100-year post-development peak flows to 2-year pre-development levels. Stormwater runoff for storm events up to and including the 100-year storm event from Phase 1 will be captured and controlled by the internal storm sewer system before outletting to the existing 300 mm diameter storm sewer on Shepard Avenue.

6. Stormwater quality controls for the Phase 1 will be provided by an in-line Jellyfish Filtration System (JF-6 or approved equivalent) unit installed downstream of the underground stormwater storage tank.

7. Erosion and sediment controls will be implemented prior to the beginning of any construction on the site.

Phase 2

1. The estimated peak hourly domestic water demand for Phase 2 is 16.37 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. The services will connect to the existing 250 mm diameter watermain within Shepard Avenue.

2. The estimated fire flow requirements for Phase 2 are 150 L/s for a duration of 2.0 hours according to the Fire Underwriters Survey calculations.

3. The proposed water system and detailed fire protection system design and flow calculations within the development will be designed by the Project's Mechanical Engineer.

4. The estimated sanitary flow generated from the Phase 1 is 21.59 L/s. A 200 mm diameter sanitary sewer connection is proposed to connect to the existing 250 mm diameter sanitary sewer on Shepard Avenue.

5. Phase 2 stormwater quantity controls will be achieved through the implementation of a 240 m^3 underground storage tank complete with a 100 mm orifice tube to attenuate the 100-year post-development peak flows to 2-year pre-development levels. Stormwater runoff for storm events up to and including the 100-year storm event from Phase 1 will be captured and controlled by the internal storm sewer system before outletting to the existing 300 mm diameter storm sewer on Shepard Avenue.

6. Stormwater quality controls for the Phase 1 will be provided by an in-line Jellyfish Filtration System (JF-6 or approved equivalent) unit installed downstream of the underground stormwater storage tank.

7. A storage volume of 37 m^3 (equivalent to 5 mm across the impervious areas of the site) will be provided through the implementation of an infiltration trench to meet the water balance criteria for the site.

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

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Brett Pond, E.I.T.
Land Development

C.F. CROZIER & ASSOCIATES INC.

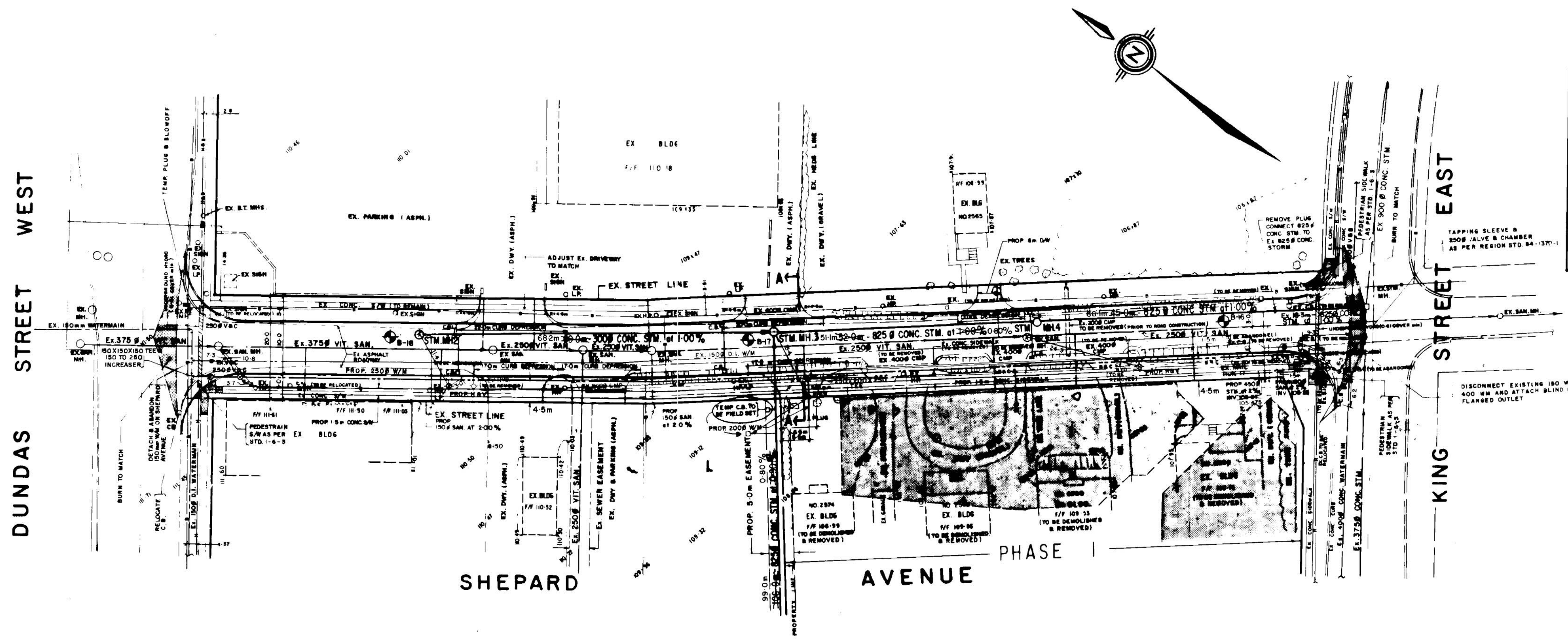
Brendan Walton, P.Eng.
Project Manager

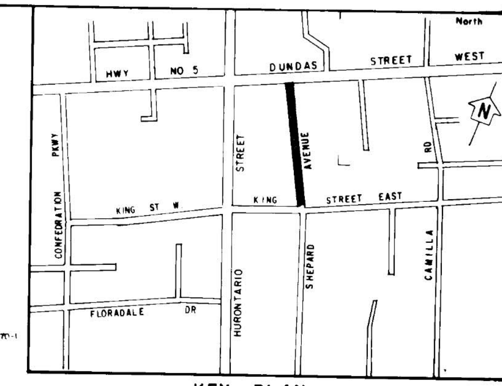
BP/cj

I:\2200\2234- Almega Corp\6274- 60 Dundas St Towers\Reports\2022.11.16 FSRSWM 2nd Submission (ZBA + SPA)\2022.12.14_(2234-6274)_6274_Servicing & SWM_.docx

APPENDIX A

As-Builts





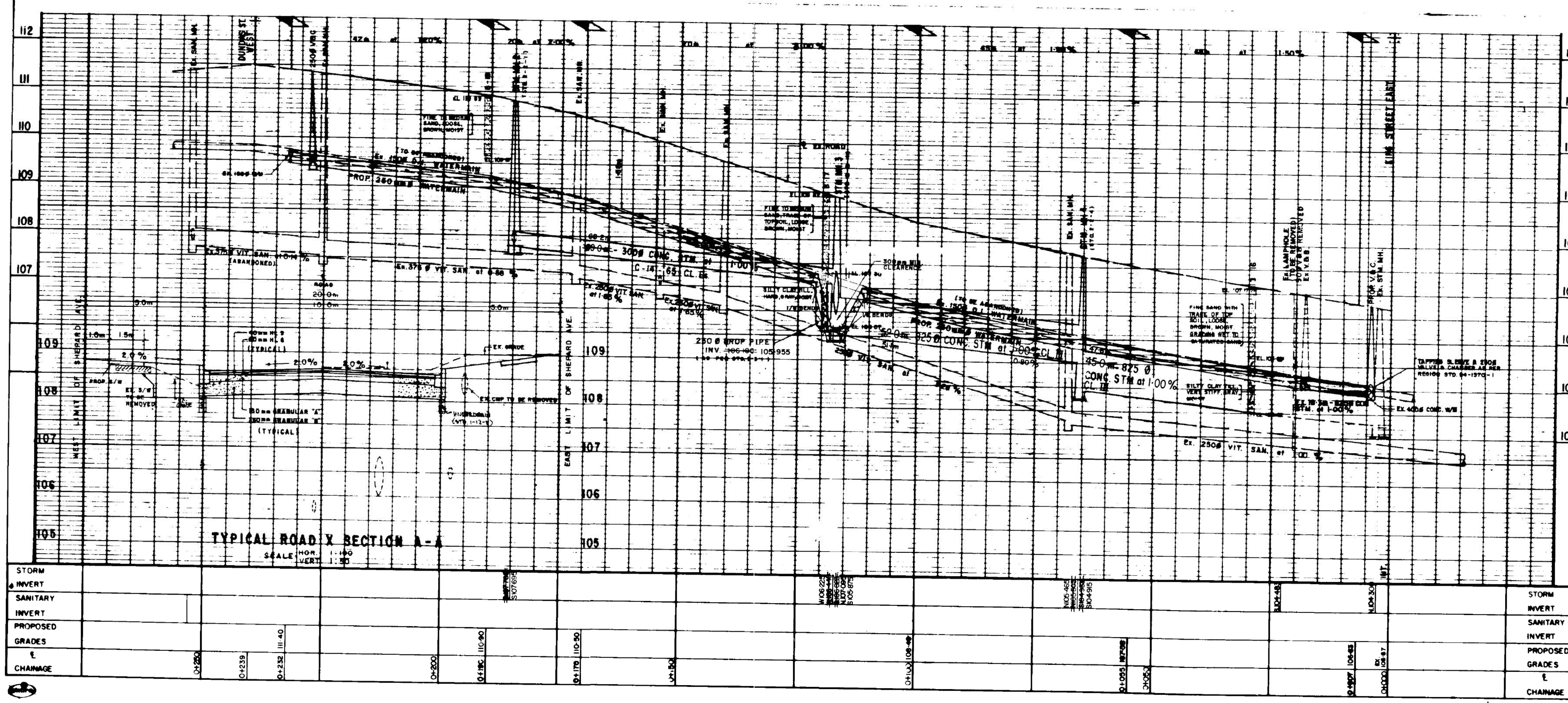
KEY PLAN
SCALE 1 : 6 000

NOTE: SEE GENERAL NOTES ON DWG. No 2

LEGEND

— H —	DENOTES	HYDRO LINE
— B —	DENOTES	BELL TELEPHONE LINE
— C —	DENOTES	CABLE TV LINE
▭	DENOTES	PROPOSED COMMERCIAL BUILDINGS
EX. 250 Ø VIT SAN	DENOTES	APPROXIMATE LOCATION OF SERVICES
B-16	DENOTES	BORE HOLE No. 16

NOTE: ALL EXISTING SAN. SEWER CONNECTIONS WHICH CONFLICT WITH PROP. STM. SEWER MUST BE RECONSTRUCTED AS PER REGION OF PEEL STDS.



BENCH MARK No. 117

ON THE E. FACE AT THE N. CORNER OF GARAGE OF A RED BRICK BUNGALOW, No. 2470 ON THE W. SIDE OF CAMILLA RD., 161·294m (530') S. OF KING ST.

ELEV. 109·576m (359·50')

NO	REVISION	DATE	BY	APPROVED
2	STM & WM AS CONSTRUCTED	APR.'88	AN	
1.	W/M RELOCATED TO 4·5m OFF W. ℄	SEPT. 9/85	AKL	

DESIGNED BY Apr 23/85 CHK'D

APPROVED BY

Anton Kikas Limited
Consulting Engineers
Ontario Land Surveyors

DUNDAS SHEPARD SQUARE LTD.

CITY OF MISSISSAUGA
REGION OF PEEL
Engineering Department

T-85042

SHEPARD AVENUE
(DUNDAS STREET WEST TO KING STREET EAST)
STA. 0+000 TO STA. 0+239

SCALE H 1:500 V 1:50		PROJECT NO. 316E-84
DRAWN BY K H	CHECKED BY J T T	PLAN NO. 10284-D
DATE: JANUARY 1985	SHEET 1 OF 4	

10284-D

DUNDAS STREET E

HURONTARIO ST.

SHEPPARD AVE.

JAGUAR VALLEY DRIVE

REFER TO DWG. No. 23696-D

SIGNATURE PLAZA

RENTAL UNITS

BELL CANADA

CIBC

ROYAL BANK

GASOLITE STATION

RETAIL STORES

APARTMENT PARKING LOT

BRIDGE

SAN. SEWER

375 SAN. SEWER

300 WM.

MH. 3

MH. 2

MH. 1

BH-2

INV. 107.85
INV. 107.76

EXPOSE PIPE, CUT & FILL WITH GROUT

9m-250mm ø 1.0%

2.0m FROM EDGE OF PAVEM.

375x250 TEE

2-45° BENDS

2-45° BENDS VERT.

Pt:C

Pt:A

Pt:B

600mm BELL DUCT

300 V&B

SEE LEGEND

45° BEND

HYD.V&B

EX.WW.TO BE ABANDONED

ABAND.

REDUCER

90° BEND

CUT & PLUG EX.WW.

EX. SAN. SEWER TO TO BE ABANDONED (EX. MH. 16 TO 19)

300x250 TEE

2-45° BENDS HOR.

300x250 CROSS PLUGGED WEST

3-45° BENDS VERT.

FOR GENERAL NOTES, LEGEND AND DETAILS SEE DWG. No's. 23696-D & 23701-D

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS	FEB. 1998	A.S.	GAS MAINS	NOV. 1996	A.S.
STORM SEWERS	FEB. 1998	A.S.	BELL U/G CABLE	NOV. 1996	A.S.
WATERMAINS	FEB. 1998	A.S.	HYDRO U/G CABLE	NOV. 1996	A.S.
TRANSIT			ONT. HYDRO		
PARKS & REC.			CTV	NOV. 1996	A.S.
ONT. CLEAN WATER	NOV. 1996	A.S.			

REVISIONS		
DATE	DETAILS	INIT.
21.06.1999	SANITARY SEWER AS CONSTRUCTED	I.F.
22.06.1999	WATERMAIN AS CONSTRUCTED	I.F.

PROP. MH. No. 3 (SEE DETAIL)

PROP. MH. 2

PROP. MH. 1

EX. ROAD GRADE

LOCATION & ELEVATION OF EX.WW.TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR

EX.150 WM.

2m MIN.

FINE BROWN SAND

TOP OF BENCHING 108.186

300mm DIA. DUCTILE IRON PROTEC COATED PIPE WATERMAIN CLASS 350 OR PVC CLASS 150

SAFETY PLATFORM @ 108.10

INTERNAL DROP PIPE (SEE DETAIL)

280mm ASPHALTIC CONCRETE over FILL- consists of sand and gravel, brown, moist, becomes wet below 4.5m depth.

SILT TILL- numerous shale fragments below 4.5m depth, grey, moist, very dense

112.5m-375mm SAN. SEWER @ 0.65%

114m-375 SAN. SEWER @ 0.65%

14m-375mm SAN. SEWER @ 0.75%

W.INV. 109.705 N.INV. 108.680 E.INV. 108.540	108.624 108.477	300x300 CROSS	300 GATE VALVE & BOX	300x150 REDUCER HOR.	300x150 REDUCER HOR.	300x150 ANCHOR TEE	W.INV. 107.846 E.INV. 107.716	107.790 107.700	300 GATE VALVE & BOX	300x250 TEE TURNED DOWN	90° BEND VERT.& HOR.& 300X150 REDUCER	W.INV. 107.085 N.E. INV. 106.995	106.959 106.841	S.W. INV. 106.880	106.825
0+008		0+015	0+015	0+025	0+025	0+053			0+142	0+145.2	0+153.5				
109.65		109.65	109.65	109.65	109.57	109.54	109.42	109.30							
0+000	0+020	0+040	0+060	0+080	0+100	0+120	0+140	0+160	0+180	0+200	0+220	0+240 RD. CHAINAGE			

ELEV. BTM. PROP. WW.

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

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

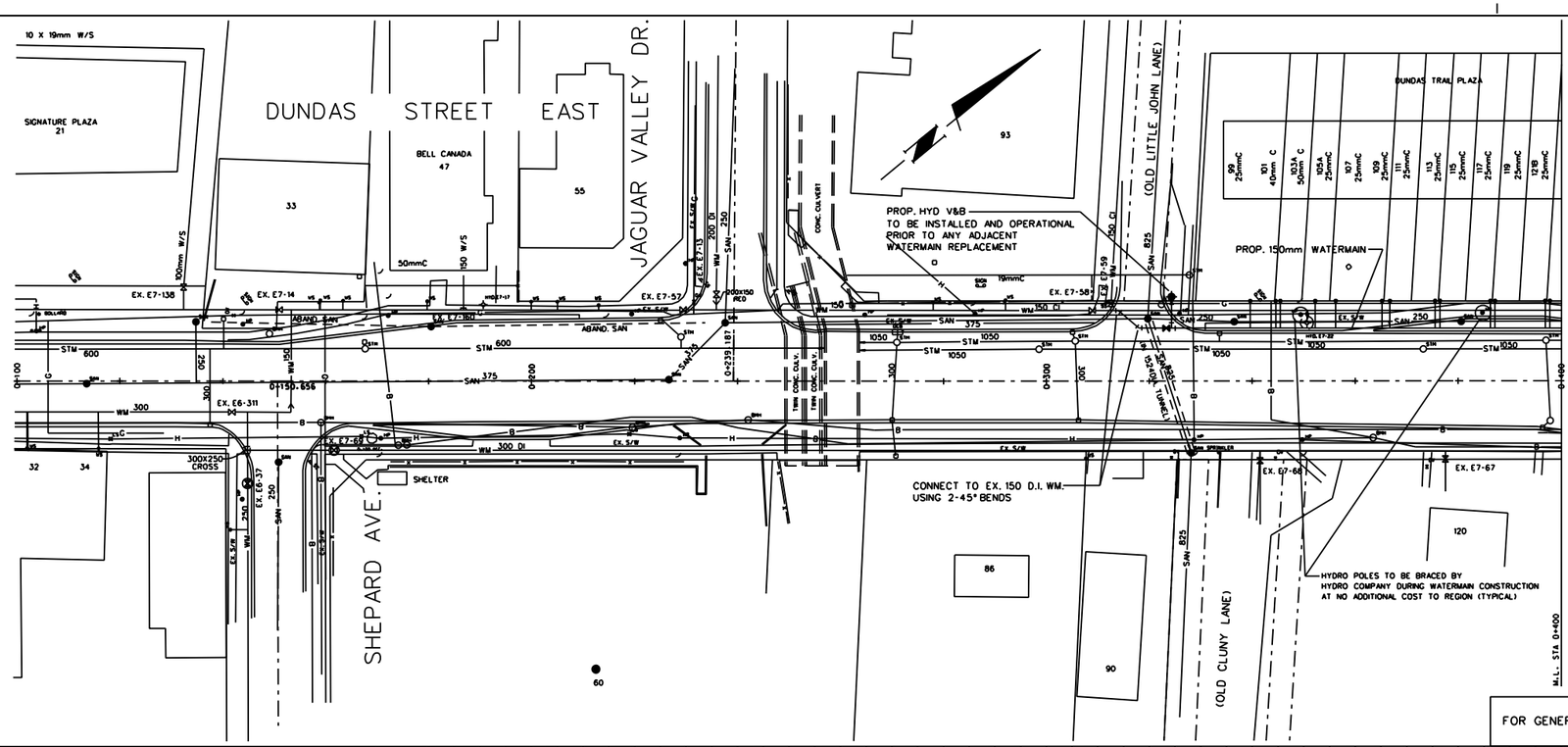
Region of Peel
Public Works

DUNDAS STREET E.

375mm SANITARY SEWER
300mm WATERMAIN

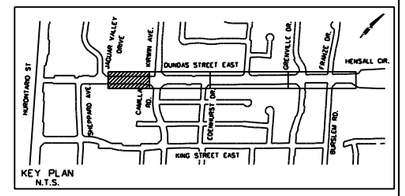
Sta. 0+000 **To Sta.** 0+240

LOTS	AREA Z-21	PROJECT NO.	98-1440 96-2110
CHECKED BY	DRAWN BY A.S.	PLAN NO.	23086-D
DATE FEB. 1998	SHEET 1 OF 1		



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
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.			

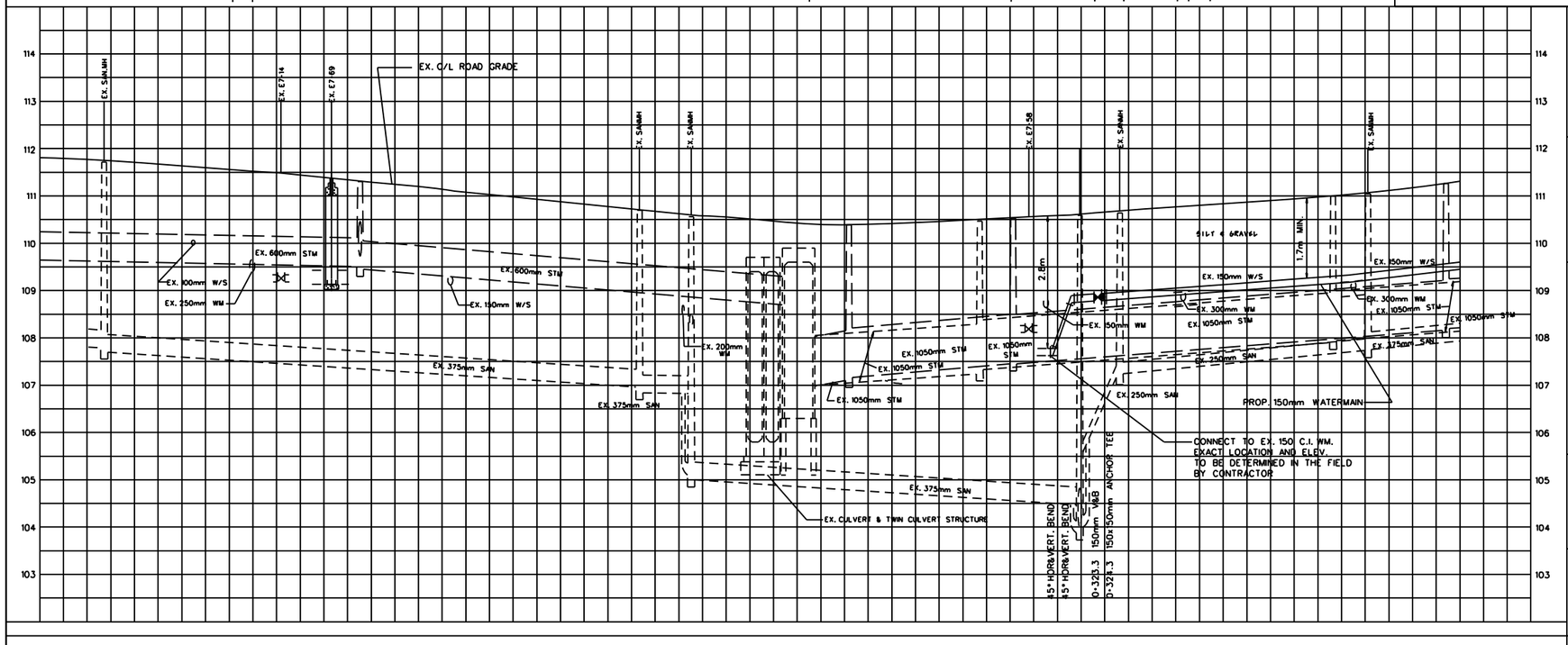
REVISIONS		
DATE	DETAILS	INIT.
DEC. 2001	AS CONSTRUCTED	J.P.



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.



