FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

69 & 117 JOHN STREET

CITY OF MISSISSAUGA REGION OF PEEL

PREPARED FOR: CENTRACONDOS DE LA MONTAGNE

PREPARED BY:

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

OCTOBER 2024

CFCA FILE NO. 2378-6557

The material in this report reflects best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. C.F. Crozier & Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Revision Number	Date	Comments
Rev. 0	April 24, 2024	Issued for 1st Submission (OPA & ZBA)
Rev.1	October 16, 2024	Issued for 2 nd Submission (OPA & ZBA)

TABLE OF CONTENTS

1.0	INTRODUCTION	
2.0	SITE DESCRIPTION	1
	WATER CERVICING	
3.0	WATER SERVICING	2
3.	.1 Existing Water Servicing	2
3.		
3.	.3 Fire Flow Demand	2
3.	.4 Proposed Water Servicing	3
4.0	SANITARY SERVICING	,
4.0	SANITART SERVICING	
4.	.1 Existing Sanitary Servicing	
4.	.2 Design Sanitary Flow	
4.	.3 Proposed Sanitary Servicing	4
6.0	DRAINAGE CONDITIONS	6
6.	.1 Existing Drainage	6
6.		
	·	
7.0	STORMWATER MANAGEMENT	
7.	.1 Stormwater Quantity Control	
7.		
7.	•	
0 0	CONCLUSIONS AND RECOMMENDATIONS	10

LIST OF TABLES

Table 1:Equivalent Population Estimate

 Table 2:
 Existing/Proposed Domestic Water Demand

Table 3: Estimated Fire Flow Demand

Table 4: Existing/Proposed Sanitary Design Flows

Table 5:Pre-Development Land Areas and Runoff CoefficientsTable 6:Post-Development Land Areas and Runoff Coefficients

Table 7: Summary of 100-year Peak Stormwater Flow Rates and Storage

Table 8: Water Balance and Erosion Control Storage Requirement

LIST OF APPENDICES

Appendix A: As-Constructed Drawings & Background Materials

Appendix B: Water Demand Calculations

Appendix C: Sanitary Flow Calculations

Appendix D: Stormwater Management Calculations

LIST OF FIGURES

Drawing C102: Preliminary Site Servicing **Drawing C103:** Preliminary Site Grading

Figure 1: Pre-Development Drainage Plan
Figure 2: Post-Development Drainage Plan

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Centracondos de la Montagne to prepare a Functional Servicing & Preliminary Stormwater Management Report to support the Zoning By-Law Amendment applications for the proposed infill development located at 69 & 117 John Street in the City of Mississauga, Regional Municipality of Peel (Region of Peel) (hereby known as Site).

The purpose of this report is to demonstrate that the proposed development can be developed in accordance with the City of Mississauga (City) and Region of Peel (Region), Credit Valley Conservation (CVC) guidelines and standards from a water, wastewater, and stormwater management perspective.

2.0 Site Description

The subject property is approximately 1.87 ha in total and is currently an undeveloped gravel lot. The Site is bounded by the Canadian Pacific Railway to the north and west, an existing residential neighbourhood to the east, and a commercial storage building to the south. The elements envisioned for the proposed development include:

- 12-Storey shared podium with three (3) towers
- 600 sq.m commercial space
- Two levels underground parking
- Parkland dedication

The parkland dedication accounts for 0.27 ha of the total development area. This area will be dedicated to the City. As such, the 'Development Area' of the Site has been further defined as 1.57 ha, which consists of the portion of the site subject to re-grading and re-development in support of the proposed building.

The Region of Peel Public Works Design Criteria Manual (March 2017) was used to determine the equivalent population estimate for the existing and proposed buildings. Table 1 uses a unit rate occupancy density of 2.7 persons/unit to determine the equivalent population for each building. The Site plan drawing prepared by Tregebov Cogan Architect has been provided in Appendix A.

Table 1: Equivalent Population Estimate

	•		
Туре	Building	Number of Units	Total Persons
Existing	-	0	0
	Podium	679	1833
[Tower A	247	667
Proposed	Tower B	226	610
	Tower C	190	513
Entire Site Total	-	1,342	3,624

The total proposed population for the Site is 3,624 persons.

3.0 Water Servicing

The Region of Peel is responsible for the operation and maintenance of the public water supply and treatment system in the City of Mississauga. Any local water supply system will connect to the Region's municipal water network. The existing and proposed water servicing is discussed in the following sections.