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

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 COMMMENCING 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

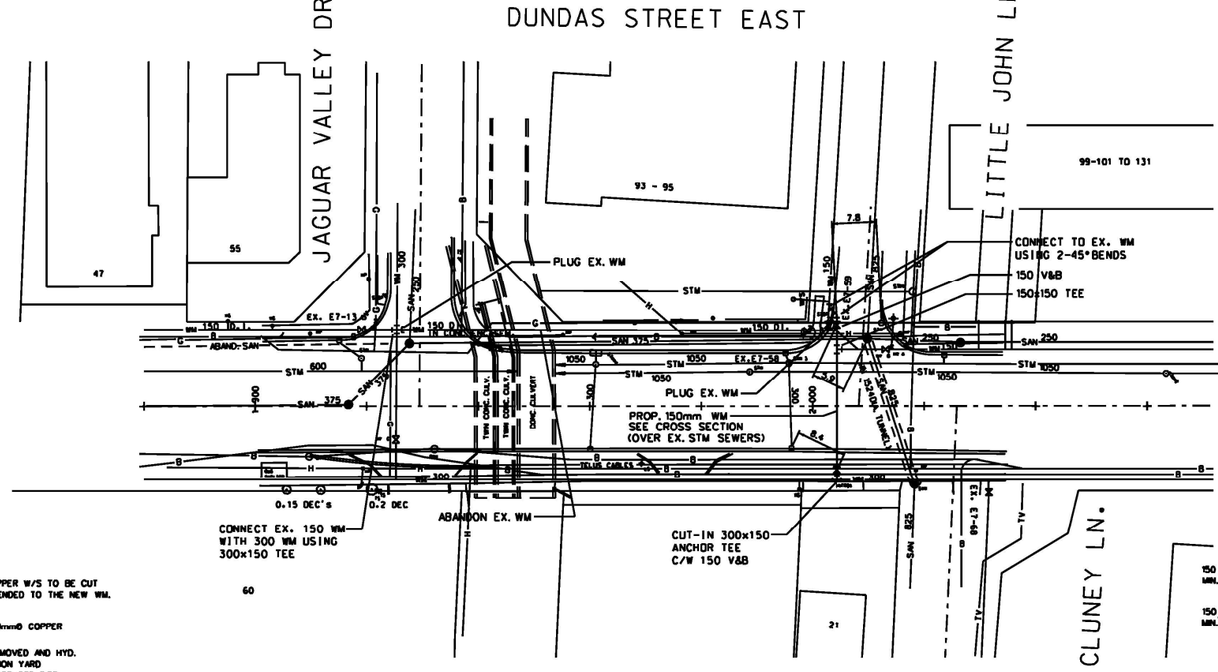
FROM EAST OF HURONTARIO ST. TO HENSALL CIR.

PROP. WATER SERVICES TRANSFER

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

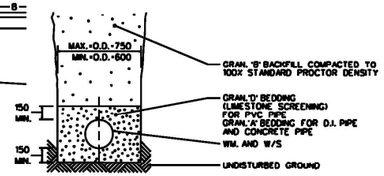
LOTS	AREA Z-14/21	PROJECT NO.	00-1350
CHECKED BY	DRAWN BY J.P.	PLAN NO.	26042-D
DATE MARCH, 2001	SHEET 1 OF 4		

26042_d.dgn 13/05/09 2:22:02 PM



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.



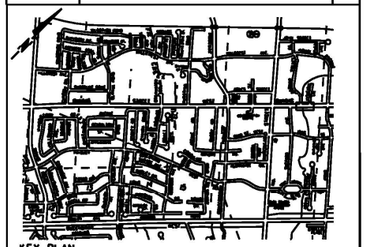
WATERMAIN AND WATERSERVICE BEDDING AND BACKFILL
N.T.S.

SERVICE DATA

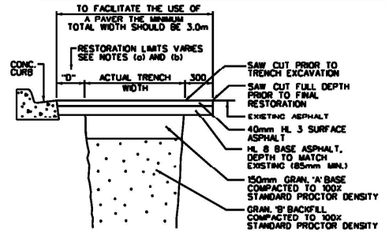
SERVICE	DATE	INT.	SERVICE	DATE	INT.
SAN SEWERS			GAS MAINS	V/24/05	J.P.
STORM SEWERS			BELL U/G CABLE	V/12/04	J.P.
WATERMAINS			HYDRO U/G CABLE	V/8/04	J.P.
TRANSIT	V/8/12/04	J.P.	HYDRO ONE NET.	I/05/05	J.P.
PARKS & REC.			CTV	V/8/12/04	J.P.
ONT. CLEAN WATER	I/17/05	J.P.	COMMUNIC. CABLE	I/10/05	J.P.

REVISIONS

DATE	DETAILS	INT.
MAY. 07	AS RECORDED	



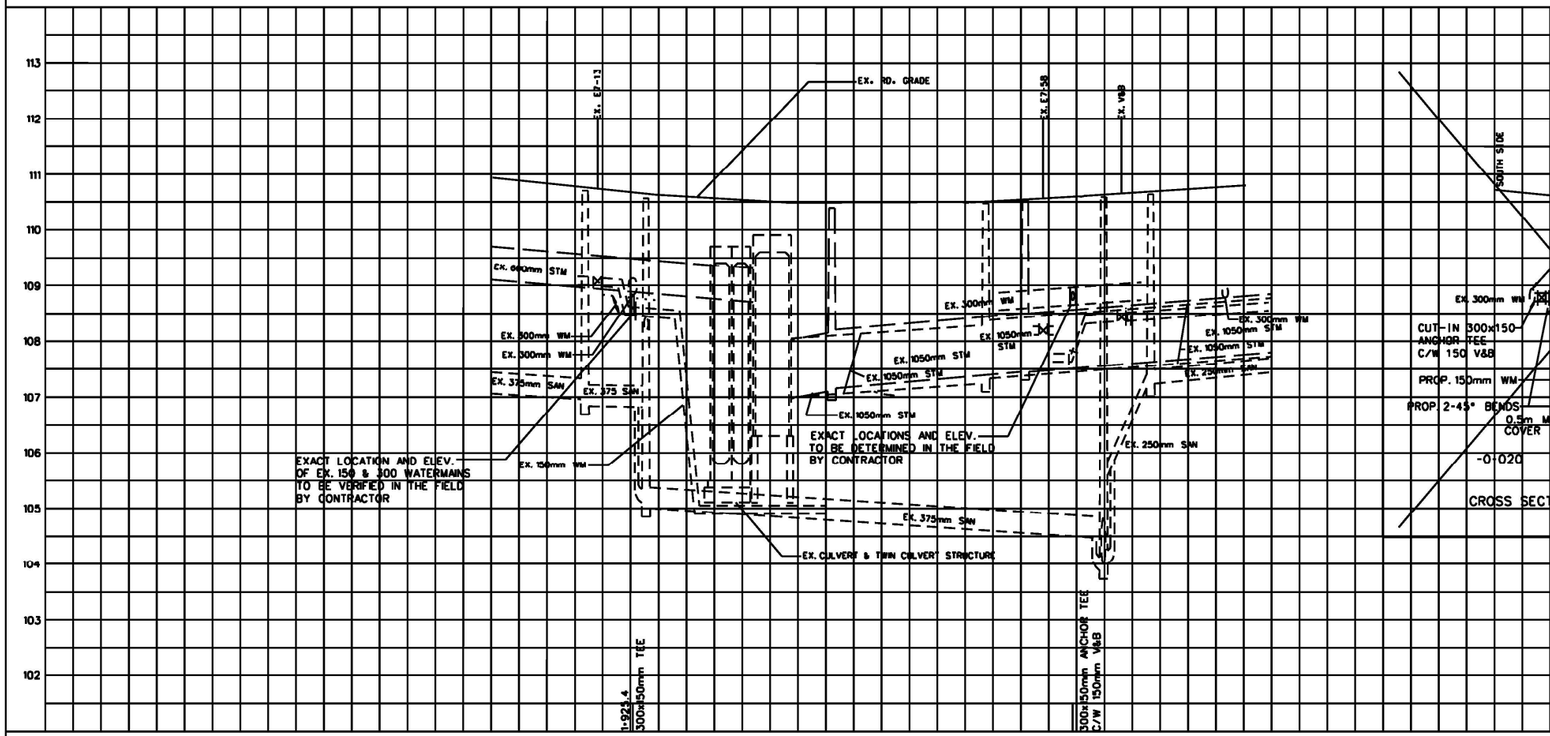
KEY PLAN
N.T.S.

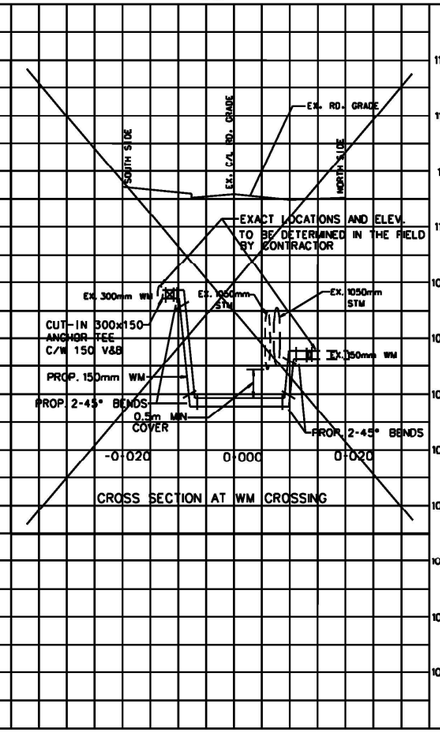


NOTES: (a) WHERE DISTANCE "D" FROM EDGE OF TRENCH TO CURB EXCEEDS 1.3m THEN SAW CUT FULL DEPTH 300mm BEYOND TRENCH WIDTH PRIOR TO FINAL RESTORATION

(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.





CROSS SECTION AT WM CROSSING

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 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 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

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

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

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: BP
Checked By: BW
Date: 2022.02.18
Revised : 2022.11.16

Site Statistics - Equivalent Population
60 Dundas Street East, Mississauga

SUMMARY OF UNIT BREAKDOWN

Phase	1 BR	2 BR	Penthouse	Studio	Town	Total Units	Amenity Area m^2	Retail Area m^2
Phase 1	142	87	4	23	0	256	2557	1980
Phase 2	450	208	0	80	15	753	6423	0
TOTAL	592	295	4	103	15	1009	8980	1980

SUMMARY OF POPULATION

Phase	1 BR	2 BR	Penthouse	Studio	Townhouse	Amenity	Retail	Total Persons
Phase 1	284	261	16	23	0	13	10	607
Phase 2	900	624	0	80	45	32	0	1681
Total	1184	885	16	103	45	45	10	2288

Notes:

1. The project statistics have been taken from the Site Plan by Chamberlain Architect Services Ltd. issued October 26, 2022.

2. Based on the following PPU rates provided by Chamberlain Architect Services Ltd. via. email correspondence. (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 50 persons/ha per Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) Section 2.1 and includes outdoor and indoor amenity areas.

4. Retail (Commercial) Area population based on 50 persons/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: BP
Checked By: BW
Date: 2022.02.18
Revised : 2022.11.16

WATER DEMAND CALCULATIONS SUMMARY
60 Dundas Street East, Mississauga

SUMMARY OF WATER DEMAND

Phase	Use	Population	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
One	Residential	584	1.89	3.79	5.68
	Retail/Amenity	23	0.08	0.11	0.24
	Total	607	1.97	3.90	5.91
Two	Residential	1649	5.34	10.69	16.03
	Retail/Amenity	32	0.11	0.16	0.33
	Total	1681	5.46	10.84	16.37
Full Buildout (Phase 1&2)	Residential	2233	7.24	14.47	21.71
	Retail/Amenity	55	0.19	0.27	0.57
	Total	2288	7.43	14.74	22.28

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: BP
Checked By: BW
Date: 2022.02.18
Revised : 2022.11.16

WATER DEMAND CALCULATIONS
60 Dundas Street East, Mississauga
Phase 1

Residential

Average Residential Consumption	280	L/cap * day
Equivalent Residential Population	584	persons
Average Daily Demand	163,520.00	L/day
	1.89	**L/s**
Maximum Day Factor	2.0	
Peak Hour Factor	3.0	
Maximum Daily Flow	327,040.00	L/day
	3.79	**L/s**
Peak Hour Flow	490,560.00	L/day
	5.68	**L/s**

Commercial/Amenity

Average Commercial Consumption	300	L/cap * day
Equivalent Commercial Population	23	persons
Average Daily Demand	6,805.50	L/day
	0.08	**L/s**
Maximum Day Factor	1.4	
Peak Hour Factor	3.0	
Maximum Daily Flow	9,527.70	L/day
	0.11	**L/s**
Peak Hour Flow	20,416.50	L/day
	0.24	**L/s**

Table 1: Phase 1 Water Demand Summary

Use	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
Residential	1.89	3.79	5.68
Retail/Amenity	0.08	0.11	0.24
Total	**1.97**	**3.90**	**5.91**

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

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

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: BP
Checked By: BW
Date: 2022.02.18
Revised : 2022.11.16

WATER DEMAND CALCULATIONS
60 Dundas Street East, Mississauga
Phase 2

Residential

Average Residential Consumption	280	L/cap * day
Equivalent Residential Population	1649	persons
Average Daily Demand	461,720.00	L/day
	5.34	**L/s**
Maximum Day Factor	2.0	
Peak Hour Factor	3.0	
Maximum Daily Flow	923,440.00	L/day
	10.69	**L/s**
Peak Hour Flow	1,385,160.00	L/day
	16.03	**L/s**

Commercial/Amenity

Average Commercial Consumption	300	L/cap * day
Equivalent Commercial Population	32	persons
Average Daily Demand	9,634.50	L/day
	0.11	**L/s**
Maximum Day Factor	1.4	
Peak Hour Factor	3.0	
Maximum Daily Flow	13,488.30	L/day
	0.16	**L/s**
Peak Hour Flow	28,903.50	L/day
	0.33	**L/s**

Table 1: Phase 2 Water Demand Summary

Use	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
Residential	5.34	10.69	16.03
Retail/Amenity	0.11	0.16	0.33
Total	**5.46**	**10.84**	**16.37**

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

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

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: BP
Checked By: BW
Date: 2022.02.18
Revised : 2022.11.16

SANITARY FLOW CALCULATIONS
60 Dundas Street East, Mississauga

SUMMARY OF SANITARY FLOW

Phase	Use	Population	Average Daily Flow (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Sanitary Flow (L/s)
One	Residential	584	2.05	8.04	0.09	8.45
	Retail/Amenity	23	0.08	0.31		
Two	Residential	1649	5.78	21.05	0.12	21.59
	Retail/Amenity	32	0.11	0.41		
Full Buildout (Phase 1&2)	Residential	2233	7.83	29.10	0.21	30.03
	Retail/Amenity	55	0.19	0.72		

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: BP
Checked By: BW
Date: 2022.02.18
Revised: 2022.11.16

SANITARY FLOW CALCULATIONS
60 Dundas Street East, Mississauga
Phase 1

Total Population Residential	584	persons
Total Population Commercial/Amenity	23	persons
Total Site Area Phase 1	0.47	ha
Average daily demand	302.8	L/person*day
Harmon Peaking Factor (M)	3.93	

M = 1+(14/(4+p^0.5))

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

Residential

Average Daily Flow	176,835.20	L/day
	2.05	**L/s**
Peak Flow	694,881.79	L/day
	8.04	**L/s**

Commercial/Amenity

Average Daily Flow	6,869.02	L/day
	0.08	**L/s**
Peak Flow	26,992.11	L/day
	0.31	**L/s**

Infiltration

Infiltration	0.0002	cms/ha
	0.00009	cms
	0.09	**L/s**
Total Sanitary Flow	**8.45**	**L/s**

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) Section 2.3

Use	Average Daily Flow (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Sanitary Flow (L/s)
Residential	**2.05**	**8.04**	**0.09**	**8.45**
Retail/Amenity	**0.08**	**0.31**		

Project: 60 Dundas Street East
Project No.: 2234-6274
Prepared By: BP
Checked By: BW
Date: 2022.02.18
Revised: 2022.11.16

SANITARY FLOW CALCULATIONS
60 Dundas Street East, Mississauga
Phase 2

Total Population Residential	1649	persons
Total Population Commercial/Amenity	32	persons
Total Site Area Phase 2	0.61	ha
Average daily demand	302.8	L/person*day
Harmon Peaking Factor (M) M = 1+(14/(4+p^0.5))	3.64	

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

Residential

Average Daily Flow	499,317.20	L/day
	5.78	**L/s**
Peak Flow	1,819,120.39	L/day
	21.05	**L/s**

Commercial/Amenity

Average Daily Flow	9,724.42	L/day
	0.11	**L/s**
Peak Flow	35,428.17	L/day
	0.41	**L/s**

Infiltration

Infiltration	0.0002	cms/ha
	0.00012	cms
	0.12	**L/s**
Total Sanitary Flow	**21.59**	**L/s**

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure - Sanitary Sewer Design Criteria (March, 2017) Section 2.3

Use	Average Daily Flow (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Sanitary Flow (L/s)
Residential	**5.78**	**21.05**	**0.12**	**21.59**
Retail/Amenity	**0.11**	**0.41**		

APPENDIX C

Fire Underwriters Survey and Region of Peel Demand Sheet

CROZIER CONSULTING ENGINEERS

60 Dundas Street East
Fire Protection Volume Calculation

PROJECT: 60 Dundas Street East
PROJECT No.: 2234-6274
DATE: 2022.11.17
DESIGN: BP
CHECK: BW

SUMMARY OF FIRE DEMANDS

Phase	Base Fire Flow [L/min]	Building Occupancy 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	**9,081**	**1,362**	**4540**	**2,724**	**6,000**	**100**
2	**11,012**	**1,652**	**5506**	**4,955**	**9,000**	**150**

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

Date: 2022.11.17
Designed By: BP
Checked By: BW

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

Per email correspondence with Chamberlain Architect Services Limited dated December 12, 2022 the following criteria were used to determine the Fire Flows for the site.

1) The development will be non-combustible construction with protected vertical openings (unprotected metal structural components) (C-value = 0.8).
2) The building is assumed to have an automatic sprinkler protection system.
3) The building is classified as a limited hazard occupancy as per the appendix of the Water Supply for Public Fire Protection (2020) by FUS.

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)
=	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= 2,662 sq.m — Area per Site Plan prepared by Chamberlain Architect Services Limited dated October 26, 2022.

C= 0.8

Therefore RFF = 9,081 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%		

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

1,362 L/min reduction
Subtotal = 7,719 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%

4,540 L/min reduction
Subtotal = 3,178 L/min

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%		

Exposed buildings

Direction	Distance (m)	Charge	Surcharge (L/min)	
North	-	0%	0	*>30m
South	20	15%	1,362	*Building B & C
East	-	0%	0	*>30m
West	20	15%	1,362	*Money Mart Plaza
Total Surcharge			**2724**	

Determine Required Fire Flow

No.1	9,081
No. 2	1,362 reduction
No. 3	4,540 reduction
No. 4	2,724 surcharge

Required Flow: **5,902 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

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

Date: 2022.11.17
Designed By: BP
Checked By: BW

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

Per email correspondence with Chamberlain Architect Services Limited dated December 12, 2022 the following criteria were used to determine the Fire Flows for the site.

1) The development will be non-combustible construction with protected vertical openings (unprotected metal structural components) (C-value = 0.8).
2) The building is assumed to have an automatic sprinkler protection system.
3) The building is classified as a limited hazard occupancy as per the appendix of the Water Supply for Public Fire Protection (2020) by FUS.

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)
=	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= 3,914 sq.m — Area per Site Plan prepared by Chamberlain Architect Services Limited dated October 26, 2022.

C= 0.8

Therefore RFF = 11,012 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%		

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

1,652 L/min reduction
Subtotal = 9,360 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%

5,506 L/min reduction
Subtotal = 3,854 L/min

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%		

Exposed buildings

Direction	Distance (m)	Charge	Surcharge (L/min)
North	20	15%	1,652
South	18	15%	1,652
East	-	0%	0
West	20	15%	1,652
Total Surcharge			**4955**

*Building B & C
*Revera King Gardens apartment building
*>30m
*Newin Centre Mall

Determine Required Fire Flow

No.1	11,012			
No. 2	1,652 reduction			
No. 3	5,506 reduction			
No. 4	4,955 surcharge			
Required Flow:	**8,809**	**L/min**		
Rounded to nearest 1000 L/min:	**9,000**	**L/min**	or	**150 L/s**
				2,376 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

PROJECT: 60 Dundas Street East
PROJECT No.: 2234-6274
DATE: 2022.11.17
DESIGN: BP
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			607	persons
Total lands to be serviced			0.47	ha
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	1.97		1.97
2	Maximum day flow	3.90		3.9
3	Peak hour flow	5.91		5.91
4	Fire flow	100		100
Analysis				
5	Maximum day plus fire flow	104		104

WASTEWATER CONNECTION			
			Total
Connection Point	Dundas Street East		
Total equivalent population to be serviced	607		607
Total lands to be serviced	0.47		0.47
6 Wastewater sewer effluent (L/s)	8.45		8.45

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)

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.

PROJECT: 60 Dundas Street East
PROJECT No.: 2234-6274
DATE: 2022.11.17
DESIGN: BP
CHECK: BW

Water Demand Table (Region of Peel)

Connection Demand Table - Phase 2				
Water Connection				
Connection point				
Dundas Street East				
Pressure zone of connection point			2	*from EPAL hydrant # 2018963*
Total equivalent population to be serviced			1681	persons
Total lands to be serviced			0.61	ha
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	5.46		5.46
2	Maximum day flow	10.84		10.84
3	Peak hour flow	16.37		16.37
4	Fire flow	150		150
Analysis				
5	Maximum day plus fire flow	161		161

WASTEWATER CONNECTION				
				Total
Connection Point		Dundas Street East		
Total equivalent population to be serviced		1681		1681
Total lands to be serviced		0.61		0.61
6	Wastewater sewer effluent (L/s)	21.59		21.59

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)

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

Stormwater Management Design Sheets

Project:	60 Dundas Appartments
Project No.:	2234-6274
Created By:	BP
Checked By:	BW
Date:	2022.02.17
Updated:	2022.11.11

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	10734	10734	0.50
Total Site Area	0	10734	**10734**	**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	369	2569	2938	0.85
202	2152	4149	6301	0.76
UC1	50	362	412	0.85
UC2	148	293	441	0.77
UC3	496	146	642	0.59
Total Site Area	3215	7519	**10734**	**0.78**

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:	BP
Checked By:	BW
Date:	2022.02.17
Updated:	2022.11.11

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)		**Post-Development Uncontrolled**		**Post-Development Controlled**	
Return Period @ Tc = 15 min	**Q** (L/s)	**Return Period @ Tc = 15 min**	**Q** (L/s)	**Return Period @ Tc = 15 min**	**Q** (L/s)
2 Year	89	**2 Year**	139	**2 Year**	78
5 Year	120	**5 Year**	187	**5 Year**	84
10 Year	148	**10 Year**	231	**10 Year**	90
25 Year	187	**25 Year**	292	**25 Year**	98
50 Year	228	**50 Year**	355	**50 Year**	106
100 Year	262	**100 Year**	409	**100 Year**	113

Phase 1 - Catchment 201 and UC1 & UC3						
Return Period @ Tc = 15 min	**$Q_{runoff\ Uncontrolled}$** (L/s)	**$Q_{runoff\ Uncontrolled}$** (L/s)	**$Q_{runoff\ Uncontrolled}$** (L/s)	**$Q_{release\ controlled}$** (L/s)	**$Q_{release\ controlled\ total}$** (L/s)	**Required Storage** (m^3)
	Pre-Development	**Post-Development**				
Catchment	**101***	**201**	**UC1+UC3**	**201**	**201+UC1+UC3**	**Phase 1**
2 Year	33	42	12	23	35	17
5 Year		56	16		39	30
10 Year		69	20		43	42
25 Year		87	25		48	60
50 Year		106	31		54	79
100 Year		122	36		59	92

*Phase 1 area flows from Catchment 101 (approximately 0.46 ha)

Phase 2 - Catchment 202 and UC2 (Post-development)						
Return Period @ Tc = 15 min	**Qrunoff Uncontrolled (L/s)**	**Qrunoff Uncontrolled (L/s)**	**Qrunoff Uncontrolled (L/s)**	**Qrelease controlled (L/s)**	**Qrelease controlled total (L/s)**	**Required Storage** (m^3)
	Pre-Development	**Post-Development**				
Catchment	**101**	**202**	**UC2**	**202**	**202+UC2**	**Phase 2**
2 Year	56	80	6	38	43	38
5 Year		108	8		45	63
10 Year		133	9		47	88
25 Year		168	12		49	126
50 Year		204	14		52	169
100 Year		235	17		54	209

*Phase 2 area flows from Catchment 101 (approximately 0.61 ha)

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

Project: 60 Dundas Appartments
Project No: 2234-6274
Created By: BP
Checked By: BW
Date: 2022.02.17

60 DUNDAS APPARTMENTS
ORIFICE DESIGN SUMMARY - PHASE 1

System Parameters	Symbol	Value	Units
Diameter of Orifice	d	75	mm
Area of Orifice	A_o	0.004	m^2
Orifice Coefficient	C_d	0.82	-
Bottom of Tank	-	107.94	m
Orifice Type	-	Tube	-
Invert Elevation	-	107.94	m

Pressure Head on Orifice	Symbol	Value	Units
Centroid Elevation	-	107.98	m
Water Elevation	-	110.00	m
Upstream Head[1]	h	2.02	m

Storage Requirements	Symbol	Value	Units
Catchment area	A_s	0.29	ha
Minimum Storage Required	S_R	92.4	m^3
Storage Provided	S_P	126.4	m^3

Maximum Orifice Controlled Discharge	**Q**	**22.8**	**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 Modified Rational Calacualtion for Phase 1.

Modified Rational Calculations: 2 Year Year Storm Event

Phase 1

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 =	201
Drainage Area =	0.29 ha
Runoff Coefficient =	0.85
Storage	
Storage Required =	16.9 m3
Storage Provided =	126.4 m3
Controlled Release Rate =	**22.8 L/s**

Time (minutes)	Rainfall Intensity (mm/hr)	Q_{Runoff} (L/s)	$Q_{Release}$ (L/s)	Storage Required (m^3)
15.0	59.9	41.6	22.8	16.9
20.0	50.2	34.8	22.8	14.4
25.0	43.4	30.1	22.8	11.0
30.0	38.4	26.7	22.8	7.0
35.0	34.6	24.0	22.8	2.5
40.0	31.5	21.9	21.9	0.0
45.0	29.0	20.1	20.1	0.0
50.0	26.9	18.7	18.7	0.0
55.0	25.2	17.5	17.5	0.0
60.0	23.6	16.4	16.4	0.0
65.0	22.3	15.5	15.5	0.0
70.0	21.1	14.7	14.7	0.0
75.0	20.1	13.9	13.9	0.0
80.0	19.1	13.3	13.3	0.0
85.0	18.3	12.7	12.7	0.0
90.0	17.5	12.2	12.2	0.0
95.0	16.9	11.7	11.7	0.0
100.0	16.2	11.3	11.3	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

Phase 1

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 =	201
Drainage Area =	0.29 ha
Runoff Coefficient =	0.85
Storage	
Storage Required =	29.8 m3
Storage Provided =	126.4 m3
Controlled Release Rate =	**22.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	80.5	55.9	22.8	29.8
20.0	67.4	46.8	22.8	28.8
25.0	58.4	40.5	22.8	26.5
30.0	51.7	35.9	22.8	23.5
35.0	46.5	32.3	22.8	19.9
40.0	42.4	29.4	22.8	15.9
45.0	39.0	27.1	22.8	11.5
50.0	36.2	25.1	22.8	6.9
55.0	33.8	23.5	22.8	2.1
60.0	31.8	22.0	22.0	0.0
65.0	30.0	20.8	20.8	0.0
70.0	28.4	19.7	19.7	0.0
75.0	27.0	18.7	18.7	0.0
80.0	25.7	17.9	17.9	0.0
85.0	24.6	17.1	17.1	0.0
90.0	23.6	16.4	16.4	0.0
95.0	22.7	15.7	15.7	0.0
100.0	21.8	15.1	15.1	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

Phase 1

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 =	201
Drainage Area =	0.29 ha
Runoff Coefficient =	0.85
Storage	
Storage Required =	41.8 m3
Storage Provided =	126.4 m3
Controlled Release Rate =	**22.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	99.2	68.8	22.8	41.4
20.0	83.1	57.6	22.8	41.8
25.0	71.9	49.9	22.8	40.6
30.0	63.7	44.2	22.8	38.4
35.0	57.3	39.8	22.8	35.6
40.0	52.2	36.2	22.8	32.2
45.0	48.1	33.4	22.8	28.5
50.0	44.6	31.0	22.8	24.4
55.0	41.7	28.9	22.8	20.1
60.0	39.1	27.1	22.8	15.6
65.0	36.9	25.6	22.8	10.9
70.0	35.0	24.3	22.8	6.1
75.0	33.2	23.1	22.8	1.1
80.0	31.7	22.0	22.0	0.0
85.0	30.3	21.0	21.0	0.0
90.0	29.0	20.2	20.2	0.0
95.0	27.9	19.4	19.4	0.0
100.0	26.9	18.6	18.6	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: 25 Year Year Storm Event

Phase 1

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 =	201
Drainage Area =	0.29 ha
Runoff Coefficient =	0.85
Adjusted RC =	0.93
Storage	
Storage Required =	60.3 m3
Storage Provided =	126.4 m3
Controlled Release Rate =	**22.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	113.9	87.0	22.8	57.7
20.0	95.4	72.8	22.8	60.0
25.0	82.6	63.0	22.8	60.3
30.0	73.1	55.8	22.8	59.4
35.0	65.8	50.2	22.8	57.6
40.0	60.0	45.8	22.8	55.1
45.0	55.2	42.1	22.8	52.2
50.0	51.2	39.1	22.8	48.9
55.0	47.8	36.5	22.8	45.2
60.0	44.9	34.3	22.8	41.3
65.0	42.4	32.4	22.8	37.2
70.0	40.2	30.7	22.8	32.9
75.0	38.2	29.1	22.8	28.5
80.0	36.4	27.8	22.8	23.9
85.0	34.8	26.6	22.8	19.1
90.0	33.4	25.5	22.8	14.3
95.0	32.0	24.5	22.8	9.4
100.0	30.8	23.6	22.8	4.4

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

Phase 1

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 =	201
Drainage Area =	0.29 ha
Runoff Coefficient =	0.85
Adjusted RC =	1.00
Storage	
Storage Required =	79.1 m3
Storage Provided =	126.4 m3
Controlled Release Rate =	**22.8 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	127.1	103.8	22.8	72.9
20.0	106.6	87.0	22.8	77.1
25.0	92.3	75.4	22.8	78.8
30.0	81.7	66.8	22.8	79.1
35.0	73.6	60.1	22.8	78.3
40.0	67.1	54.8	22.8	76.8
45.0	61.8	50.5	22.8	74.6
50.0	57.3	46.8	22.8	72.0
55.0	53.5	43.7	22.8	69.0
60.0	50.3	41.1	22.8	65.7
65.0	47.4	38.8	22.8	62.1
70.0	45.0	36.7	22.8	58.4
75.0	42.7	34.9	22.8	54.4
80.0	40.8	33.3	22.8	50.2
85.0	39.0	31.8	22.8	46.0
90.0	37.4	30.5	22.8	41.5
95.0	35.9	29.3	22.8	37.0
100.0	34.5	28.2	22.8	32.4

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

Phase 1

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 =	201
Drainage Area =	0.29 ha
Runoff Coefficient =	0.85
Adjusted RC =	1.00
Storage	
Storage Required =	92.4 m3
Storage Provided =	126.4 m3
Controlled Release Rate =	**22.8 L/s**

Time (minutes)	Rainfall Intensity (mm/hr)	Q_{Runoff} (L/s)	$Q_{Release}$ (L/s)	Storage Required (m^3)
15.0	140.7	114.9	22.8	82.9
20.0	118.1	96.5	22.8	88.4
25.0	102.4	83.6	22.8	91.2
30.0	90.8	74.1	22.8	92.4
35.0	81.8	66.8	22.8	92.3
40.0	74.6	60.9	22.8	91.4
45.0	68.7	56.1	22.8	89.8
50.0	63.8	52.1	22.8	87.8
55.0	59.6	48.6	22.8	85.2
60.0	56.0	45.7	22.8	82.4
65.0	52.8	43.1	22.8	79.2
70.0	50.0	40.9	22.8	75.8
75.0	47.6	38.9	22.8	72.2
80.0	45.4	37.1	22.8	68.4
85.0	43.4	35.4	22.8	64.4
90.0	41.6	34.0	22.8	60.3
95.0	40.0	32.6	22.8	56.0
100.0	38.5	31.4	22.8	51.6

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:

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

CROZIER CONSULTING ENGINEERS

Project: 60 Dundas Appartments
Project No: 2234-6274
Created By: BP
Checked By: BW
Date: 2022.02.17

60 DUNDAS APPARTMENTS
ORIFICE DESIGN SUMMARY - PHASE 2

System Parameters	Symbol	Value	Units
Diameter of Orifice	d	100	mm
Area of Orifice	A_o	0.008	m^2
Orifice Coefficient	C_d	0.82	-
Bottom of Tank	-	107.70	m
Orifice Type	-	Tube	-
Invert Elevation	-	107.70	m

Pressure Head on Orifice	Symbol	Value	Units
Centroid Elevation	-	107.75	m
Water Elevation	-	109.50	m
Upstream Head[1]	h	1.75	m

Storage Requirements	Symbol	Value	Units
Catchment area	A_s	0.63	ha
Minimum Storage Required	S_R	208.6	m^3
Storage Provided	S_P	240.6	m^3

Maximum Orifice Controlled Discharge	**Q**	**37.7**	**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 Modified Rational Calacualtion for Phase 2.

Modified Rational Calculations: 2 Year Year Storm Event

Phase 2

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	
202	
Characteristics:	
Drainage Area ID =	202
Drainage Area =	0.63 ha
Runoff Coefficient =	0.76
Storage	
Storage Required =	38.1 m3
Storage Provided =	240.6 m3
Controlled Release Rate =	**37.7 L/s**

Time (minutes)	Rainfall Intensity (mm/hr)	Q_{Runoff} (L/s)	$Q_{Release}$ (L/s)	Storage Required (m^3)
15.0	59.9	80.1	37.7	38.1
20.0	50.2	67.1	37.7	35.2
25.0	43.4	58.1	37.7	30.5
30.0	38.4	51.4	37.7	24.6
35.0	34.6	46.3	37.7	17.9
40.0	31.5	42.2	37.7	10.6
45.0	29.0	38.8	37.7	2.9
50.0	26.9	36.0	36.0	0.0
55.0	25.2	33.6	33.6	0.0
60.0	23.6	31.6	31.6	0.0
65.0	22.3	29.8	29.8	0.0
70.0	21.1	28.2	28.2	0.0
75.0	20.1	26.8	26.8	0.0
80.0	19.1	25.6	25.6	0.0
85.0	18.3	24.5	24.5	0.0
90.0	17.5	23.5	23.5	0.0
95.0	16.9	22.5	22.5	0.0
100.0	16.2	21.7	21.7	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

Phase 2

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	
202	
Characteristics:	
Drainage Area ID =	202
Drainage Area =	0.63 ha
Runoff Coefficient =	0.76
Storage	
Storage Required =	62.9 m3
Storage Provided =	240.6 m3
Controlled Release Rate =	**37.7 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	80.5	107.7	37.7	62.9
20.0	67.4	90.2	37.7	62.9
25.0	58.4	78.1	37.7	60.5
30.0	51.7	69.1	37.7	56.5
35.0	46.5	62.2	37.7	51.4
40.0	42.4	56.7	37.7	45.5
45.0	39.0	52.2	37.7	39.0
50.0	36.2	48.4	37.7	32.0
55.0	33.8	45.2	37.7	24.7
60.0	31.8	42.5	37.7	17.0
65.0	30.0	40.1	37.7	9.1
70.0	28.4	38.0	37.7	0.9
75.0	27.0	36.1	36.1	0.0
80.0	25.7	34.4	34.4	0.0
85.0	24.6	32.9	32.9	0.0
90.0	23.6	31.5	31.5	0.0
95.0	22.7	30.3	30.3	0.0
100.0	21.8	29.2	29.2	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: 10 Year Year Storm Event

Phase 2

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	
202	
Characteristics:	
Drainage Area ID =	202
Drainage Area =	0.63 ha
Runoff Coefficient =	0.76
Storage	
Storage Required =	88.0 m3
Storage Provided =	241 m3
Controlled Release Rate =	**37.7 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	99.2	132.6	37.7	85.4
20.0	83.1	111.1	37.7	88.0
25.0	71.9	96.1	37.7	87.6
30.0	63.7	85.1	37.7	85.3
35.0	57.3	76.6	37.7	81.6
40.0	52.2	69.8	37.7	77.0
45.0	48.1	64.3	37.7	71.7
50.0	44.6	59.6	37.7	65.7
55.0	41.7	55.7	37.7	59.3
60.0	39.1	52.3	37.7	52.4
65.0	36.9	49.3	37.7	45.3
70.0	35.0	46.8	37.7	37.9
75.0	33.2	44.4	37.7	30.2
80.0	31.7	42.4	37.7	22.3
85.0	30.3	40.5	37.7	14.2
90.0	29.0	38.8	37.7	6.0
95.0	27.9	37.3	37.3	0.0
100.0	26.9	35.9	35.9	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

Phase 2

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	
202	
Characteristics:	
Drainage Area ID =	202
Drainage Area =	0.63 ha
Runoff Coefficient =	0.76
Adjusted RC =	0.84
Storage	
Storage Required =	125.6 m3
Storage Provided =	240.6 m3
Controlled Release Rate =	**37.7 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff}** (L/s)	**$Q_{Release}$** (L/s)	**Storage Required** (m^3)
15.0	113.9	167.5	37.7	116.8
20.0	95.4	140.3	37.7	123.1
25.0	82.6	121.5	37.7	125.6
30.0	73.1	107.5	37.7	125.6
35.0	65.8	96.8	37.7	124.0
40.0	60.0	88.2	37.7	121.2
45.0	55.2	81.2	37.7	117.4
50.0	51.2	75.3	37.7	112.8
55.0	47.8	70.4	37.7	107.7
60.0	44.9	66.1	37.7	102.0
65.0	42.4	62.3	37.7	96.0
70.0	40.2	59.1	37.7	89.6
75.0	38.2	56.1	37.7	82.8
80.0	36.4	53.5	37.7	75.9
85.0	34.8	51.2	37.7	68.6
90.0	33.4	49.1	37.7	61.2
95.0	32.0	47.1	37.7	53.6
100.0	30.8	45.4	37.7	45.8

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

Phase 2

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	
202	
Characteristics:	
Drainage Area ID =	202
Drainage Area =	0.63 ha
Runoff Coefficient =	0.76
Adjusted RC =	0.92
Storage	
Storage Required =	168.8 m3
Storage Provided =	240.6 m3
Controlled Release Rate =	**37.7 L/s**

Time (minutes)	Rainfall Intensity (mm/hr)	Q_{Runoff} (L/s)	$Q_{Release}$ (L/s)	Storage Required (m^3)
15.0	127.1	204.0	37.7	149.6
20.0	106.6	171.0	37.7	159.9
25.0	92.3	148.1	37.7	165.6
30.0	81.7	131.2	37.7	168.2
35.0	73.6	118.1	37.7	168.8
40.0	67.1	107.7	37.7	167.8
45.0	61.8	99.1	37.7	165.7
50.0	57.3	92.0	37.7	162.7
55.0	53.5	85.9	37.7	159.0
60.0	50.3	80.7	37.7	154.6
65.0	47.4	76.1	37.7	149.8
70.0	45.0	72.1	37.7	144.5
75.0	42.7	68.6	37.7	138.8
80.0	40.8	65.4	37.7	132.8
85.0	39.0	62.5	37.7	126.5
90.0	37.4	59.9	37.7	119.9
95.0	35.9	57.6	37.7	113.2
100.0	34.5	55.4	37.7	106.2

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

Phase 2

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	
202	
Characteristics:	
Drainage Area ID =	202
Drainage Area =	0.63 ha
Runoff Coefficient =	0.76
Adjusted RC =	0.95
Storage	
Storage Required =	208.6 m3
Storage Provided =	240.6 m3
Controlled Release Rate =	**37.7 L/s**

Time (minutes)	Rainfall Intensity (mm/hr)	Q_{Runoff} (L/s)	$Q_{Release}$ (L/s)	Storage Required (m^3)
15.0	140.7	235.2	37.7	177.7
20.0	118.1	197.4	37.7	191.6
25.0	102.4	171.2	37.7	200.2
30.0	90.8	151.7	37.7	205.2
35.0	81.8	136.7	37.7	207.8
40.0	74.6	124.7	37.7	208.6
45.0	68.7	114.8	37.7	208.1
50.0	63.8	106.6	37.7	206.5
55.0	59.6	99.6	37.7	204.0
60.0	56.0	93.5	37.7	200.8
65.0	52.8	88.3	37.7	197.1
70.0	50.0	83.6	37.7	192.8
75.0	47.6	79.5	37.7	188.0
80.0	45.4	75.8	37.7	182.9
85.0	43.4	72.5	37.7	177.5
90.0	41.6	69.5	37.7	171.7
95.0	40.0	66.8	37.7	165.7
100.0	38.5	64.3	37.7	159.4

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:

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

ON-LINE
Jellyfish Filter Sizing Report

Project Information

Date	Tuesday, December 13, 2022
Project Name	60 Dundas St.
Project Number	Phase 1
Location	Mississauga

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.
Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF6-3-1-L1 is recommended to meet the water quality objective by treating a flow of 17.7 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This Jellyfish Model has a Peak Flow Capacity of 131 L/s. This model has a sediment capacity of 199 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Peak Capacity (L/s)	Bypass MAW	Sediment Capacity (kg)
JF6-3-1-L1	3	1	1.8	17.7	131	Yes	199

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance inverval is designed to be a minimum of 12 months, but this will vary significantly with on-line desings based on storm event conditions, site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.
Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

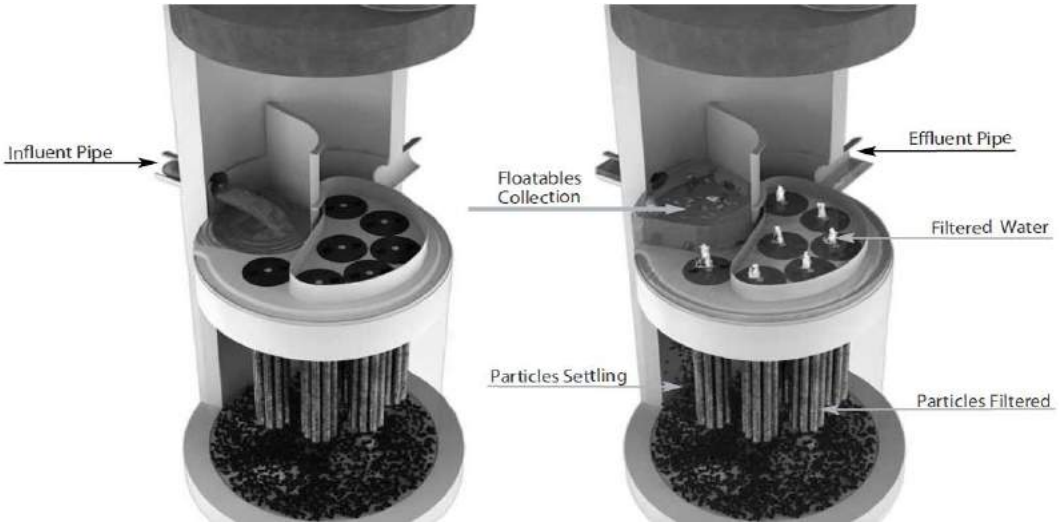
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 59%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Jellyfish® Filter

Project Information

Date:	Tuesday, December 13, 2022
Project Name:	60 Dundas St.
Project Number:	Phase 1
Location:	Mississauga

Designer Information

Company:	C.F. Crozier & Associates Inc.
Contact:	Brett Pond
Phone #:	

Notes

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

Total Area:	0.29 ha
Imperviousness:	87%

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	**7.8 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 1515 m³, with a suspended sediment concentration of 100 mg/L.	**152 kg***
Peak Flow	The flow which must pass through the unit, includes	**22.8 L/s**

** Indicates that sediment loading is the limiting parameter in the sizing of this Jellyfish system.*

Recommendation

The Jellyfish Filter model JF6-3-1-L1 is recommended to meet the water quality objective by treating a flow of 17.7 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This Jellyfish Model has a Peak Flow Capacity of 131 L/s. This model has a sediment capacity of 199 kg, which meets or exceeds the estimated average annual sediment load.

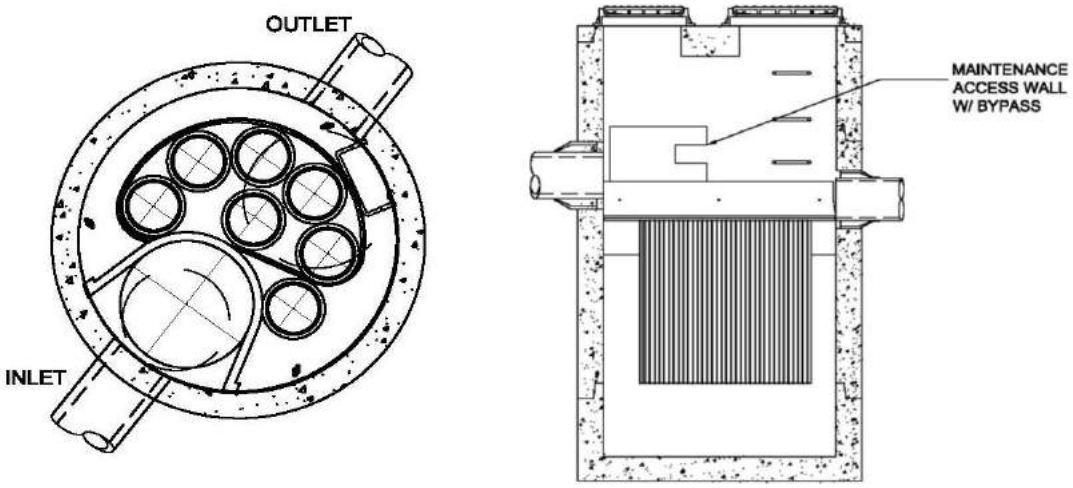
Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Bypass MAW	Addt'l Sump (ft)	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1-L0	1	1	No	0	1.2	2313	0.34	379	7.6	85
JF4-1-1-L1	1	1	Yes	1	1.2	2661	0.34	379	7.6	85
JF4-2-1-L0	2	1	No	0	1.2	2313	0.34	379	12.6	142
JF4-2-1-L1	2	1	Yes	1	1.2	2661	0.34	379	12.6	142
JF6-3-1-L0	3	1	No	0	1.8	5205	0.79	848	17.7	199
JF6-3-1-L1	**3**	**1**	**Yes**	**1**	**1.8**	**6003**	**0.79**	**848**	**17.7**	**199**
JF6-4-1-L0	4	1	No	0	1.8	5205	0.79	848	22.7	256
JF6-4-1-L1	4	1	Yes	1	1.8	6003	0.79	848	22.7	256
JF6-5-1-L0	5	1	No	0	1.8	5205	0.79	848	27.8	313
JF6-5-1-L1	5	1	Yes	1	1.8	6003	0.79	848	27.8	313
JF6-6-1-L0	6	1	No	0	1.8	5205	0.79	848	28.6	370
JF6-6-1-L1	6	1	Yes	1	1.8	6003	0.79	848	28.6	370
JF8-6-2-L0	6	2	No	0	2.4	9252	1.42	1469	35.3	398
JF8-6-2-L1	6	2	Yes	1	2.4	10675	1.42	1469	35.3	398
JF8-7-2-L0	7	2	No	0	2.4	9252	1.42	1469	40.4	455
JF8-7-2-L1	7	2	Yes	1	2.4	10675	1.42	1469	40.4	455
JF8-8-2-L0	8	2	No	0	2.4	9252	1.42	1469	45.4	512
JF8-8-2-L1	8	2	Yes	1	2.4	10675	1.42	1469	45.4	512
JF8-9-2-L0	9	2	No	0	2.4	9252	1.42	1469	50.5	569
JF8-9-2-L1	9	2	Yes	1	2.4	10675	1.42	1469	50.5	569
JF8-10-2-L0	10	2	No	0	2.4	9252	1.42	1469	50.5	626
JF8-10-2-L1	10	2	Yes	1	2.4	10675	1.42	1469	50.5	626
JF10-11-3-L0	11	3	No	0	3.0	14456	2.21	2302	63.1	711
JF10-11-3-L1	11	3	Yes	1	3.0	16678	2.21	2302	63.1	711
JF10-12-3-L0	12	3	No	0	3.0	14456	2.21	2302	68.2	768
JF10-12-3-L1	12	3	Yes	1	3.0	16678	2.21	2302	68.2	768
JF10-12-4-L0	12	4	No	0	3.0	14456	2.21	2302	70.7	796
JF10-12-4-L1	12	4	Yes	1	3.0	16678	2.21	2302	70.7	796
JF10-13-4-L0	13	4	No	0	3.0	14456	2.21	2302	75.7	853
JF10-13-4-L1	13	4	Yes	1	3.0	16678	2.21	2302	75.7	853
JF10-14-4-L0	14	4	No	0	3.0	14456	2.21	2302	78.9	910

JF10-14-4-L1	14	4	Yes	1	3.0	16678	2.21	2302	78.9	910
JF10-15-4-L0	15	4	No	0	3.0	14456	2.21	2302	78.9	967
JF10-15-4-L1	15	4	Yes	1	3.0	16678	2.21	2302	78.9	967
JF10-16-4-L0	16	4	No	0	3.0	14456	2.21	2302	78.9	1024
JF10-16-4-L1	16	4	Yes	1	3.0	16678	2.21	2302	78.9	1024
JF10-17-4-L0	17	4	No	0	3.0	14456	2.21	2302	78.9	1081
JF10-17-4-L1	17	4	Yes	1	3.0	16678	2.21	2302	78.9	1081
JF10-18-4-L0	18	4	No	0	3.0	14456	2.21	2302	78.9	1138
JF10-18-4-L1	18	4	Yes	1	3.0	16678	2.21	2302	78.9	1138
JF10-19-4-L0	19	4	No	0	3.0	14456	2.21	2302	78.9	1195
JF10-19-4-L1	19	4	Yes	1	3.0	16678	2.21	2302	78.9	1195
JF12-20-5-L0	20	5	No	0	3.6	20820	3.2	2771	113.6	1280
JF12-20-5-L1	20	5	Yes	1	3.6	24012	3.2	2771	113.6	1280
JF12-21-5-L0	21	5	No	0	3.6	20820	3.2	2771	113.7	1337
JF12-21-5-L1	21	5	Yes	1	3.6	24012	3.2	2771	113.7	1337
JF12-22-5-L0	22	5	No	0	3.6	20820	3.2	2771	113.7	1394
JF12-22-5-L1	22	5	Yes	1	3.6	24012	3.2	2771	113.7	1394
JF12-23-5-L0	23	5	No	0	3.6	20820	3.2	2771	113.7	1451
JF12-23-5-L1	23	5	Yes	1	3.6	24012	3.2	2771	113.7	1451
JF12-24-5-L0	24	5	No	0	3.6	20820	3.2	2771	113.7	1508
JF12-24-5-L1	24	5	Yes	1	3.6	24012	3.2	2771	113.7	1508
JF12-25-5-L0	25	5	No	0	3.6	20820	3.2	2771	113.7	1565
JF12-25-5-L1	25	5	Yes	1	3.6	24012	3.2	2771	113.7	1565
JF12-26-5-L0	26	5	No	0	3.6	20820	3.2	2771	113.7	1622
JF12-26-5-L1	26	5	Yes	1	3.6	24012	3.2	2771	113.7	1622
JF12-27-5-L0	27	5	No	0	3.6	20820	3.2	2771	113.7	1679
JF12-27-5-L1	27	5	Yes	1	3.6	24012	3.2	2771	113.7	1679

Jellyfish® Filter

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter. However, note that inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Online Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance. Alternative driving head values are only possible with off-line configuration.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation.
- The Jellyfish Filter can not accommodate multiple inlet pipes in an on-line configuration.
- Typical systems conform to the following pipe orientations:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Maximum Inlet Pipe Diameter (mm)
1.2	62º	150	300
1.8	**59º**	**200**	**300**
2.4	52º	250	375
3.0	48º	300	450
3.6	40º	300	450

- Outlet pipes to be one size larger than inlet pipes on new projects.
- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish vault units can be designed.