3.1 Existing Water Servicing

A review of City of Mississauga and Region of Peel as-constructed drawings indicate that there is an existing 200 mm - 300 mm diameter ductile iron watermain on the north side of John Street fronting the Site (Town of Mississauga drawing C10776 dated as-constructed November 1970). The watermain is 300 mm and located south of Little John Lane and is reduced to a 200 mm at the intersection of John Street and Little John Lane. It is understood that the there are no water services extended to the Site in the existing conditions. Refer to as-constructed drawings provided in Appendix A.

3.2 Design Water Demand

The Region of Peel Linear Infrastructure Watermain Design Criteria (June 2010) was used to determine the maximum domestic water demand generated by the proposed development based on the equivalent population estimate and an average daily residential water demand of 280 L/cap/day along with the associated peaking factors for max day and max hour demands. Table 2 summarizes the estimated design water demand. Appendix B contains detailed water demand calculations.

Table 2: Existing/Proposed Domestic Water Demand

Standard	Site	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hourly Demand (L/s)
Region of Peel Public Works Design, Specification & Procedures Manual –	Existing Site	-	-	-
Linear Infrastructure Watermain Design Criteria (June 2010)	Proposed Site	11.7	23.5	35.2

As presented in Table 2, the estimated average daily demand, maximum daily demand, and peak hourly demand for the proposed development is 11.7 L/s, 23.5 L/s and 35.2 L/s, respectively.

3.3 Fire Flow Demand

The Fire Underwriters Survey (2020) method was used to estimate the fire flow demand for the proposed building within the development area. It is assumed that the towers will be constructed with non-combustible materials and therefore, a construction coefficient of 0.80 was applied to the fire flow calculations. The area of the largest floor plus 25% of each of the two immediately adjoining floors was used, which was estimated to be 8,685 m². As the proposed building use is residential, a "Limited-Combustible" occupancy hazard has been applied. The proposed building shall have a fire line connection to the same municipal watermain system as the fire department connection and will be supported by an automatic and fully supervised fire suppression system in conformance with NFPA 13 sprinkler standards. We have also assumed the proposed residential building will be equipped with automatic sprinkler systems which reduces the initial fire flow demand by 30%.

The automated sprinkler system is to be designed by the Mechanical Engineer at detailed design stage. Table 3 summarizes the required fire flow demand and duration of flow required for the proposed development.

Table 3: Estimated Fire Flow Demand

Method	Demand Flow (L/s)	Duration (h)
Water Supply for Public Fire Protection by Fire Underwriters Survey (2020)	217	2.75

As shown in Table 3, the proposed fire line is required to accommodate a fire flow demand of 217 L/s for a duration of 2.0 hours. Detailed calculations are provided in Appendix B.

A hydrant flow test was carried out by Hydrant Testing Ontario on November 8th, 2022. The minimum projected fire flow at 138 kPa (20 psi) residual pressure was determined to be 371.0 L/s (5,885 USGPM). Refer to Appendix B for detailed results of the hydrant flow test and estimated fire flows.

3.4 Proposed Water Servicing

The proposed development will have a single connection to the existing 300 mm diameter PVC watermain on the north side of John Street. The connection will split at the property line into an individual 150 mm diameter domestic water service and individual 200 mm diameter fire line. The Ontario Building Code requires a second water supply feed if the proposed building is 84 metres or higher (measured between grade and the ceiling level of the top storey) and the building shall be served by no less than two sources of water supply from a public water system. An additional 200 mm fire line has been proposed. The services will extend to the underground parking level.

The proposed water servicing design is shown on the Preliminary Site Servicing plan (C102). The Mechanical Engineer will design the internal private water system including the internal sprinkler system within the building and underground parking structure at detailed design stage.

C.F. Crozier & Associates Inc. Project No. 2378-6557

4.0 Sanitary Servicing

The Region of Peel is responsible for the operation and maintenance of the public sewage collection and treatment system in the City of Mississauga. Any local sewage system will connect to the Region's municipal sanitary sewage network.

4.1 Existing Sanitary Servicing

A review of as-constructed drawings and Subsurface Utility Investigation (SUE) completed by 4Sight indicates that there is an existing 375 mm diameter PVC sanitary sewer running south-north within the John Street right-of-way (City of Mississauga drawings C-10270 and C-10776 dated as-recorded April and November 1970, respectively). As-constructed drawings and Subsurface Utility Investigation are included in Appendix D.

4.2 Design Sanitary Flow

The sanitary design flow for the proposed development was calculated using the Region of Peel Public Works Design, Specifications & Procedures Manual – Linear Infrastructure Sanitary Sewer Manual (March 2017) and the equivalent population estimate described in section 2.0. A unit sewage flow of 302.8 L/cap/d applied to a peaking factor and infiltration flow were used to obtain the total estimated design sewage flow.