STANDARD SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92
Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92
Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.

2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.

2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft2 / m2)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.

2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).

3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.

3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.

3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.

3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).

3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.

3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL
In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after is has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

ON-LINE
Jellyfish Filter Sizing Report

Project Information

Date	Tuesday, December 13, 2022
Project Name	60 Dundas St.
Project Number	Phase 2
Location	Mississauga

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.
Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF6-4-1-L1 is recommended to meet the water quality objective by treating a flow of 22.7 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This Jellyfish Model has a Peak Flow Capacity of 136 L/s. This model has a sediment capacity of 256 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Peak Capacity (L/s)	Bypass MAW	Sediment Capacity (kg)
JF6-4-1-L1	4	1	1.8	22.7	136	Yes	256

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance inverval is designed to be a minimum of 12 months, but this will vary significantly with on-line desings based on storm event conditions, site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.
Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

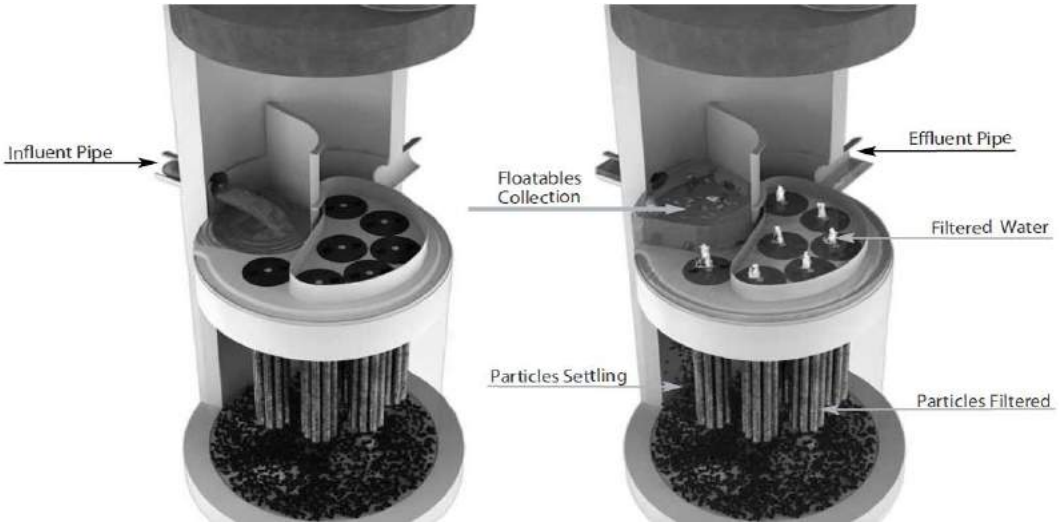
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 59%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Jellyfish® Filter

Project Information

Date:	Tuesday, December 13, 2022
Project Name:	60 Dundas St.
Project Number:	Phase 2
Location:	Mississauga

Designer Information

Company:	C.F. Crozier & Associates Inc.
Contact:	Brett Pond
Phone #:	

Notes

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

Total Area:	0.63 ha
Imperviousness:	66%

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	**12.6 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 2499 m³, with a suspended sediment concentration of 100 mg/L.	**250 kg***
Peak Flow	The flow which must pass through the unit, includes	**37.7 L/s**

** Indicates that sediment loading is the limiting parameter in the sizing of this Jellyfish system.*

Recommendation

The Jellyfish Filter model JF6-4-1-L1 is recommended to meet the water quality objective by treating a flow of 22.7 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This Jellyfish Model has a Peak Flow Capacity of 136 L/s. This model has a sediment capacity of 256 kg, which meets or exceeds the estimated average annual sediment load.

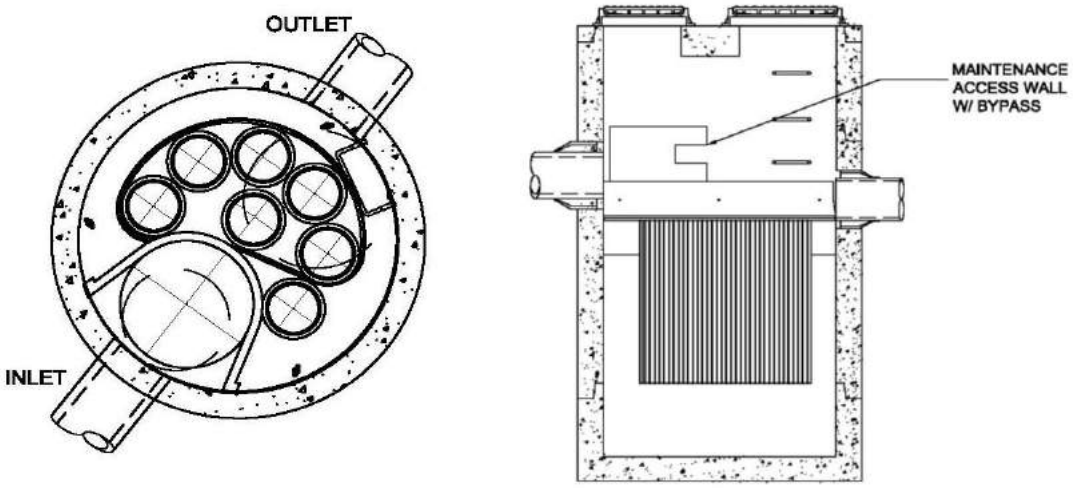
Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Bypass MAW	Addt'l Sump (ft)	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1-L0	1	1	No	0	1.2	2313	0.34	379	7.6	85
JF4-1-1-L1	1	1	Yes	1	1.2	2661	0.34	379	7.6	85
JF4-2-1-L0	2	1	No	0	1.2	2313	0.34	379	12.6	142
JF4-2-1-L1	2	1	Yes	1	1.2	2661	0.34	379	12.6	142
JF6-3-1-L0	3	1	No	0	1.8	5205	0.79	848	17.7	199
JF6-3-1-L1	3	1	Yes	1	1.8	6003	0.79	848	17.7	199
JF6-4-1-L0	4	1	No	0	1.8	5205	0.79	848	22.7	256
JF6-4-1-L1	**4**	**1**	**Yes**	**1**	**1.8**	**6003**	**0.79**	**848**	**22.7**	**256**
JF6-5-1-L0	5	1	No	0	1.8	5205	0.79	848	27.8	313
JF6-5-1-L1	5	1	Yes	1	1.8	6003	0.79	848	27.8	313
JF6-6-1-L0	6	1	No	0	1.8	5205	0.79	848	28.6	370
JF6-6-1-L1	6	1	Yes	1	1.8	6003	0.79	848	28.6	370
JF8-6-2-L0	6	2	No	0	2.4	9252	1.42	1469	35.3	398
JF8-6-2-L1	6	2	Yes	1	2.4	10675	1.42	1469	35.3	398
JF8-7-2-L0	7	2	No	0	2.4	9252	1.42	1469	40.4	455
JF8-7-2-L1	7	2	Yes	1	2.4	10675	1.42	1469	40.4	455
JF8-8-2-L0	8	2	No	0	2.4	9252	1.42	1469	45.4	512
JF8-8-2-L1	8	2	Yes	1	2.4	10675	1.42	1469	45.4	512
JF8-9-2-L0	9	2	No	0	2.4	9252	1.42	1469	50.5	569
JF8-9-2-L1	9	2	Yes	1	2.4	10675	1.42	1469	50.5	569
JF8-10-2-L0	10	2	No	0	2.4	9252	1.42	1469	50.5	626
JF8-10-2-L1	10	2	Yes	1	2.4	10675	1.42	1469	50.5	626
JF10-11-3-L0	11	3	No	0	3.0	14456	2.21	2302	63.1	711
JF10-11-3-L1	11	3	Yes	1	3.0	16678	2.21	2302	63.1	711
JF10-12-3-L0	12	3	No	0	3.0	14456	2.21	2302	68.2	768
JF10-12-3-L1	12	3	Yes	1	3.0	16678	2.21	2302	68.2	768
JF10-12-4-L0	12	4	No	0	3.0	14456	2.21	2302	70.7	796
JF10-12-4-L1	12	4	Yes	1	3.0	16678	2.21	2302	70.7	796
JF10-13-4-L0	13	4	No	0	3.0	14456	2.21	2302	75.7	853
JF10-13-4-L1	13	4	Yes	1	3.0	16678	2.21	2302	75.7	853
JF10-14-4-L0	14	4	No	0	3.0	14456	2.21	2302	78.9	910

JF10-14-4-L1	14	4	Yes	1	3.0	16678	2.21	2302	78.9	910
JF10-15-4-L0	15	4	No	0	3.0	14456	2.21	2302	78.9	967
JF10-15-4-L1	15	4	Yes	1	3.0	16678	2.21	2302	78.9	967
JF10-16-4-L0	16	4	No	0	3.0	14456	2.21	2302	78.9	1024
JF10-16-4-L1	16	4	Yes	1	3.0	16678	2.21	2302	78.9	1024
JF10-17-4-L0	17	4	No	0	3.0	14456	2.21	2302	78.9	1081
JF10-17-4-L1	17	4	Yes	1	3.0	16678	2.21	2302	78.9	1081
JF10-18-4-L0	18	4	No	0	3.0	14456	2.21	2302	78.9	1138
JF10-18-4-L1	18	4	Yes	1	3.0	16678	2.21	2302	78.9	1138
JF10-19-4-L0	19	4	No	0	3.0	14456	2.21	2302	78.9	1195
JF10-19-4-L1	19	4	Yes	1	3.0	16678	2.21	2302	78.9	1195
JF12-20-5-L0	20	5	No	0	3.6	20820	3.2	2771	113.6	1280
JF12-20-5-L1	20	5	Yes	1	3.6	24012	3.2	2771	113.6	1280
JF12-21-5-L0	21	5	No	0	3.6	20820	3.2	2771	113.7	1337
JF12-21-5-L1	21	5	Yes	1	3.6	24012	3.2	2771	113.7	1337
JF12-22-5-L0	22	5	No	0	3.6	20820	3.2	2771	113.7	1394
JF12-22-5-L1	22	5	Yes	1	3.6	24012	3.2	2771	113.7	1394
JF12-23-5-L0	23	5	No	0	3.6	20820	3.2	2771	113.7	1451
JF12-23-5-L1	23	5	Yes	1	3.6	24012	3.2	2771	113.7	1451
JF12-24-5-L0	24	5	No	0	3.6	20820	3.2	2771	113.7	1508
JF12-24-5-L1	24	5	Yes	1	3.6	24012	3.2	2771	113.7	1508
JF12-25-5-L0	25	5	No	0	3.6	20820	3.2	2771	113.7	1565
JF12-25-5-L1	25	5	Yes	1	3.6	24012	3.2	2771	113.7	1565
JF12-26-5-L0	26	5	No	0	3.6	20820	3.2	2771	113.7	1622
JF12-26-5-L1	26	5	Yes	1	3.6	24012	3.2	2771	113.7	1622
JF12-27-5-L0	27	5	No	0	3.6	20820	3.2	2771	113.7	1679
JF12-27-5-L1	27	5	Yes	1	3.6	24012	3.2	2771	113.7	1679

Jellyfish® Filter

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter. However, note that inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Online Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance. Alternative driving head values are only possible with off-line configuration.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation.
- The Jellyfish Filter can not accommodate multiple inlet pipes in an on-line configuration.
- Typical systems conform to the following pipe orientations:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Maximum Inlet Pipe Diameter (mm)
1.2	62º	150	300
1.8	**59º**	**200**	**300**
2.4	52º	250	375
3.0	48º	300	450
3.6	40º	300	450

- Outlet pipes to be one size larger than inlet pipes on new projects.
- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish vault units can be designed.

STANDARD SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92
Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92
Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.

2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.

2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft2 / m2)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.

2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).

3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.

3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.

3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.

3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).

3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.

3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL
In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after is has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

STANDARD PERFORMANCE SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental Management – Environmental Technology Verification (ETV)

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: filtration surface area, treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, filtration treatment device product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the internal components. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of their installed placement for the entire length of the cartridge.

2.1.2 Pollutant Storage: The Filter device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter treatment device shall have been field tested in accordance with either TARP Tier II Protocol (TARP, 2003) and New Jersey Tier II Stormwater Test Requirements – Amendments to TARP Tier II Protocol (NJDEP, 2009) or Washington State Technology Assessment Protocol – Ecology (TAPE), 2011 or later version. The field test shall have been verified in accordance with ISO 14034:2016 Environmental Management – Environmental Technology Verification (ETV). See Section 3.2 of this specification for field test performance requirements.

3.2 FIELD TEST PERFORMANCE

The field test (as specified in section 3.1.1)shall have monitored a minimum of twenty (20) TARP or TAPE qualifying storm events, and report at **minimum** the following results:

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have ISO 14034 ETV verified load based median TSS removal efficiency of at least 85% and load based median SSC removal efficiency of at least 98%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, and an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce turbidity such that effluent turbidity is 15 NTU or lower.

3.2.5 Nutrients & Metals – The stormwater quality filter treatment device shall have ISO 14034 ETV Verified minimum load based removal efficiencies for the following:

3.2.5.1 Total Phosphorus (TP) Removal - Median TP removal efficiency of at least 49%.

3.2.5.2 Total Nitrogen (TN) Removal - Median TN removal efficiency of at least 39%.

3.2.5.3 Total Zinc (Zn) Removal - Median Zn removal efficiency of at least 69%.

3.2.5.4 Total Copper (Cu) Removal - Median Cu removal efficiency of at least 91%.

END OF SECTION

Project: 60 Dundas Apartments
Project No.: 2234-6274

Date: 12/12/2022
Created By: BP
Checked By: BW

Water Balance Volume Requirement

Site Area	1.07	ha

Water Balance criteria is 5mm across site impervious area

Impervious Area:	0.73	ha
Volume Required:	36.5	m^3

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CONSULTING ENGINEERS

60 DUNDAS STREET EAST
STORM SEWER DESIGN SHEET

5 YEAR DESIGN STORM - City of Missisauga
A 820 **B** 4.6 **C** 0.78

PROJECT: 60 Dundas St E
PROJECT No.: 2234-6274
FILE: Storm Sewer Design
DATE: 2022/12/07
Revised: 2022/12/14
Design: KIR
Check: BP

INITIAL TIME OF CONCENTRATION (min) 15.00 MANNINGS "n" 0.013

Catchment ID	FROM MH NO	TO MH NO	AREA (A) Ha	RUN-OFF COEFF	A x C	Cummul. A x C	TIME OF CONC. min	I mm/hr	Q l/sec	SLOPE %	PIPE DIA. mm	Area m2	VEL. m/sec	Q/A m/s	Hv m	LENGTH m	TIME OF FLOW min	CAPACITY l/sec	% CAPACITY
101	STM MH 1	STM MH 3	0.66	0.90	0.59	0.59	15.00	80.51	**132.95**	1.00	300	0.07	1.37	1.88	0.18	68.2	0.83	**96.70**	137
102	STM MH 2	STM MH 3	0.48	0.90	0.43	0.43	15.00	80.51	**96.69**	0.80	825	0.53	2.40	0.18	0.00	99.0	0.69	**1283.89**	8
	STM MH 3	STM MH 4	0.00	0.90	0.00	1.03	15.83	77.95	**222.32**	0.80	825	0.53	2.40	0.42	0.01	51.1	0.35	**1283.89**	17
	STM MH 4	STM MH 5	0.00	0.90	0.00	1.03	16.19	76.91	**219.36**	1.00	825	0.53	2.69	0.41	0.01	47.5	0.29	**1435.44**	15
103 & 104	STM MH 5	STM MH 7	1.33	0.90	1.20	2.22	16.48	76.07	**470.08**	1.00	825	0.53	2.69	0.88	0.04	18.3	0.11	**1435.44**	33
105	STM MH 6	STM MH 7	0.28	0.90	0.25	0.25	15.00	80.51	**56.40**	1.00	375	0.11	1.59	0.51	0.01	76.0	0.80	**175.33**	32
106	STM MH 7	STM MH 8	0.06	0.90	0.05	2.53	16.59	75.75	**532.55**	1.00	900	0.64	2.85	0.84	0.04	46.0	0.27	**1810.31**	29
107	STM MH 8	Outlet	1.23	0.90	1.11	3.64	16.86	75.01	**758.16**	1.00	900	0.64	2.85	1.19	0.07	70.0	0.41	**1810.31**	42

Notes:
1. All existing pipe inverts to be confirmed prior to construction.
2. As-constrcuted drawings for King Street East were not avaiable; therefore, the pipe slopes and length were approximated based on avaible information and surrounding pipe characteristics.
3. The above storm design sheet details free flow conditions of the proposed and existing storm sewers.
4. The above storm design sheet assumes that all exisitng catchments (i.e. 101 - 107) do not have on-site stormwater controls.

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CONSULTING ENGINEERS

60 DUNDAS STREET EAST
STORM SEWER DESIGN SHEET

10 YEAR DESIGN STORM - City of Missisauga
A 1010 **B** 4.6 **C** 0.78

PROJECT: 60 Dundas St E
PROJECT No.: 2234-6274
FILE: Storm Sewer Design
DATE: 2022/12/07
Revised: 2022/12/14
Design: KIR
Check: BP

INITIAL TIME OF CONCENTRATION (min) 15.00 MANNINGS "n" 0.013

Catchment ID	FROM MH NO	TO MH NO	AREA (A) Ha	RUN-OFF COEFF	A x C	Cummul. A x C	TIME OF CONC. min	I mm/hr	Q l/sec	SLOPE %	PIPE DIA. mm	Area m2	VEL. m/sec	Q/A m/s	Hv m	LENGTH m	TIME OF FLOW min	CAPACITY l/sec	% CAPACITY
101	STM MH 1	STM MH 3	0.66	0.90	0.59	0.59	15.00	99.17	**163.75**	1.00	300	0.07	1.37	2.32	0.27	68.2	0.83	**96.70**	169
102	STM MH 2	STM MH 3	0.48	0.90	0.43	0.43	15.00	99.17	**119.09**	0.80	825	0.53	2.40	0.22	0.00	99.0	0.69	**1283.89**	9
	STM MH 3	STM MH 4	0.00	0.90	0.00	1.03	15.83	96.01	**273.84**	0.80	825	0.53	2.40	0.51	0.01	51.1	0.35	**1283.89**	21
	STM MH 4	STM MH 5	0.00	0.90	0.00	1.03	16.19	94.73	**270.18**	1.00	825	0.53	2.69	0.51	0.01	47.5	0.29	**1435.44**	19
103 & 104	STM MH 5	STM MH 7	1.33	0.90	1.20	2.22	16.48	93.69	**579.00**	1.00	825	0.53	2.69	1.08	0.06	18.3	0.11	**1435.44**	40
105	STM MH 6	STM MH 7	0.28	0.90	0.25	0.25	15.00	99.17	**69.47**	1.00	375	0.11	1.59	0.63	0.02	76.0	0.80	**175.33**	40
106	STM MH 7	STM MH 8	0.06	0.90	0.05	2.53	16.59	93.30	**655.95**	1.00	900	0.64	2.85	1.03	0.05	46.0	0.27	**1810.31**	36
107	STM MH 8	Outlet	1.23	0.90	1.11	3.64	16.86	92.38	**933.83**	1.00	900	0.64	2.85	1.47	0.11	70.0	0.41	**1810.31**	52

Notes: 1. All existing pipe inverts to be confirmed prior to construction.
2. As-constrcuted drawings for King Street East were not avaiable; therefore, the pipe slopes and length were approximated based on avaible information and surrounding pipe characteristics.
3. The above storm design sheet details free flow conditions of the proposed and existing storm sewers.
4. The above storm design sheet assumes that all exisitng catchments (i.e. 101 - 107) do not have on-site stormwater controls.

CROZIER
CONSULTING ENGINEERS

60 DUNDAS STREET EAST
STORM SEWER DESIGN SHEET

10 YEAR DESIGN STORM - City of Missisauga
A 820 **B** 4.6 **C** 0.78

PROJECT: 60 Dundas St E
PROJECT No.: 2234-6274
FILE: Storm Sewer Design
DATE: 2022/12/07
Revised: 2022/12/14
Design: KIR
Check: BP

INITIAL TIME OF CONCENTRATION (min) 15.00 MANNINGS "n" 0.013

Catchment ID	FROM MH NO	TO MH NO	AREA (A) Ha	RUN-OFF COEFF	A x C	Cummul. A x C	TIME OF CONC. min	I mm/hr	Q[1] l/sec (per MR)	Q l/sec	SLOPE %	PIPE DIA. mm	Area m2	VEL. m/sec	Q/A m/s	Hv m	LENGTH m	TIME OF FLOW min	CAPACITY l/sec	% CAPACITY
201	Orifice 1	STM MH 1	0.40	0.85	0.34	0.34	15.00	80.51	**22.80**	-	0.50	300	0.07	0.97	0.32	0.01	8.2	0.14	**68.38**	33
101	Catchment	STM MH 1	0.66	0.90	0.59	0.59	15.00	80.51	-	**132.95**										
	STM MH 1	STM PR MH 1	0.00	0.90	0.00	0.59	15.14	80.06	-	**155.01**	1.00	300	0.07	1.37	2.19	0.25	46.0	0.56	**96.70**	160
202	Orifice 2	STM PR MH 1	0.67	0.76	0.51	0.51	15.00	80.51	**37.70**	-	0.50	300	0.07	0.97	0.53	0.01	7.2	0.12	**68.38**	55
	STM PR MH 1	STM MH 3	0.00	0.90	0.00	0.59	15.70	78.33	-	**189.85**	1.00	300	0.07	1.37	2.69	0.37	22.2	0.27	**96.70**	196
102	STM PR MH 2	STM MH 3	0.48	0.90	0.43	0.43	15.00	80.51	-	**96.69**	0.80	825	0.53	2.40	0.18	0.00	99.0	0.69	**1283.89**	8
	STM MH 3	STM MH 4	0.00	0.90	0.00	1.03	15.97	77.53	-	**281.63**	0.80	825	0.53	2.40	0.53	0.01	51.1	0.35	**1283.89**	22
	STM MH 4	STM MH 5	0.00	0.90	0.00	1.03	16.33	76.50	-	**278.70**	0.80	825	0.53	2.40	0.52	0.01	99.0	0.69	**1283.89**	22
103 & 104	STM MH 5	STM MH 7	1.33	0.90	1.20	2.22	17.01	74.60	-	**521.51**	1.00	825	0.53	2.69	0.98	0.05	18.3	0.11	**1435.44**	36
105	STM MH 6	STM MH 7	0.28	0.90	0.25	0.25	15.00	80.51	-	**56.40**	1.00	375	0.11	1.59	0.51	0.01	76.0	0.80	**175.33**	32
106	STM MH 7	STM MH 8	0.06	0.90	0.05	2.53	17.13	74.29	**-**	**582.83**	1.00	900	0.64	2.85	0.92	0.04	46.0	0.27	**1810.31**	32
107	STM MH 8	Outlet	1.23	0.90	1.11	3.64	17.40	73.58	-	**804.28**	1.00	900	0.64	2.85	1.26	0.08	70.0	0.41	**1810.31**	44

Notes:
1. The flow from the two proposed catchments will be controlled via. an orifice. Therefore, the fixed orifice flow rate was utilized for Catchment 201 and 202.
2. All existing pipe inverts to be confirmed prior to construction.
3. As-constrcuted drawings for King Street East were not avaiable; therefore, the pipe slopes and length were approximated based on avaible information and surrounding pipe characteristics.
4. The above storm design sheet details free flow conditions of the proposed and existing storm sewers.
5. The above storm design sheet assumes that all exisitng catchments (i.e. 101 - 107) do not have on-site stormwater controls.

CROZIER CONSULTING ENGINEERS

60 DUNDAS STREET EAST
STORM SEWER DESIGN SHEET

10 YEAR DESIGN STORM - City of Missisauga
A 1010 B 4.6 C 0.78

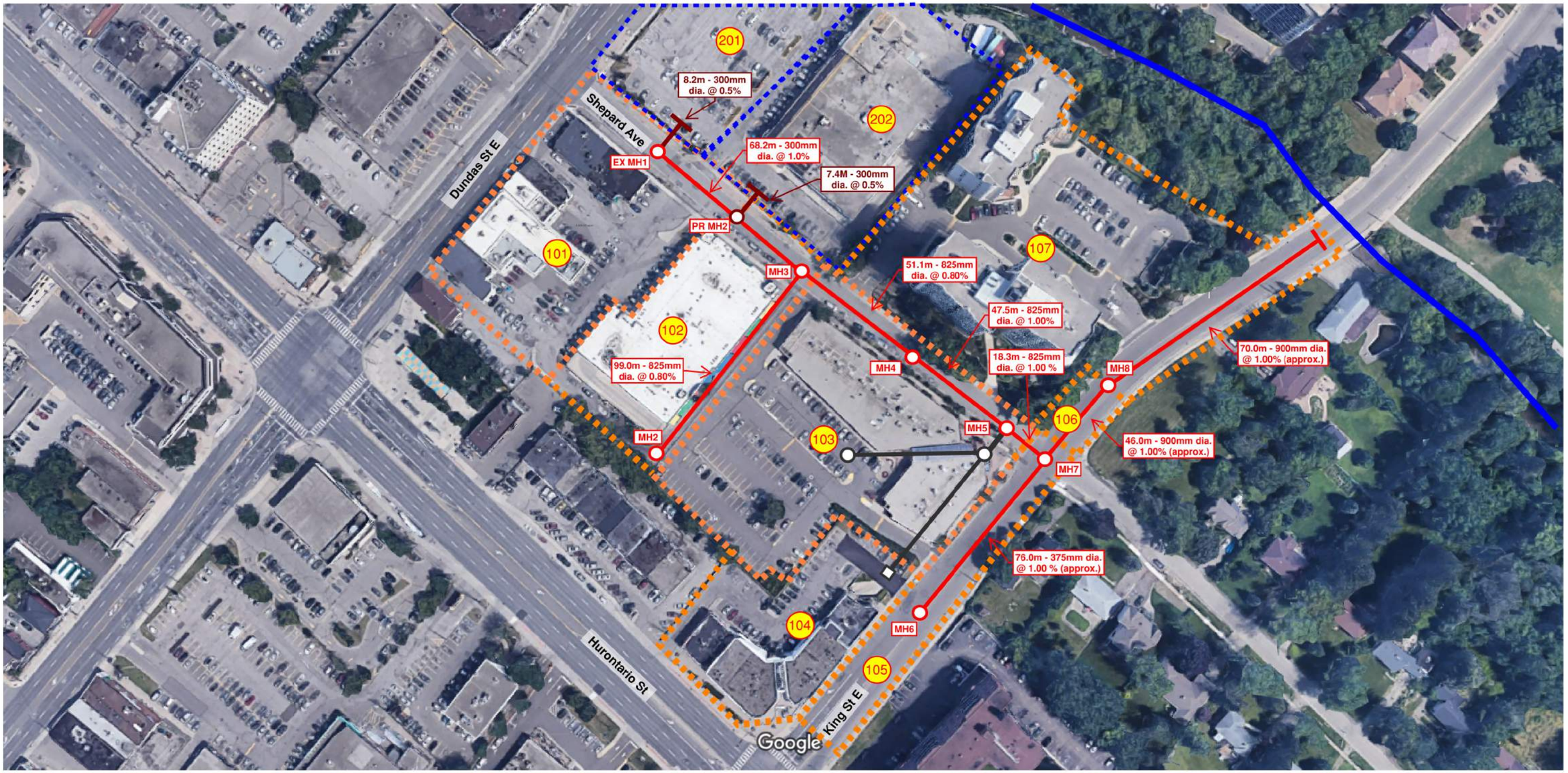
PROJECT: 60 Dundas St E
PROJECT No.: 2234-6274
FILE: Storm Sewer Design
DATE: 2022/12/07
Revised: 2022/12/14
Design: KIR
Check: BP

INITIAL TIME OF CONCENTRATION (min) 15.00 MANNINGS "n" 0.013

Catchment ID	FROM MH NO	TO MH NO	AREA (A) Ha	RUN-OFF COEFF	A x C	Cummul. A x C	TIME OF CONC. min	I mm/hr	Q[1] l/sec (per MR)	Q l/sec	SLOPE %	PIPE DIA. mm	Area m2	VEL. m/sec	Q/A m/s	Hv m	LENGTH m	TIME OF FLOW min	CAPACITY l/sec	% CAPACITY
201	Orifice 1	STM MH 1	0.40	0.85	0.34	0.34	15.00	99.17	**22.80**	-	0.50	300	0.07	0.97	0.32	0.01	8.2	0.14	**68.38**	33
101	Catchment	STM MH 1	0.66	0.90	0.59	0.59	15.00	99.17	-	**163.75**										
	STM MH 1	STM PR MH 1	0.00	0.90	0.00	0.59	15.14	98.61	-	**185.64**	1.00	300	0.07	1.37	2.63	0.35	46.0	0.56	**96.70**	192
202	Orifice 2	STM PR MH 1	0.67	0.76	0.51	0.51	15.00	99.17	**37.70**	-	0.50	300	0.07	0.97	0.53	0.01	7.4	0.13	**68.38**	55
	STM PR MH 1	STM MH 3	0.00	0.90	0.00	0.59	15.70	96.48	-	**219.82**	1.00	300	0.07	1.37	3.11	0.49	22.2	0.27	**96.70**	227
102	STM PR MH 2	STM MH 3	0.48	0.90	0.43	0.43	15.00	99.17	-	**119.09**	0.80	825	0.53	2.40	0.22	0.00	99.0	0.69	**1283.89**	9
	STM MH 3	STM MH 4	0.00	0.90	0.00	1.03	15.97	95.49	-	**332.87**	0.80	825	0.53	2.40	0.62	0.02	51.1	0.35	**1283.89**	26
	STM MH 4	STM MH 5	0.00	0.90	0.00	1.03	16.33	94.23	-	**329.26**	0.80	825	0.53	2.40	0.62	0.02	99.0	0.69	**1283.89**	26
103 & 104	STM MH 5	STM MH 7	1.33	0.90	1.20	2.22	17.01	91.88	-	**628.33**	1.00	825	0.53	2.69	1.18	0.07	18.3	0.11	**1435.44**	44
105	STM MH 6	STM MH 7	0.28	0.90	0.25	0.25	15.00	99.17	-	**69.47**	1.00	375	0.11	1.59	0.63	0.02	76.0	0.80	**175.33**	40
106	STM MH 7	STM MH 8	0.06	0.90	0.05	2.53	17.13	91.51	**-**	**703.85**	1.00	900	0.64	2.85	1.11	0.06	46.0	0.27	**1810.31**	39
107	STM MH 8	Outlet	1.23	0.90	1.11	3.64	17.40	90.63	-	**976.62**	1.00	900	0.64	2.85	1.54	0.12	70.0	0.41	**1810.31**	54

Notes:
1. The flow from the two proposed catchments will be controlled via. an orifice. Therefore, the fixed orifice flow rate was utilized for Catchment 201 and 202.
2. All existing pipe inverts to be confirmed prior to construction.
3. As-constrcuted drawings for King Street East were not avaiable; therefore, the pipe slopes and length were approximated based on avaible information and surrounding pipe characteristics.
4. The above storm design sheet details free flow conditions of the proposed and existing storm sewers.
5. The above storm design sheet assumes that all exisitng catchments (i.e. 101 - 107) do not have on-site stormwater controls.

60 Dundas Street E - External Storm Sewer Capacity Analysis



Notes:
- Lengths and slopes along King Street E are approximate
- Catchbasins and manholes within 103 and 104 are shown for reference
- Catchments are estimated based on topography and as-constructed drawings.

Existing Drainage Areas:

101: Area = 0.66 ha, RC = 0.9
102: Area = 0.48 ha, RC = 0.9
103: Area = 0.92 ha, RC = 0.9
104: Area = 0.41 ha, RC = 0.9
105: Area = 0.28 ha, RC = 0.9
106: Area = 0.06 ha, RC = 0.9
107: Area = 1.23 ha, RC = 0.9

Proposed Drainage Areas:

201: Area = 0.40 ha, RC = 0.85
202: Area = 0.67 ha, RC = 0.76

Legend:

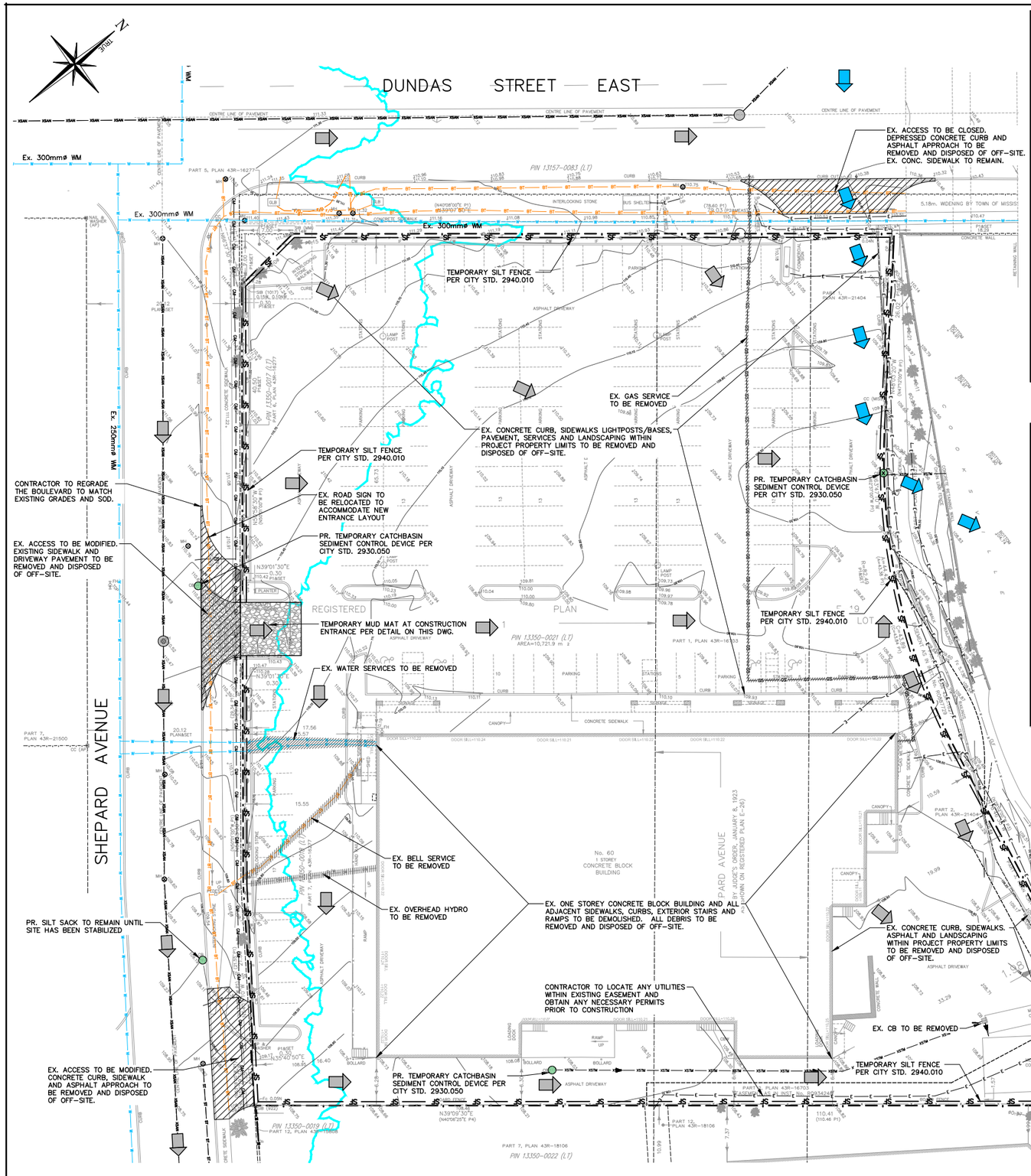
- Storm Sewer Manhole
- Catchbasin
- Storm Sewer
- Ex. Catchment Boundary
- Pr. Catchment Boundary
- Catchment ID
- Watercourse

CROZIER CONSULTING ENGINEERS

Project #: 2234-6274
Date: 2022-12-06
Created By: KIR
Checked By: BP

50m

DRAWINGS

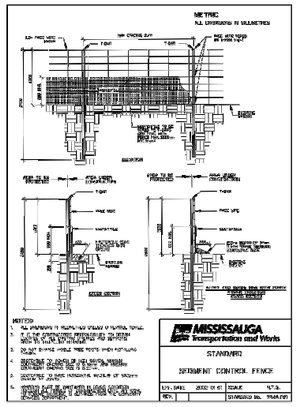


MANDATORY EROSION & SEDIMENT CONTROL NOTES (CVC)

1. BE ADVISED THAT THE CREDIT VALLEY CONSERVATION AUTHORITY MAY, AT ANY TIME, WITHDRAW THIS PERMISSION, IF, IN THE OPINION OF THE AUTHORITY, THE CONDITIONS OF THE PERMIT ARE NOT BEING COMPLIED WITH. THIS APPROVAL DOES NOT EXEMPT THE PROPERTY OWNER/APPLICANT/AGENT FROM THE PROVISIONS OF ANY OTHER FEDERAL, PROVINCIAL OR MUNICIPAL STATUTES, REGULATIONS OR BY-LAWS, OR ANY RIGHTS UNDER COMMON LAW.
2. FOLLOWING INSTALLATION OF THE PROPOSED ESC MEASURES, A QUALIFIED AGENT OF THE PROPONENT, PREFERABLY AN ENVIRONMENTAL MONITOR, WILL CONDUCT REGULAR SITE VISITS TO MONITOR ALL WORKS, PARTICULARLY THE CONDITION OF THE ESC MEASURES, DEWATERING, AND IN- OR NEAR-WATER WORKS. SHOULD CONCERNS ARISE; THE ENVIRONMENTAL MONITOR WILL CONTACT THE PROPONENT, CVC, AND ANY OTHER APPROPRIATE PARTIES.
3. ALL CONSTRUCTION ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF DEBRIS, SEDIMENTS, OR OTHER DELETERIOUS PRODUCTS TO THE WATERCOURSE OR WETLAND. EQUIPMENT MAINTENANCE WILL BE CONDUCTED A MINIMUM OF 30 METRES FROM THE WATERCOURSE/WETLAND.
4. SEDIMENT LADEN RUNOFF FROM DISTURBED AREAS TO THE WATERCOURSE OR NATURAL FEATURE IS NOT ALLOWED. ALL DEWATERING SHALL BE TREATED AND THEN RELEASED 30 METRES FROM A WATERCOURSE OR WETLAND. DISCHARGE IS TO BE RELEASED TO AN UNDISTURBED NATURAL AREA. THESE CONTROL MEASURES SHALL BE MONITORED AND MAINTAINED OR REVISED TO ENSURE WATER QUALITY TARGETS ARE BEING ACHIEVED.
5. PLEASE REFER TO ESC GUIDELINE FOR URBAN CONSTRUCTION (DECEMBER 2006) FOR THE DESIGN AND DESIGN ALTERATION OF ESC MEASURES.
6. ESC MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATERCOURSE/NATURAL AREAS. ESC MEASURES ARE TO BE EVALUATED ON A WEEKLY BASIS AND AFTER ANY STORM EVENT. ANY REPAIRS REQUIRED ARE TO BE RECTIFIED IMMEDIATELY.
7. THE EROSION AND SEDIMENT CONTROL (ESC) PLAN IS A DYNAMIC DOCUMENT, WHICH MAY BE SUBJECT TO CHANGE OR MODIFICATIONS AS A RESULT OF SITE DEVELOPMENTS OR CHANGES ON SITE. ANY DEVIATION FROM APPROVED PLANS MUST BE DESIGNED BY A QUALIFIED PROFESSIONAL.
8. ADDITIONAL ESC MATERIALS (I.E. SILT FENCE, FILTER SOCKS, STRAW BALES, CLEAR STONES, ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
9. THE PROJECT PROPONENT OR THEIR REPRESENTATIVE IS ULTIMATELY RESPONSIBLE FOR CONTROLLING SEDIMENT AND EROSION WITHIN THE CONSTRUCTION SITE FOR THE TOTAL PERIOD OF THE CONSTRUCTION.
10. DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES. ALL DISTURBED GROUND LEFT INACTIVE FOR MORE THAN 30 DAYS SHALL BE STABILIZED USING APPROPRIATE EROSION CONTROL MEASURES AND AN APPROPRIATE NATIVE NON-INVASIVE SEED MIX OR WITH THE FINAL APPROVED RESTORATION PLAN.
11. ANY SEDIMENT SPILL FROM THE SITE SHOULD BE REPORTED TO MINISTRY OF ENVIRONMENT (SPILL ACTION CENTER) AT 1-800-268-6060.
12. IF EXCESSIVE SILTATION RESULTS FROM THE CONSTRUCTION ACTIVITIES, THE ONSITE SUPERVISOR/INSPECTOR AND/OR CVC RESERVE THE RIGHT TO REQUEST ADDITIONAL ESC MEASURES WHICH WOULD BE INSTALLED PRIOR TO FURTHER CONSTRUCTION ACTIVITIES.

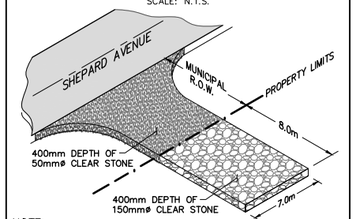
SITE-SPECIFIC NOTES

13. THE CONTRACTOR SHALL MONITOR WEATHER FORECASTS TO ENSURE THAT THE WORKS WILL BE CONDUCTED IN FAVOURABLE WEATHER. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL CONSTRUCTION EQUIPMENT AND MATERIALS THAT WOULD HAVE POTENTIAL TO CAUSE A SPILL OR OBSTRUCTION (I.E. FUEL TANKS, PORTABLE TOILETS, MACHINERY, ETC.), FROM THE WETLAND IN THE CASE OF A LARGE STORM EVENT.
14. CROSSING AN ACTIVE WATERCOURSE OR WETLAND BY EQUIPMENT, VEHICLES, PERSONNEL, ETC. IS NOT PERMITTED UNLESS APPROVED BY CVC. ALL ACCESS TO WORK SITES SHALL BE FROM EITHER SIDES OF THE WATERCOURSE OR WETLAND.
15. ALL IN-WATER AND NEAR WATER WORKS WILL BE CONDUCTED IN THE DRY AND MUST BE STAGED WITH APPROPRIATE EROSION AND SEDIMENT CONTROLS. PLAN THE WORK ACCORDINGLY WITH THE WEATHER FORECAST.
16. AN AFTER-HOURS CONTACT NUMBER IS TO BE VISIBLY POSTED ON-SITE FOR EMERGENCIES. ALL THE PLANS SHOULD HAVE NAME AND CONTACT INFO OF THE PERSON RESPONSIBLE FOR ESC MEASURES.

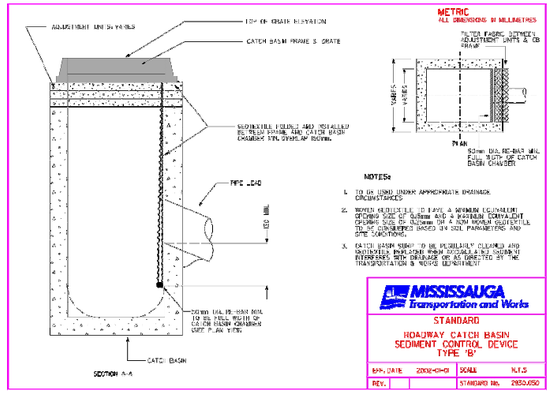


MUD-MAT DETAIL

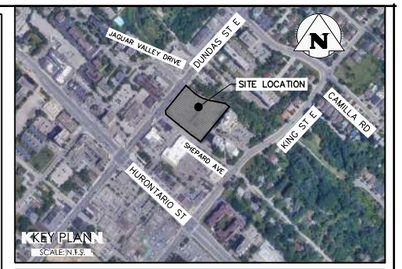
SCALE: N.T.S.



NOTE:
GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.



NOTES:
1. ALL EXISTING UTILITIES TO EXISTING 60 DUNDAS ST. E BUILDING TO BE REMOVED AND DECOMMISSIONED PER UTILITY COMPANY STANDARDS.
2. CONSTRUCTION PHASING TO BE CONFIRMED DURING DETAILED DESIGN PROCESS.



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING FENCE
- 215.00 EXISTING GRADE
- SF PR. SEDIMENT CONTROL FENCE
- EXISTING UTILITY REMOVAL
- W EXISTING WATERSERVICE
- E EXISTING ELECTRICAL SERVICE
- BT EXISTING BELL TELEPHONE
- F/O EXISTING FIBER OPTIC
- GS EXISTING GAS SERVICE
- GM EXISTING GAS MAIN
- TEMPORARY CATCHBASIN SILTATION CONTROL DEVICE. (SILTSACK)
- EXISTING OVERLAND FLOW DIRECTION
- REGIONAL OVERLAND FLOW DIRECTION
- EXISTING REGIONAL FLOODPLAIN

No.	ISSUE / REVISION	YYYY/MMM/DD
2	ISSUED FOR OPA, ZBA & SPA	2022/DEC/15
1	ISSUED ADDITIONAL FIGURES PER CITY REQUEST	2022/JUN/02
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

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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

FOR REVIEW

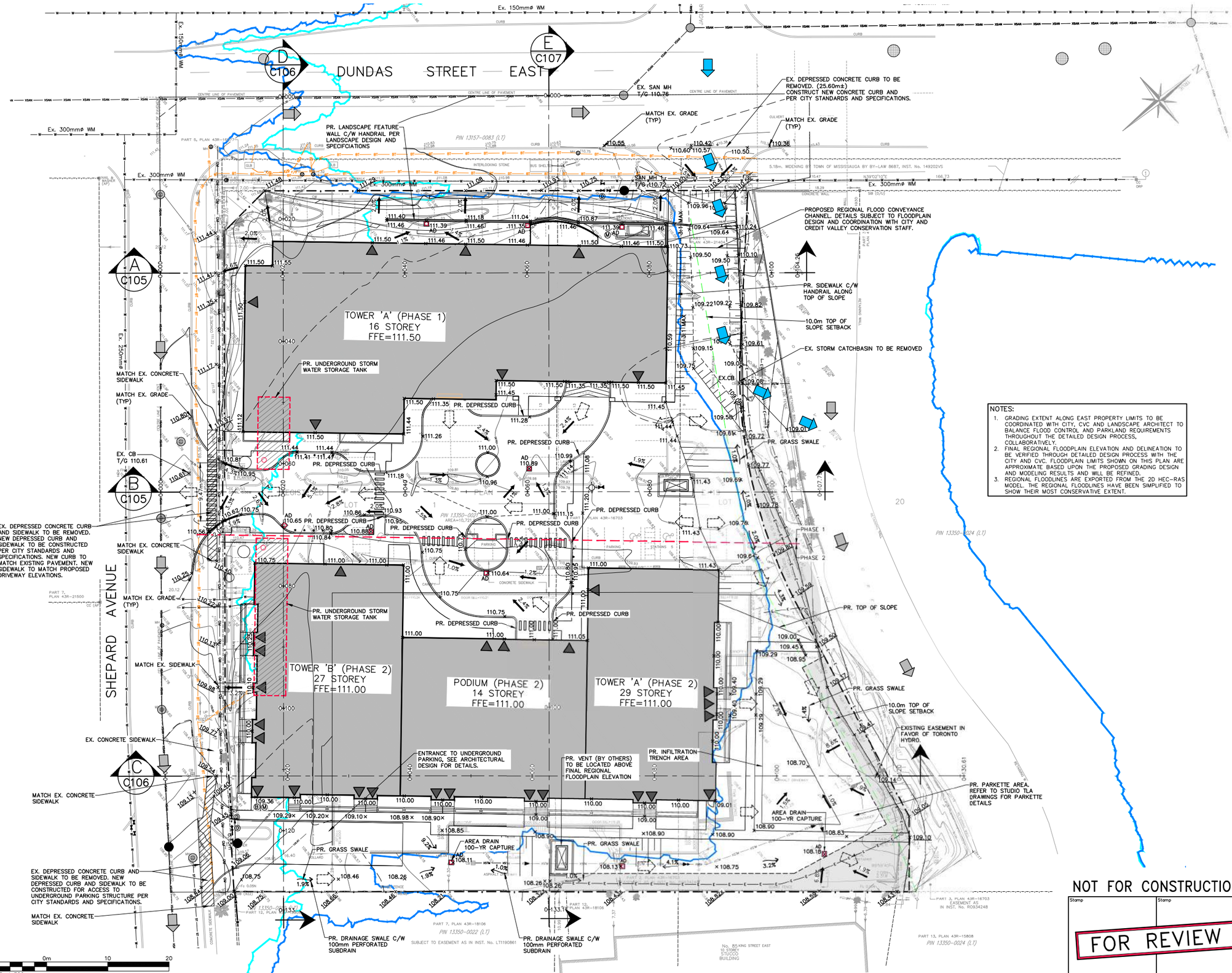
Stamp

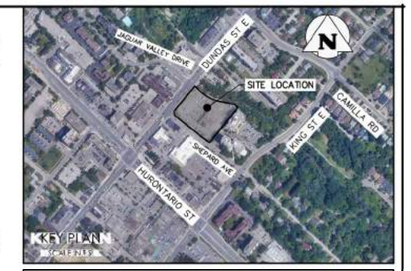
Project
60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing
EROSION, SEDIMENT CONTROL AND REMOVALS 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./B.W.	2234-6274	
Check	Check	Scale	Dwg.
B.W.	B.W.	1:300	C 101





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING FENCE
- EXISTING GRADE
- PROPOSED GRADE
- PROPOSED GRADE (TO MATCH EXISTING)
- PROPOSED MINOR FLOW DIRECTION
- 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
- PROPOSED AREA DRAIN PER MECHANICAL DESIGN AND SPECIFICATIONS
- PROPOSED WATER VALVE
- PROPOSED DETECTOR CHECK VALVE & CHAMBER
- PROPOSED WATER METER
- EXISTING REGIONAL FLOODPLAIN
- PROPOSED REGIONAL FLOODPLAIN (TO BE CONFIRMED)

NOTES:

1. GRADING EXTENT ALONG EAST PROPERTY LIMITS TO BE COORDINATED WITH CITY, CVC AND LANDSCAPE ARCHITECT TO BALANCE FLOOD CONTROL AND PARKLAND REQUIREMENTS THROUGHOUT THE DETAILED DESIGN PROCESS, COLLABORATIVELY.
2. FINAL REGIONAL FLOODPLAIN ELEVATION AND DELINEATION TO BE VERIFIED THROUGH DETAILED DESIGN PROCESS WITH THE CITY AND CVC. FLOODPLAIN LIMITS SHOWN ON THIS PLAN ARE APPROXIMATE BASED UPON THE PROPOSED GRADING DESIGN AND MODELING RESULTS AND WILL BE REFINED.
3. REGIONAL FLOODLINES ARE EXPORTED FROM THE 2D HEC-RAS MODEL. THE REGIONAL FLOODLINES HAVE BEEN SIMPLIFIED TO SHOW THEIR MOST CONSERVATIVE EXTENT.

No.	ISSUE / REVISION	YYYY/MMM/DD
2	ISSUED FOR OPA, ZBA & SPA	2022/DEC/15
1	ISSUED ADDITIONAL FIGURES PER CITY REQUEST	2022/JUN/02
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.

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

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Project

60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing

SITE GRADING PLAN

NOT FOR CONSTRUCTION

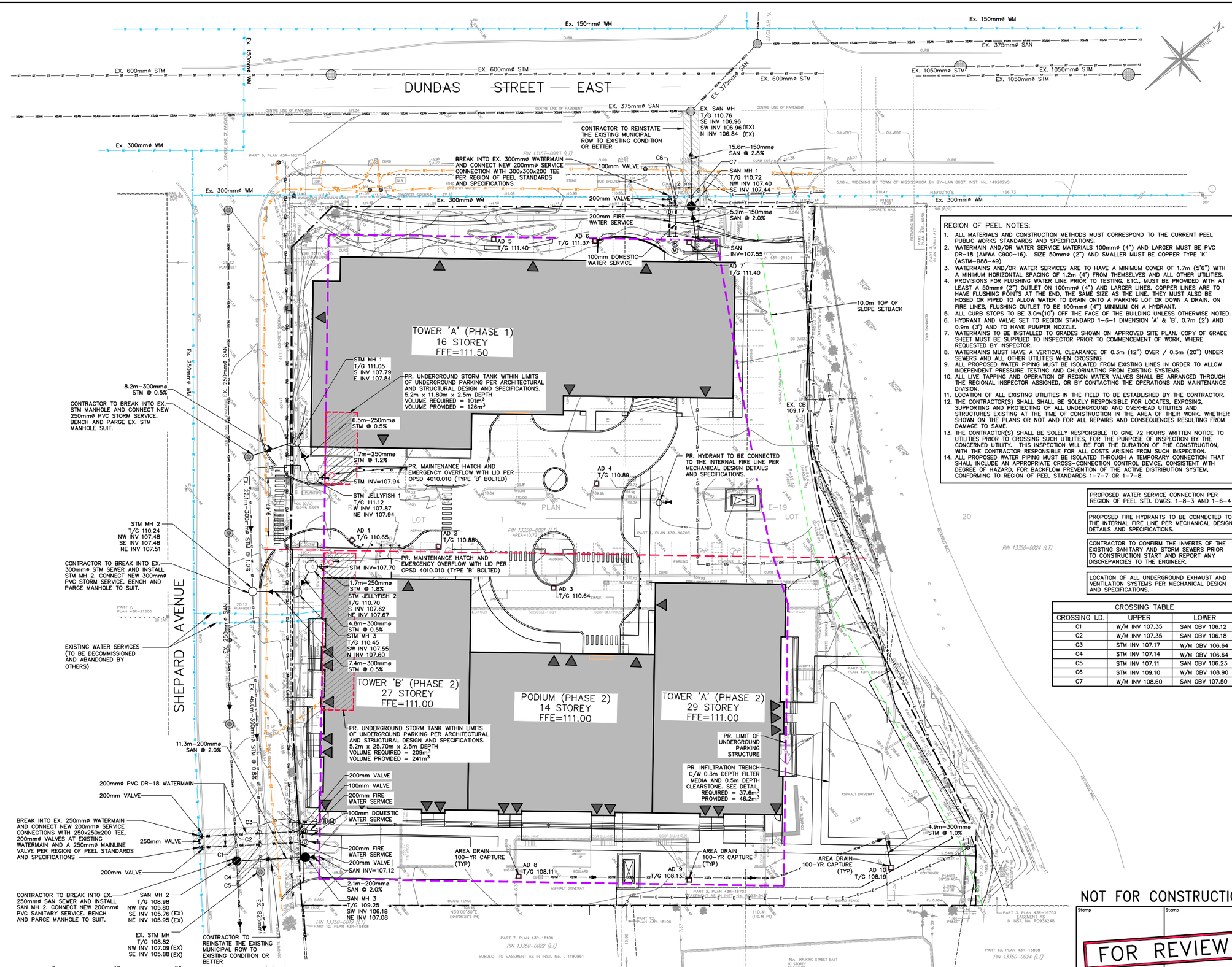
Stamp

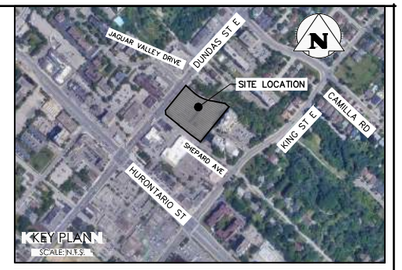
FOR REVIEW

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	M.I.M.	Design	M.I.M. /B.W.	Project No.	2234-6274
Check	B.W.	Check	B.W.	Scale	1:300
				Dwg.	C 102





REGION OF PEEL NOTES:

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAIN AND/OR WATER SERVICE MATERIALS 100mmø (4") AND LARGER MUST BE PVC DR-18 (AWWA C900-16). SIZE 50mmø (2") AND SMALLER MUST BE COPPER TYPE 'K' (ASTM-B88-49)
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7m (5'6") WITH A MINIMUM HORIZONTAL SPACING OF 1.2m (4') FROM THEMSELVES AND ALL OTHER UTILITIES.
4. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC., MUST BE PROVIDED WITH AT LEAST A 50mmø (2") OUTLET ON 100mmø (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100mmø (4") MINIMUM ON A HYDRANT.
5. ALL CURB STOPS TO BE 3.0m(10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
6. HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1 DIMENSION 'A' & 'B', 0.7m (2') AND 0.9m (3') AND TO HAVE PUMPER NOZZLE.
7. WATERMAINS TO BE INSTALLED TO GRADES SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAINS MUST HAVE A VERTICAL CLEARANCE OF 0.3m (12") OVER / 0.5m (20") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
9. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR ASSIGNED, OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.
11. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
12. THE CONTRACTOR(S) SHALL SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK. WHETHER SHOWN ON THE PLANS OR NOT AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
13. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO UTILITIES PRIOR TO CROSSING SUCH UTILITIES, FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.
14. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS-CONNECTION CONTROL DEVICE, CONSISTENT WITH DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARDS 1-7-7 OR 1-7-8.

CROSSING TABLE		
CROSSING I.D.	UPPER	LOWER
C1	W/M INV 107.35	SAN OBV 106.12
C2	W/M INV 107.35	SAN OBV 106.18
C3	STM INV 107.17	W/M OBV 106.64
C4	STM INV 107.14	W/M OBV 106.64
C5	STM INV 107.11	SAN OBV 106.23
C6	STM INV 109.10	W/M OBV 108.90
C7	W/M INV 108.60	SAN OBV 107.50

LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN & GATE VALVE
- EXISTING FIRE HYDRANT & GATE VALVE
- (M) PROPOSED WATER METER INSTALLED IN BUILDING PER MECHANICAL DESIGN AND SPECIFICATIONS. (100mmø PER REGION STD. 1-4-3)
- (B) PROPOSED BACKFLOW PREVENTOR INSTALLED IN BUILDING PER MECHANICAL DESIGN AND SPECIFICATIONS.
- (D) PROPOSED DETECTOR CHECK VALVE IN CHAMBER INSTALLED PER REGION OF PEEL STD 1-3-1 FOR CHECK VALVE & 1-1-5 FOR CHAMBER
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SANITARY SEWER & MANHOLE
- BUILDING ENTRANCE (PERSONNEL DOOR)
- AD PROPOSED AREA DRAIN PER MECHANICAL DESIGN AND SPECIFICATIONS
- LIMITS OF UNDERGROUND
- W EXISTING WATERSERVICE
- E EXISTING ELECTRICAL SERVICE
- BT EXISTING BELL TELEPHONE
- F/O EXISTING FIBER OPTIC
- GS EXISTING GAS SERVICE
- GM EXISTING GAS MAIN

No.	ISSUE / REVISION	YYYY/MMM/DD
2	ISSUED FOR OPA, ZBA & SPA	2022/DEC/15
1	ISSUED ADDITIONAL FIGURES PER CITY REQUEST	2022/JUN/02
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.

Project

60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing

SITE SERVICING 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	M.I.M.	Design	M.I.M./B.W.	Project No.	2234-6274
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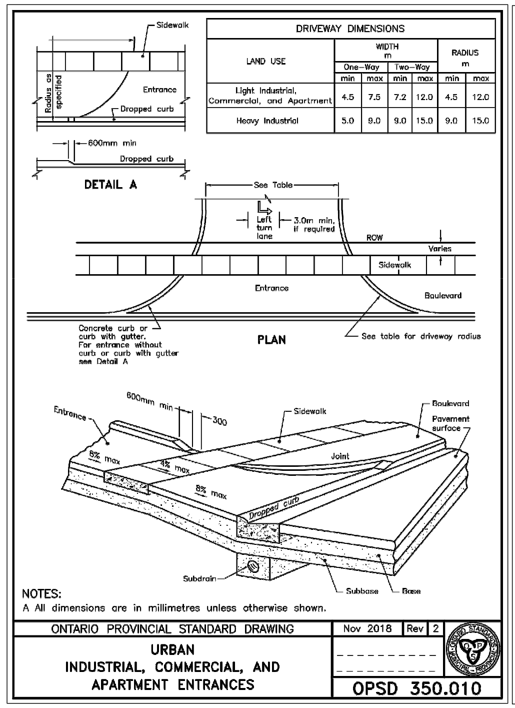
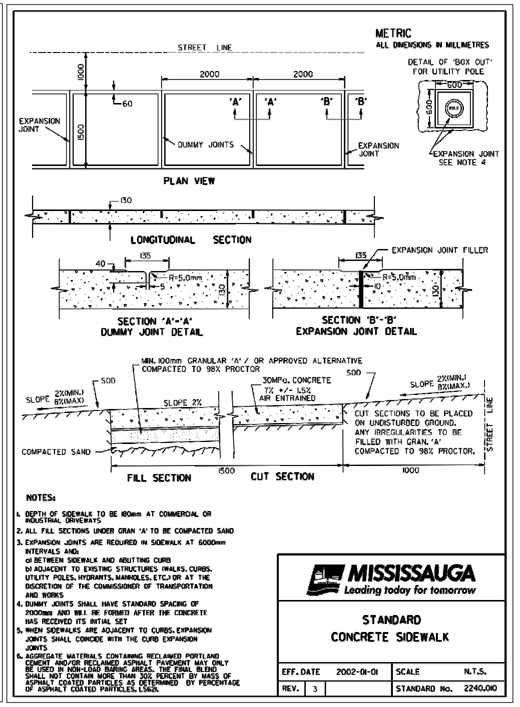
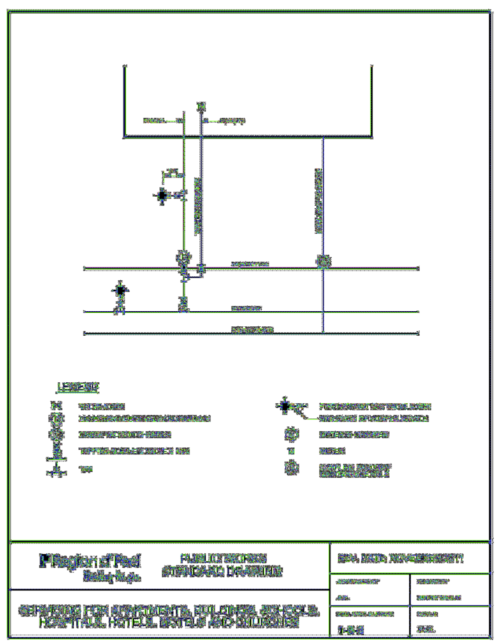
				Dwg.	C 103







CONSTRUCTION (GENERAL)

1. ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH CURRENT ONTARIO BUILDING CODE, CITY OF MISSISSAUGA STANDARDS, REGION OF PEEL STANDARDS, OPSD & OPSS. WHERE CONFLICT OCCURS, CITY OF MISSISSAUGA STANDARDS TO GOVERN FOR STORMWATER, ROADWORKS & INTERNAL GRADING; REGION OF PEEL STANDARDS TO GOVERN FOR SANITARY & WATERMAIN INSTALLATION.
2. ALL TOPSOIL & EARTH EXCAVATION TO BE REMOVED TO AN APPROVED SITE.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED LAYOUT OF THE WORK.
4. ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY O.L.S. AT CONTRACTOR'S EXPENSE IF REMOVED DURING CONSTRUCTION.
5. THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR THE SUPPLY OF TEMPORARY WATER & POWER.
6. IF REQUIRED, DEWATERING TO BE CARRIED OUT IN ACCORDANCE WITH OPSS-517 & 518 TO MAINTAIN ALL TRENCHES IN A DRY CONDITION. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING M.E.C.P. PERMIT IF REQUIRED.
7. ALL ENGINE DRIVEN PUMPS TO BE ADEQUATELY SILENCED, SUITABLE FOR OPERATION IN A RESIDENTIAL DISTRICT.
8. THE UTILITIES SHOWN ON PLANS ARE APPROXIMATE ONLY & CONTRACTOR TO CONFIRM LOCATIONS IN ADVANCE OF CONSTRUCTION.
9. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK & CO-ORDINATE CONSTRUCTION ACCORDINGLY.
10. THE LOCATION AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE RESTORATION AND/OR REPAIR OF EXISTING UTILITIES DISTURBED DURING CONSTRUCTION
11. ALL AREAS BEYOND THE SITE PLAN WHICH ARE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE EXPENSE OF THE CONTRACTOR.
12. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
13. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
14. ROAD AND BOULEVARD RESTORATION AS PER CITY OF MISSISSAUGA ROAD CUT PERMIT.
15. THE GEOTECHNICAL SUITABILITY OF ALL THE FILL MATERIAL WILL BE ASSESSED BY THE GEOTECHNICAL ENGINEER.
16. GEOTECHNICAL ENGINEER TO CONFIRM SUITABILITY OF ROAD MATERIAL DEPTHS BASED ON SUB-BASE MATERIAL.
17. CONTRACTOR SHALL FLUSH AND VIDEO STORM SEWERS UPON INSTALLATION AND PROVIDE VIDEO TO ENGINEER.
18. CONTRACTOR SHALL PROVIDE A DIGITAL AS-BUILT SURVEY OF ALL UNDERGROUND AND ABOVEGROUND WORKS TO THE SATISFACTION OF THE ENGINEER. THIS INCLUDES A FULL TOPOGRAPHIC SURVEY OF THE AS-BUILT GRADES.

WATERMAINS

1. THESE NOTES ARE TO BE READ IN CONJUNCTION WITH REGION OF PEEL STANDARDS. IF ANY DISCREPANCIES ARISE, THE REGION OF PEEL STANDARDS WILL GOVERN.
2. BEDDING & EMBEDMENT TO REGION OF PEEL STANDARD – 1-5-1. WATERMAIN SUPPORT BRIDGING DISTURBED GROUND TO REGION OF PEEL STANDARD – 1-5-2.
3. TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
4. SERVICE CONNECTIONS TO REGION OF PEEL STD. 1-8-3. FIRE LINE AND DOMESTIC CONNECTION TO REGION OF PEEL STD. 1-8-3.
5. BEDDING & EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMDD.
6. MINIMUM COVER ON WATERMAIN AND SERVICES TO BE 1.7m BELOW FINISHED GRADE.
7. CLEARANCE BETWEEN WATERMAIN AND SEWERS TO BE A MINIMUM OF 0.5m VERTICAL WHERE WATER MAIN IS ABOVE SEWER OR 2.5m MINIMUM HORIZONTAL SEPARATION.
8. SERVICES TO BE DIRECT TAP.
9. FOLLOWING TESTING, CONTRACTOR SHALL OPERATE EACH WATER SERVICE TO VERIFY FULL FLOW AND PRESSURE AT THE CURB STOP TO THE SATISFACTION OF THE ENGINEER.
10. VALVE & BOX – MUELLER A769 WITH GUIDE PLATE; CLOW-BIBBY VB 1100/RB645.
11. MECHANICAL JOINT FITTINGS – ANSI A21.53 (A.W.W.A C153) SPECIFICATIONS; HYPROTEC FITTING SHALL BE USED WITH HYPROTEC PIPE INSTALLATION.
12. ALL PVC WATERMAINS SHALL BE EQUAL TO AWWA C-900 CLASS 150, DR 18,
13. ALL PVC WATERMAINS SHALL BE INSTALLED WITH A 12 GAUGE STRANDED COPPER TWU TRACER WIRE IN ACCORDANCE WITH REGION OF PEEL STANDARDS.
14. VALVE IN BOXES SHALL BE INSTALLED AS PER REGION OF PEEL STD. 1-3-8. MAINLINE VALVES TO BE RESTRAINED AS PER REGION OF PEEL STD. 1-3-3A.
15. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS AS PER REGION OF PEEL STANDARDS.
16. THE OPERATION OF EXISTING WATERMAIN VALVES SHALL BE CONDUCTED AS REQUIRED BY THE REGION OF PEEL.
17. THE NEW WATERMAIN TO BE TAPPED FOR WATER SERVICES MUST BE ISOLATED FROM THE EXISTING WATERMAIN TO MAINTAIN PRESSURE IN THE NEW MAIN DURING INSTALLATION OF SERVICES. A 25mm BY-PASS WITH AN APPROVED DIFFERENTIAL BACKFLOW PREVENTORS IS TO BE INSTALLED AROUND THE CLOSED VALVE.
18. FIRE HYDRANTS SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARD C-502, SHALL BE LISTED WITH ULC AND FM, AND BE PROVIDED WITH THE FOLLOWING:
    - 2 (ONLY) 63.5mm HOSE NOZZLES WITH CSA STANDARD THREAD, 5TPI, 73.4mm OD, MUELLER CODE 12B;
    - 1 (ONLY) 100mm STORZ PUMPER CONNECTION AS PER ULC S-520.
19. HYDRANTS OPEN COUNTER CLOCKWISE (OPEN LEFT), 31.75mm NUTS.
20. FIRE HYDRANTS SHALL BE LOCATED AND PLACED IN ACCORDANCE WITH THE NATIONAL BUILDING CODE AND SCHEDULE 'A' OF THE CITY OF MISSISSAUGA BY-LAW 1036-81. HYDRANTS THAT MAY BE SUBJECT TO VEHICLE DAMAGE SHALL BE PROTECTED WITH 100mm DIAMETER, CONCRETE FILLED, STEEL PIPE BOLLARDS.
21. UPON COMPLETION OF THE HYDRANT FLOW TESTING, COPIES OF THE FLOW TEST RESULTS ARE TO BE DISTRIBUTED TO THE FOLLOWING VIA E-MAIL OR HARDCOPY:
    - ENGINEER
    - BUILDING INSPECTOR

DRIVEWAY & PARKING

1. GRANULAR 'A' & 'B' BASE TO BE COMPACTED TO 98% OF THE MATERIAL'S RESPECTIVE SPMDD OR AS APPROVED BY GEOTECHNICAL ENGINEER.
2. THE TOP 1.0m OF THE SUB-BASE SHALL BE COMPACTED TO A MINIMUM OF 98% OF STANDARD PROCTOR DENSITY WITHIN 2% OF OPTIMUM MOISTURE CONTENT.
3. SUBGRADE TO BE PROOF ROLLED & CERTIFIED PRIOR TO PLACING GRANULAR MATERIAL.
4. DRIVEWAYS TO BE CONSTRUCTED WITH MINIMUM 150mm GRANULAR A BASE, 50mm H.L.8 BINDER COURSE ASPHALT & 25mm H.L.3.F SURFACE COURSE ASPHALT.
5. ALL GRANULAR AND ASPHALT MATERIAL PLACEMENT TO BE IN ACCORDANCE WITH OPSS 314 & OPSS 310.
6. ALL GRANULAR CONNECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF MISSISSAUGA STANDARD 2220.050.
7. ALL CONCRETE SIDEWALKS TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF MISSISSAUGA STANDARD 2240.010.
8. ALL PEDESTRIAN SIDEWALK ENTRANCES AT INTERSECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 350.010.

SANITARY SERVICES

1. SANITARY SEWER BEDDING SHALL BE CLASS 'B' BEDDING AS PER REGION OF PEEL STD. 2-3-1, UNLESS OTHERWISE NOTED.
2. TRENCH BACKFILL TO SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
3. BEDDING & EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
4. CLEAR STONE WRAPPED WITH FILTER FABRIC CAN BE SUBSTITUTED FOR EMBEDMENT MATERIAL IF APPROVED BY THE GEOTECHNICAL ENGINEER.
5. SANITARY SEWER, UNLESS OTHERWISE NOTED, SHALL BE PVC SDR 35 WITH MINIMUM PIPE STIFFNESS OF 320kPa – MANUFACTURED TO C.S.A.STANDARD B182.2 (A.S.T.M. SPECIFICATION D 3034) WITH RUBBER GASKETTED BELL AND SPIGOT JOINTS.
6. ALL SEWERS CONSTRUCTED WITH GRADES 0.5% OR LESS, SHALL BE INSTALLED USING A LASER AND CHECKED PRIOR TO BACKFILL AT THE CONTRACTORS EXPENSE.
7. NO ENCROACHMENT WILL BE ALLOWED ONTO PRIVATE LANDS.
8. SANITARY SEWERS TO BE VIDEO INSPECTED AFTER INSTALLATION COMPLETION, PRIOR TO ASPHALT PLACEMENT AND AFTER LANDSCAPE COMPLETION. FLUSHING OF SEWER WILL BE REQUIRED IF DEBRIS IS FOUND IN THE PIPES, TO THE SATISFACTION OF THE ENGINEER.
   (MINIMUM OF 3 SEPARATE VIDEO INSPECTIONS)

CONSTRUCTION NOTES

1. NO GRADING, STRUCTURES, RETAINING WALLS, CONSTRUCTION OR SITE/CONSTRUCTION ACCESS ARE PERMITTED ON OR FROM THE MUNICIPAL PARKLAND.
2. THE PLACEMENT OF UNAPPROVED MATERIALS OR STRUCTURES WITHIN MUNICIPAL GREENBELT/WOODLAND BLOCKS IS NOT PERMITTED BY COMMUNITY SERVICES AT ANY STAGE OF DEVELOPMENT. THIS INCLUDES, BUT IS NOT LIMITED TO, TOPSOIL STOCKPILING, CONSTRUCTION TRAILERS AND VEHICLES, CONSTRUCTION MATERIALS AND DEBRIS, SALES/PROMOTIONAL TRAILERS AND SIGNAGE.
3. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING PARK AND TREE PRESERVATION HOARDING IN AN APPROVED AND FUNCTIONING CONDITION AS REQUIRED BY THE COMMUNITY SERVICES DEPARTMENT THROUGH ALL PHASES OF CONSTRUCTION. NOTE THAT THE SOLID BOARD HOARDING TO BE PLACED ON PRIVATE LANDS WILL FUNCTION AS HOARDING TO PROTECT CITY PARKLAND.
4. INFORM THE COMMUNITY SERVICES DEPARTMENT OF THE CONSTRUCTION SCHEDULE AS IT PERTAINS TO THE MUNICIPALLY OWNED PARKLAND, ITS PROTECTIVE HOARDING, CLEAN-UPS, REINSTATEMENT AND ISSUES AFFECTING PARKLAND USE, CONSTRUCTION AND MAINTENANCE. IT IS THE RESPONSIBILITY OF THE APPLICANT TO ARRANGE FOR COMMUNITY SERVICES – PARK PLANNING SECTION INSPECTIONS AND APPROVALS AS REQUIRED.
5. REMOVE CONSTRUCTION RELATED DEBRIS OR LITTER THAT HAS MIGRATED OR HAS THE POTENTIAL TO MIGRATE INTO THE ADJACENT MUNICIPALLY OWNED GREENBELT. SHOULD THE CONTRACTOR/APPLICANT FAIL TO DO SO, ARRANGEMENTS WILL BE MADE TO DRAW ON THE SUBMITTED PARK PROTECTION AND REINSTATEMENT SECURITIES TO FUND PARK CLEAN UP ACTIVITIES.
6. PRIOR TO THE RELEASE OF SECURITIES, THE COMMUNITY SERVICES DEPARTMENT IS TO INSPECT AND APPROVE ANY REQUIRED RESTORATION, REINSTATEMENT AND/OR CLEAN UP WORKS INCLUDING HOARDING REMOVAL AND OFF-SITE DISPOSAL, CONDUCTED AT THE SHARED PROPERTY LINE WITH AND WITHIN P #96, MISSISSAUGA VALLEY PARK.
7. A FULL CONSTRUCTION MANAGEMENT PLAN IS TO BE PREPARED BY THE GENERAL CONTRACTOR AND SUBMITTED TO THE CITY FOR REVIEW.

EROSION AND SEDIMENT CONTROL NOTES:

1. EROSION AND SEDIMENT CONTROLS ARE TO BE CONTINUOUSLY EVALUATED AND UPGRADES ARE TO BE IMPLEMENTED, WHEN NECESSARY.
2. ADDITONAL EROSION AND SEDIMENT CONTROL MATERIALS (IE. SILT FENCE, STRAW BALES, CLEAR STONE, ETC.) ARE TO KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
3. AN AFTER HOURS CONTACT NUMBER IS TO BE CLEARLY POSTED ON-SITE FOR EMERGENCIES.
4. THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR CONTROLLING SEDIMENT AND EROSIN WITHIN THE CONSTRUCTION SITE FOR THE TOTAL PERIOD OF THE CONSTRUCTION. THE SEDIMENT LADEN WATER WILL NOT BE ALLOWED TO DISCHARGE TO THE CREEK.
5. ALL TEMPORARY SOIL OR DIRT STOCKPILES ARE TO BE PROVIDED WITH THE NECESSARY SEDIMENT AND EROSION CONTROL FEATURES, INCLUDING SEEDING IF ANTICIPATED TO BE STORED FOR MORE THAN 1 MONTH. STOCKPILES MUST NOT BE LOCATED IN AREAS OF CONCENTRATED FLOW AND A MINIMUM OF 15m FROM THE TOP OF BANK, WATERCOURSE OR WETLAND.

DEWATERING NOTES:

1. IF DEWATERING IS REQUIRED, THE INLET PUMP HEAD MUST BE COVERED WITH FILTER FABRIC OR CLEAR STONE; THE OUTLET PUMP MUST DISCHARGE TO THE SEDIMENT BAG OR BASIN; DISCHARGE FROM THE BAG IS TO BE RELEASED TO A VEGETATED LOCATION OR IF UNAVAILABLE, A FLOW DISSIPATING SHOULD BE PROVIDED. THE SEDIMENT BAG SHOULD BE LOCATED A MINIMUM OF 15m AWAY FROM THE RECEIVING BODY. (REFER TO EROSION AND SEDIMENT CONTROL GUIDELINE FOR URBAN CONSTRUCTION – DECEMBER 2006, FIG. E9)

INSTALLATION & RESTORATION (OPEN CUT)

1. BACKFILL MATERIALS SHALL BE OPSS GRANULAR 'A', GRANULAR 'B' & UNSHRINKABLE FILL PLACED AT THE SPECIFIED DEPTHS AS PER STANDARD 2220.030. ALL GRANULAR MATERIAL SHALL CONFORM WITH OPSS 1010 & THE UNSHRINKABLE FILL SHALL CONFORM TO OPSS 1359. STEEL PLATES SHALL BE SECURED OVER THE EXCAVATION FOR A MINIMUM OF 24 HOURS AFTER WHICH THE GRANULAR MATERIALS CAN BE PLACED. ALL GRANULAR MATERIAL SHALL BE PLACED IN 150mm LIFTS AND COMPACTED TO 100% STANDARD PROCTOR DENSITY.
2. AFTER BACKFILLING THE UTILITY TRENCH, A MIN. 300mm TOTAL ASPHALT REMOVAL SHALL BE CUT ON ALL SIDES OF THE TRENCH INTO THE EXISTING PAVEMENT STRUCTURE. THE PAVEMENT STRUCTURE MATERIALS SHALL MATCH THE EXISTING PAVEMENT MATERIAL TYPES.
3. ASPHALT RESTORATION SHALL BE A MINIMUM OF 40mm HL-3 & 50mm HL-8 & SHALL MATCH THE EXISTING PAVEMENT STRUCTURE. ALL ASPHALT RESTORATION SHALL BE IN COMPLIANCE WITH OPSS 310. ALL HOT-MIX MATERIAL SHALL CONFORM TO OPSS 1149, 1150 AND/OR 1154. EXPOSED ASPHALT AND CONCRETE FACES SHALL BE CLEANED AND COATED WITH AN RS-1 (OR EQUIVALENT) ASPHALT EMULSION & ALLOW TO 'BREAK' PRIOR TO COMMENCING ASPHALT PLACEMENT.
4. WHEN THE REMAINING ASPHALT, FROM THE EDGE OF PAVEMENT TO THE SAWCUT IS 1.3m OR LESS, THE EXISTING ASPHALT WILL BE REMOVED FULL DEPTH & REPAVED AS PER NOTE 3. WHEN TWO OR MORE ROAD CUTS ARE REQUIRED AT A GIVEN SITE AND THE CUTS ARE LESS THAN 2.5m APART THE ENTIRE AREA MUST HAVE FULL DEPTH ASPHALT RESTORATION FROM THE OUTER LIMITS OF ALL REPAIRS.
5. SIDEWALK RESTORATION SHALL BE A MINIMUM OF 1 FULL BAY INCLUDING EXPANSION JOINT MATERIAL. ALL CONCRETE SHALL BE AS PER OPSS 351. ALL SIDEWALKS SHALL BE 130mm THICK.
6. SUB-DRAINS UNDER THE CURB SHALL BE RESTORED TO ENSURE THEIR OPERATION AND SHALL BE PLACED AS PER CITY OF MISSISSAUGA STANDARD DRAWING NUMBER 2220.040
7. WHERE THE CURB HAS BEEN UNDERMINED TO FACILITATE SERVICING INSTALLATION THE CURB SHALL BE REMOVED AND REPLACED. CURB RESTORATION SHALL BE MINIMUM OF 2.0m OR SHALL EXTEND 0.5m BEYOND THE OUTER TRENCH EDGES WHICH EVER IS GREATER, ALL CONCRETE SHALL BE AS PER OPSS 353.
8. ALL GRASSED BOULEVARDS SHALL BE RE-INSTATED WITH NUMBER 1 NURSERY SOD PLACED ON TOP OF 100mm OF TOPSOIL. ALL SOD SHALL BE PLACED WITH STAGGERED JOINTS, BE ROLLED, AND WHERE APPLICABLE, STAKED INTO THE GROUND.

STORM SEWERS

1. BEDDING & EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMDD.
2. BEDDING & EMBEDMENT TO OPSD 802.010 (FLEXIBLE PIPE) GRANULAR 'A' EMBEDMENT.
3. WHERE COVER OVER THE OBVERT OF THE SEWER IS LESS THAN 1.20m, INSTALL 50mm THICKNESS OF STYROFOAM SM INSULATION MATERIAL, FOR EACH 300mm COVER DEFICIT, PER PIPE INSULATION DETAIL.
4. CATCHBASINS TO HAVE MIN. 600mm SUMPS PER OPSD 705.010.
5. STORM SEWERS TO BE VIDEO INSPECTED AFTER INSTALLATION COMPLETION, PRIOR TO ASPHALT PLACEMENT AND AFTER LANDSCAPE COMPLETION. FLUSHING OF SEWER WILL BE REQUIRED IF DEBRIS IS FOUND IN THE PIPES, TO THE SATISFACTION OF THE ENGINEER.
   (MINIMUM OF 3 SEPARATE VIDEO INSPECTIONS)

REMOVAL AND EROSION & SEDIMENT CONTROL: GENERAL NOTES

1. THE APPLICANT IS RESPONSIBLE FOR THE INSTALLATION OF HOARDING TO PROTECT THE ADJACENT PARKLAND (INCLUDES PARKS, GREENBELTS, WOODLOTS) TO COMMUNITY SERVICES STANDARDS. THE APPLICANT ACCEPTS THE RESPONSIBILITY FOR ARRANGING ALL NECESSARY REPAIRS THE AND THE REINSTATMENT OF, THE ADJOINING PARKLAND, DUE TO DAMAGES INCURRED BY THE CONSTRUCTION WORKS ASSOCIATED WITH THIS APPLICATION. THESE WORKS WILL BE COMPLETED PRIOR TO SUBMITTING THE REQUEST FOR INSPECTION AND THE SUSEQUENT REQUEST FOR THE RELEASE OF SECURITIES FROM THE COMMUNITY SERVICES DEPARTMENT. THE APPLICANT ACKNOWLEDGES THAT SECURITIES BEING HELD BY THE CITY WILL BE RELEASED ONLY UPON COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND HE REPAIRS/REINSTATEMENT WORKS FOR THE PARKLAND, TO THE SATISFACTION OF THE COMMUNITY SERVICES DEPARTMENT.

   SIGNATURE OF OWNER ____________________.

   NAME OF OWNER: ACLP DUNDAS STREET EAST

   DATE ______________.

2. NO MAINTENANCE OR REPAIR WORK ON CONSTRUCTION EQUIPMENT IS ALLOWED WITHIN 30 METRES OF AN EXISTING WATER COURSE OR DITCH.
3. ALL SEDIMENT AND EROSION CONTROL FACILITIES AND WORKS ARE TO BE CONSTRUCTED AND IN PLACE TO THE APPROVAL OF THE SITE ENGINEER PRIOR TO ANY GRADING OPERATIONS COMMENCING. TYPICAL WORKS INCLUDE SILT FENCES AND INTERCEPTOR SWALES.
4. ALL TEMPORARY SOIL OR DIRT STOCKPILES ARE TO BE PROVIDED WITH THE NECESSARY SEDIMENT AND EROSION CONTROL FEATURES. IF STOCKPILES ARE TO REMAIN FOR A PERIOD LONGER THAN 180 DAYS, STOCKPILES SHALL BE HYROSEEDED AND SURROUNDED WITH SILT FENCE.
5. ALL AREA DRAINS TO HAVE FILTER FABRIC PLACED AND MAINTAINED UNDER GRATES PER STD. 2930.040 UNTIL LANDSCAPING IS COMPLETE AND STABILIZED IN DEVELOPMENT OR AS DIRECTED BY SITE ENGINEER.
6. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES (I.E. SILT FENCE, STRAW BALES, CLEARSTONE...ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
7. EROSION AND SEDIMENT CONTROL METHODS ARE TO BE CONTINUOUSLY EVALUATED AND, WHERE NECESSARY, UPGRADES ARE TO BE IMPLEMENTED.
8. AN AFTER HOURS CONTACT NUMBER IS TO BE VISIBLY POSTED ON-SITE FOR EMERGENCIES.
9. ALL SEDIMENT CONTROL FENCING IS TO BE ERECTED PRIOR TO THE COMMENCEMENT OF ANY SITE GRADING OPERATIONS, AS PER CITY OF MISSISSAUGA STANDARD 2940.01.
10. ALL CATCHBASINS WITHIN LANDSCAPED AREAS TO HAVE SEDIMENT BARRIER (CITY OF MISSISSAUGA STANDARD 2930.02 OR 2930.03) ERECTED IMMEDIATELY AFTER CATCHBASIN INSTALLATION. SEDIMENT PROTECTION BARRIER TO BE MAINTAINED ON A REGULAR BASIS OR TO THE SATISFACTION OF THE CITY OF MISSISSAUGA.
11. ALL ROADSIDE CATCHBASINS TO HAVE SEDIMENT PROTECTION AS PER CITY OF MISSISSAUGA STANDARD 2930.04 INSTALLED IMMEDIATELY AFTER CATCHBASIN INSTALLATION. SEDIMENT PROTECTION BARRIER TO BE MAINTAINED ON A REGULAR BASIS OR TO THE SATISFACTION OF THE CITY OF MISSISSAUGA.
12. THE INSTALLATION OF 1.5m HIGH BLACK VINYL CHAINLINK FENCING, AS PER THE MOST CURRENT COMMUNITY SERVICES STANDARD DETAIL #02831-1, IS REQUIRED BETWEEN THE SUBJECT PROPERTY AND THE GREENBELT. THE FENCING IS TO BE LOCATED ENTIRELY ON MUNICIPAL PROPERTY, 0.15m INSIDE THE GREENBELT. THE FENCE FABRIC IS TO BE INSTALLED ON THE MUNICIPAL SIDE OF THE FENCE. GATES WILL NOT BE PERMITTED IN THE FENCE.
13. CONSTRUCTION SEQUENCE:

INITIAL SEDIMENT CONTROL INSTALLATION	(TBD)
SITE GRADING OPERATIONS	(TBD)
UNDERGROUND SERVICING OPERATIONS	(TBD)
BUILDING CONSTRUCTION	(TBD)
FINAL GRADING OPERATIONS	(TBD)

14. IF SITE CONSTRUCTION ACTIVITIES ARE INTERRUPTED AND/OR INACTIVITY EXCEEDS 30 DAYS, ALL STRIPPED AND/OR BARE SOIL AREAS ARE TO BE STABILIZED BY SODDING/SEEDING/MULCHING OR OTHER APPROVED METHOD, TO THE SATISFACTION OF THE CITY OF MISSISSAUGA.
15. THIS CONTROL PLAN IS PREPARED FOR SUBMISSION TO THE CITY OF MISSISSAUGA IN CONJUNCTION WITH AN APPLICATION FOR EROSION & SEDIMENT CONTROL PERMIT NO. 08-006 UNDER THE EROSION & SEDIMENT CONTROL BY-LAW NO. 512.91, AS AMENDED.
16. ALL EROSION AND SEDIMENT CONTROL MEASURE ARE TO BE REGULARLY INSPECTED AND MAINTAINED, AS REQUIRED, TO THE SATISFACTION OF THE CITY OF MISSISSAUGA.
17. DURING ALL CONSTRUCTION PHASES, MUD TRACKING CONTROL, CONSISTING OF FLUSHING AND SWEEPING ROADS, IS TO BE PROVIDED FOR ALL ROADS, AS WARRANTED, IN ACCORDANCE WITH THE CITY OF MISSISSAUGA MUD TRACKING CONTROL POLICY.

A) PRE-CONSTRUCTION
1. CONTRACTOR TO ADVISE CITY WHAT STAFF IS RESPONSIBLE FOR SITE SEDIMENT CONTROL SUPERVISION, INSPECTION AND MAINTENANCE, INCLUDING AFTER HOUR CONTACTS.
2. CONTRACTOR TO PROVIDE WRITTEN INSPECTION AND MAINTENANCE SCHEDULE OF SEDIMENT CONTROL DEVICES.
3. CONTRACTOR TO INSTALL ALL SEDIMENT CONTROL DEVICES AS IDENTIFIED ON THE APPROVED EROSION CONTROL PLAN PRIOR TO IMPLEMENTATION OF TOPSOIL STRIPPING OR EARTHWORKS OPERATIONS.

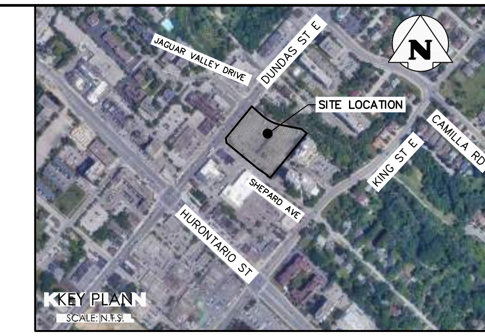
B) DURING CONSTRUCTION (SITE AND BUILDING WORKS)
1. CONTRACTOR TO ENSURE TOPSOIL, STRIPPING, GRADING AND UNDERGROUND WORKS CONFORM TO APPROVED GRADING, SERVICING AND EROSION CONTROL PLANS.
2. SITE ENGINEER TO CONDUCT REQUIRED WEEKLY INSPECTION, MAINTENANCE AND REPORTING OF SEDIMENT CONTROLS TO THE CITY STAFF.
3. CONTRACTOR TO STABILIZE SITE AS REQUIRED THROUGHOUT SITE CONSTRUCTION SCHEDULE.

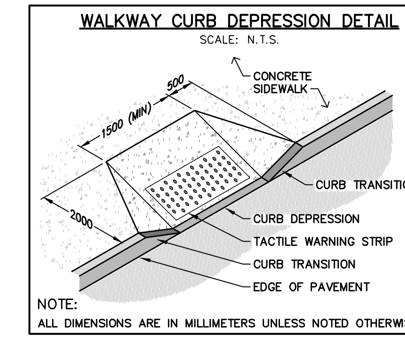
C) POST CONSTRUCTION (INCLUDING BUILDING CONSTRUCTION)
1. CONTRACTOR TO COMPLETE FINAL SITE STABILIZATION AND REVEGETATION WORKS.
2. CONTRACTOR TO REMOVE ALL SEDIMENT CONTROL DEVICES AFTER THE SITE IS STABILIZED TO A CONDITION EQUAL TO, OR BETTER THAN, PRE-CONSTRUCTION.
3. FOLLOWING COMPLETION OF CONSTRUCTION AND AS DIRECTED BY SITE ENGINEER, ALL EROSION AND SEDIMENT CONTROL WORKS ARE TO BE REMOVED INCLUDING ANY ACCUMULATED SEDIMENT.
4. ALL WORKS LOCATED ON LANDS OUTSIDE THE PROPOSED DEVELOPMENT AREA ARE TO BE GRADED TO MATCH EXISTING SURROUNDING GROUND AND HYDROSEEDED.

MAINTENANCE & OPERATIONS OF SEDIMENT CONTROLS

A) SILT FENCE (STD 2940.010 & 02830-2)

1. SILT FENCE MUST BE INSPECTED WEEKLY FOR RIPS OR TEARS, BROKEN STAKES, BLOW-OUTS AND ACCUMULATION OF SEDIMENT.
2. SILT FENCE MUST BE INSPECTED IMMEDIATELY AFTER EVERY RAIN STORM EVENT OR AS DIRECTED BY SITE ENGINEER.
3. SEDIMENT MUST BE REMOVED FROM SILT FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.
4. ALL SILT FENCES MUST BE REMOVED ONLY WHEN THE ENTIRE SITE IS STABILIZED AND AS DIRECTED BY THE SITE ENGINEER.
5. ALL SILT FENCES INSTALLED AT THE LIMIT OF THE DEVELOPMENT ARE TO BE PLACED DIRECTLY ON THE PROPERTY LINE OR AS DIRECTED BY SITE ENGINEER.





No.	ISSUE / REVISION	YYYY/MMM/DD
2	ISSUED FOR OPA, ZBA & SPA	2022/DEC/15
1	ISSUED ADDITIONAL FIGURES PER CITY REQUEST	2022/JUN/02
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:

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Project

60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing

CONSTRUCTION NOTES
AND DETAILS

NOT FOR CONSTRUCTION

Stamp

Stamp

FOR REVIEW

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./B.W.	2234-6274	
Check B.W.	Check B.W.	Scale N.T.S.	Dwg. C 104

SECTION A–A

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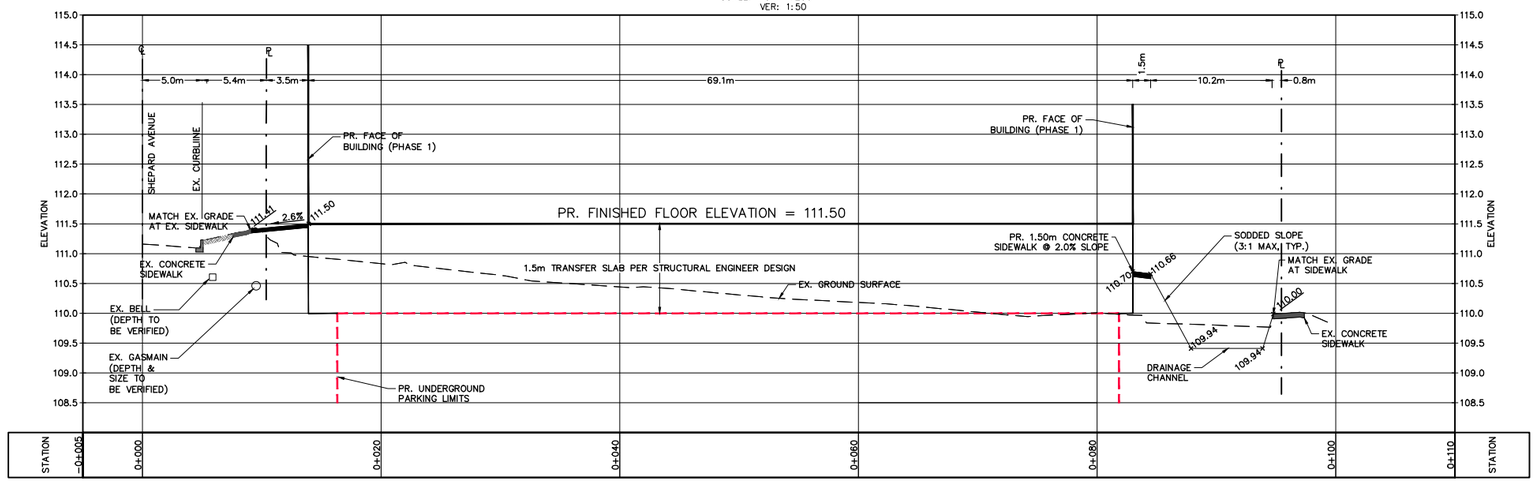
VER: 1:50



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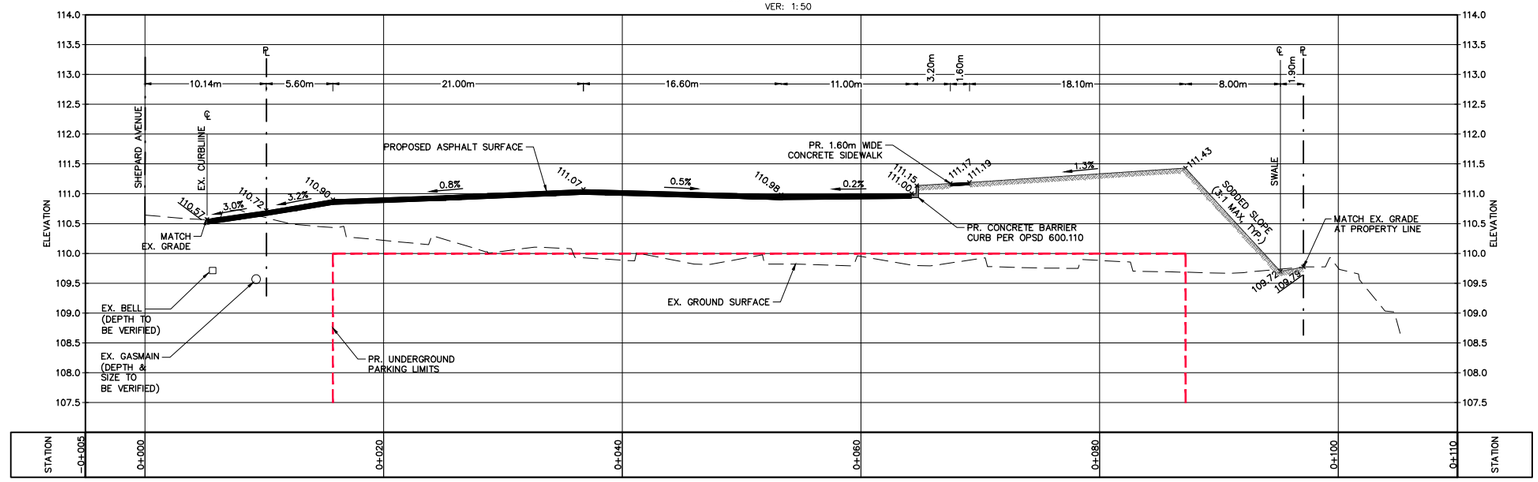

No.	ISSUE / REVISION	YYYY/MMM/DD
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PROJECT No. 121022, DRAWING No. 102

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Project

60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing

SECTIONS

NOT FOR CONSTRUCTION

Stamp

FOR REVIEW

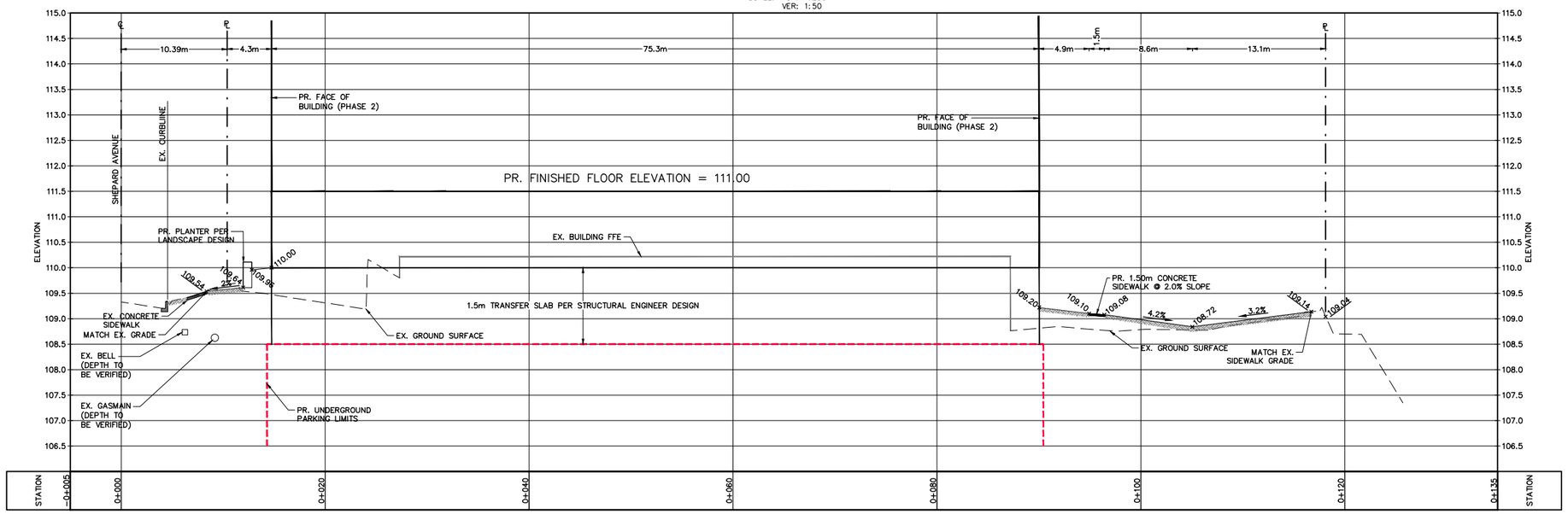
Stamp

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	M.I.M.	Design	M.I.M./B.W.	Project No.	2234-6274
Check	B.W.	Check	B.W.	Scale	SEE DWG.
				Dwg.	C 105

SECTION C–C

SCALE: HOR: 1:250
VER: 1:50



SECTION D–D

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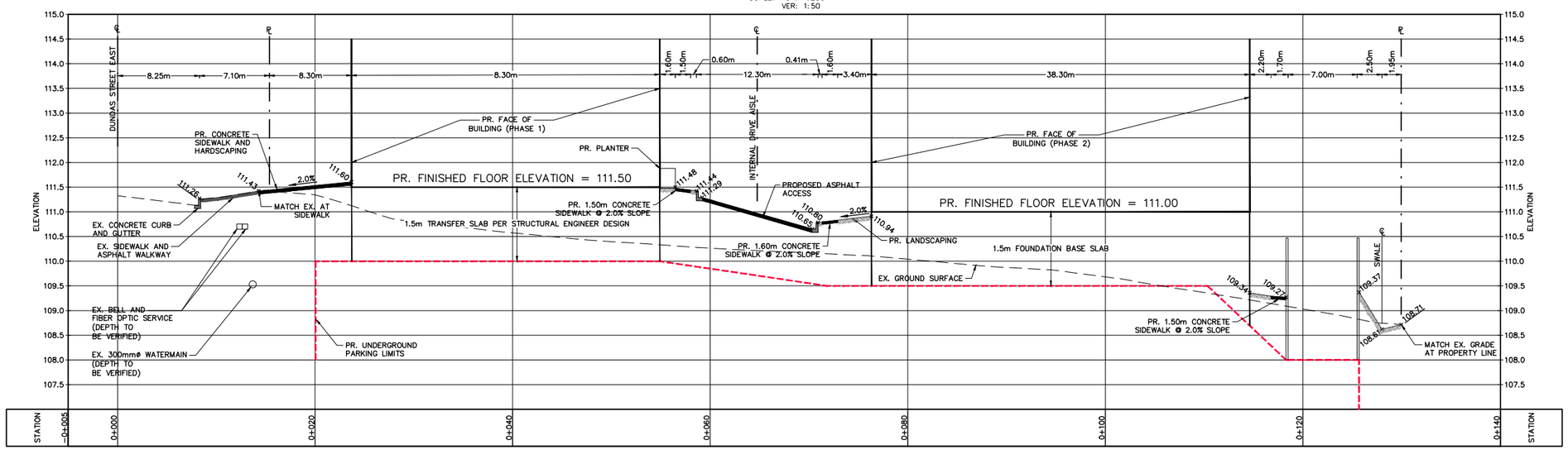

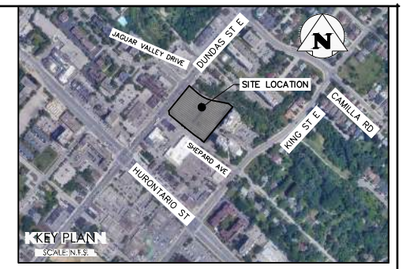

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Project

60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing

SECTIONS

NOT FOR CONSTRUCTION

Stamp

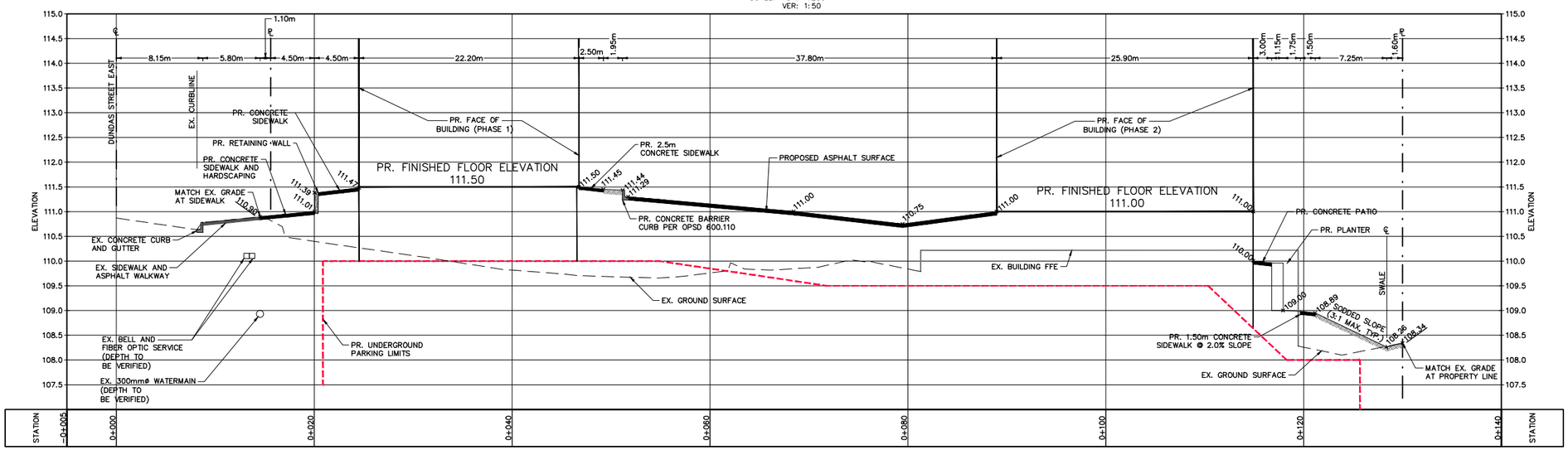
FOR REVIEW

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./B.W.		2234-6274
Check	Check	Scale	Dwg.
B.W.	B.W.	SEE DWG.	C 106

SECTION E–E

SCALE: HOR: 1:250
VER: 1:50



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PROJECT No. 121022, DRAWING No. 102

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Project

60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

Drawing

SECTIONS

NOT FOR CONSTRUCTION

Stamp

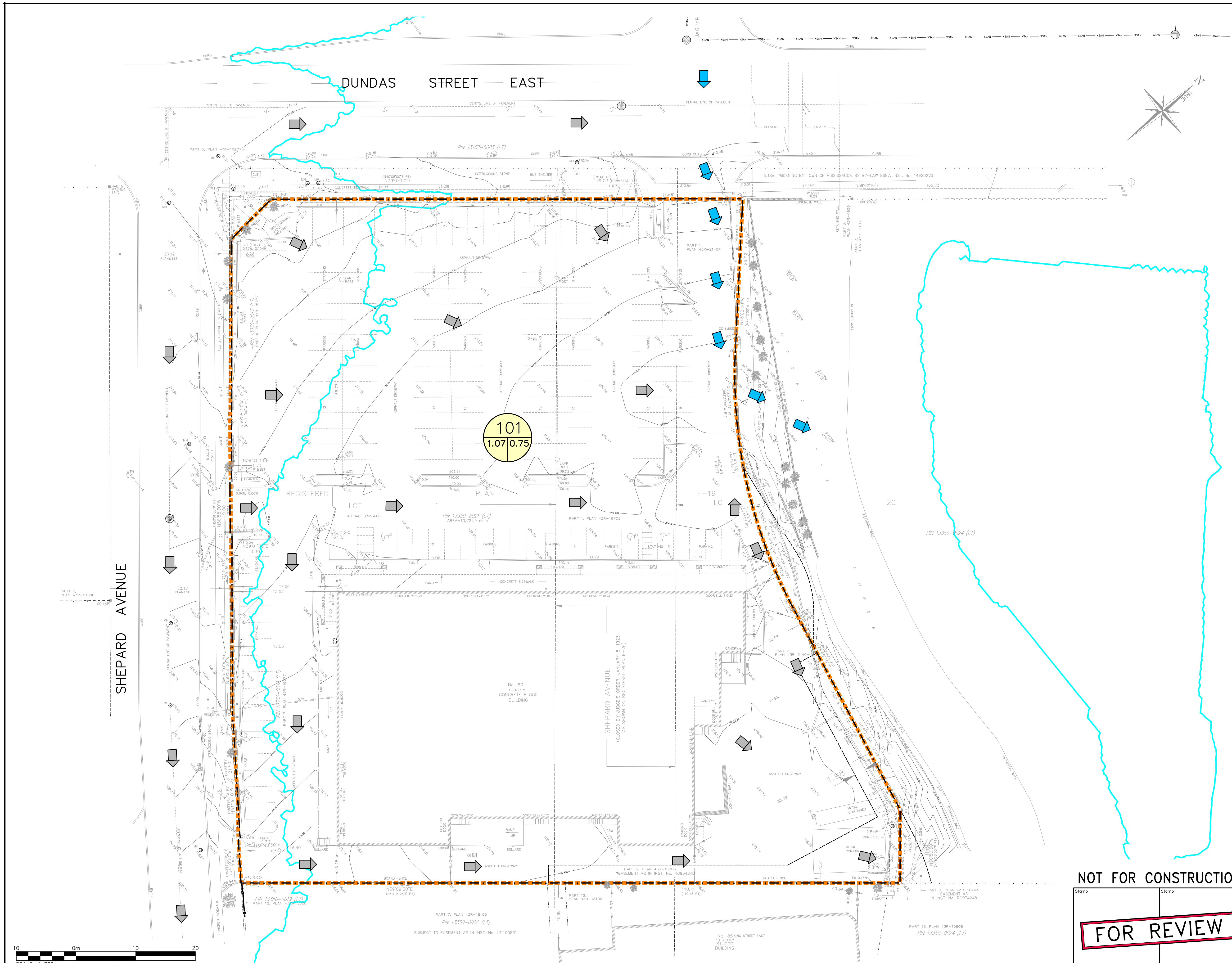
FOR REVIEW

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./B.W.		2234-6274
Check	Check	Scale	Dwg.
B.W.	B.W.	SEE DWG.	C 107

FIGURES

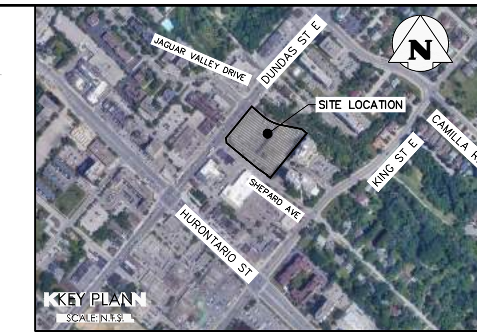


NOT FOR CONSTRUCTION

Stamp

Stamp

FOR REVIEW



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING FENCE
- EXISTING GRADE (x215.00)
- EXISTING OVERLAND FLOW DIRECTION
- REGIONAL OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- ID / A | RC: CATCHMENT I.D.; AREA (ha) | RUNOFF COEFFICIENT
- EXISTING REGIONAL FLOODPLAIN

No.	ISSUE / REVISION	YYYY/MMM/DD
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Project

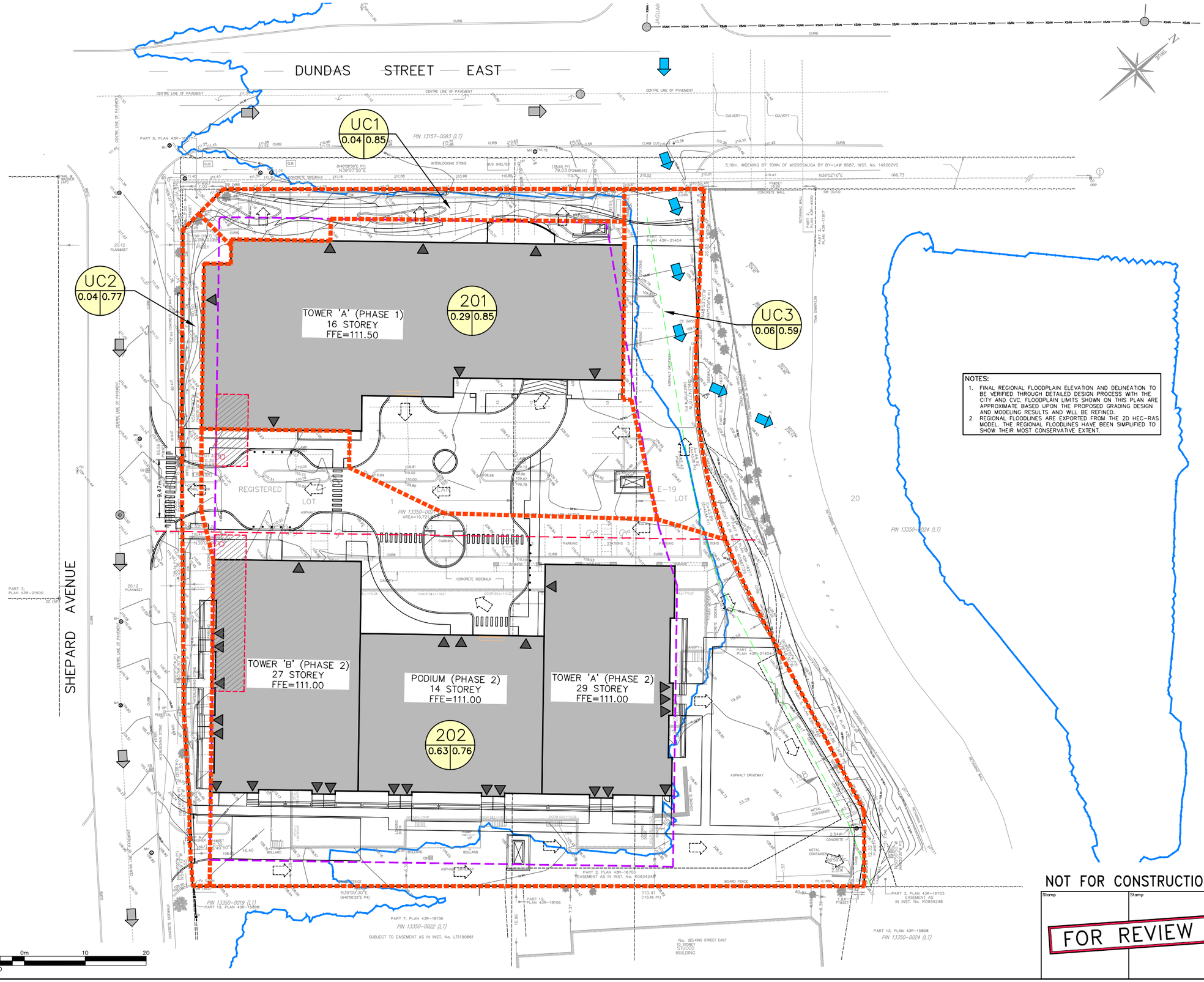
60 DUNDAS STREET EAST
CITY OF MISSISSAUGA

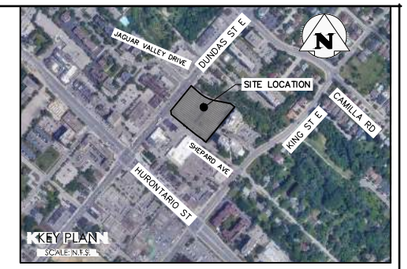
Drawing

PRE-DEVELOPMENT 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.	
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
- EXISTING GRADE (×215.00)
- EXISTING OVERLAND FLOW DIRECTION
- REGIONAL OVERLAND FLOW DIRECTION
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- ID / A | RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT
- PROPOSED REGIONAL FLOODPLAIN (TO BE CONFIRMED)

NOTES:

1. FINAL REGIONAL FLOODPLAIN ELEVATION AND DELINEATION TO BE VERIFIED THROUGH DETAILED DESIGN PROCESS WITH THE CITY AND CVC. FLOODPLAIN LIMITS SHOWN ON THIS PLAN ARE APPROXIMATE BASED UPON THE PROPOSED GRADING DESIGN AND MODELING RESULTS AND WILL BE REFINED.
2. REGIONAL FLOODLINES ARE EXPORTED FROM THE 2D HEC-RAS MODEL. THE REGIONAL FLOODLINES HAVE BEEN SIMPLIFIED TO SHOW THEIR MOST CONSERVATIVE EXTENT.

No.	ISSUE / REVISION	YYYY/MMM/DD
2	ISSUED FOR OPA, ZBA & SPA	2022/DEC/15
1	ISSUED ADDITIONAL FIGURES PER CITY REQUEST	2022/JUN/02
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.

Project

60 DUNDAS STREET EAST CITY OF MISSISSAUGA

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	M.I.M.	Design	M.I.M./B.W.	Project No.	2234-6274
Check	B.W.	Check	B.W.	Scale	1:300
				Dwg.	FIG. 2