A summary of the results is presented in Table 4 and the detailed calculations are included in Appendix C.

Table 4: Existing/Proposed Sanitary Design Flows

Standard	Building	Average Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	De- watering Flow (L/s)	Total Flow (L/s)
Region of Peel Public Works Design, Specification & Procedures Manual	Existing Site	-	-	-	-	-	-
– Linear Infrastructure Sanitary Sewer Manual (March 2017)	Proposed Site	12.7	3.4	42.8	0.3	0.00	43.1

The proposed sanitary service for the Site is 43.1 L/s according to the total flow indicated in Table 4.

4.3 Proposed Sanitary Servicing

The development is proposed to be serviced by a 200 mm diameter sanitary sewer at a slope of 2% which has a capacity of 46 L/s and therefore is sufficient to convey the design flow. The service lateral will extend from the underground parking structure to the existing 375 mm PVC sanitary sewer in the John Street right-of-way (R.O.W). The proposed sanitary servicing plan is shown on Dwg C102. The internal building plumbing will be designed by the Mechanical Engineer's details and specifications.

5.0 Groundwater Drainage Conditions

A Preliminary Hydrogeological Review Report for the subject site was completed by Palmer. dated January 19, 2023, which detailed the site's subsurface and groundwater conditions. The major conclusions of the report are summarized below:

- Groundwater Elevation = 115.2 113.0 masl (maximum)
- Groundwater Quality meets Region of Peel Storm Sewer Limits = No Exceedance
- Groundwater Quality meets Region of Peel Sanitary Sewer Limits = No Exceedance
- Short-Term (Construction Dewatering) = 1,844,100 L/day (21.3 L/s)
- Long-Term (Post-Construction Dewatering) = 750,305 L/day (8.7 L/s)

The short-term and long-term dewatering rates noted above do not include a safety factor.

Short-Term Discharge (Construction Dewatering)

As determined by Palmer, short-term dewatering is required for the Site. Short-term dewatering is to be designed by the dewatering contractor, with dewatering operations taking place prior to any excavation. Groundwater quality should be confirmed by the dewatering contractor to assess the required level of pre-treatment necessary, if any. The Property Owner shall obtain short-term discharge approval to discharge private water to the municipal sanitary/combined sewer ensuring any short-term discharge follows the City's Sewers By-Law (Municipal Code Chapter 681).

The maximum short-term construction dewatering rate is 1,844,100 L/day (21.3 L/s). The short-term discharge will outlet to the existing 525-600 mm diameter storm sewer found in John Street.

<u>Long-Term Discharge (Permanent Dewatering)</u>

As determined by Palmer, long-term groundwater seepage can be conveyed to the storm sewer through foundation drainage and subfloor drainage system. The collected groundwater can be directed to the proposed storm control manhole, bypassing the stormwater tank located in the P1 level, via the foundation drainage and subfloor drainage system. Therefore, the groundwater seepage is directed to the existing 600 mm storm sewer in John Street, separately from the controlled flows, at a rate of 8.7 L/s.

6.0 Drainage Conditions

6.1 Existing Drainage

The existing Site is an empty lot that generally drains towards the northeast corner of the Site following the road grades of John Street. A review of the survey completed by J.D. Barnes Limited (April 2023) shows that there is some external drainage that enters the site from the northwest and west corner of the Site. This drainage is collected from the CP Railway tracks and traverses through the Site in existing conditions. A general review of the survey and as-builts shows that there are catchbasins in the John Street ROW that collect drainage and convey it to the 600 mm diameter storm sewer in John Street, that drains southeast through Little John Lane and ultimately to Kirwin Avenue.

Table 5 provides a breakdown of pre-development site area and associated runoff coefficient with the existing drainage conditions on the Pre-Development Drainage Plan (**Figure 1**).

Table 5: Pre-Development Land Areas and Runoff Coefficients

Catchment No.	Outlet Location	Area (m²)	Weighted Runoff Coefficient (RC)
101	Uncontrolled to Storm Sewer in John Street	15,700	0.50
EXT1	Uncontrolled to Storm Sewer in John Street	1,370	0.50
	Total	17,070	=

Note: Per City of Mississauga Development Requirements Manual (September 2016), the pre-development RC is limited to a maximum of 0.50.

6.2 Proposed Drainage

The Site will be graded to promote positive drainage away from the building and to convey stormwater from the Site and the CP Railway tracks to area drains and catchbasins proposed within the driveway, amenity area, hardscaped area and grassed area. The roof areas, area drains and catchbasins will be connected to the proposed underground stormwater management tanks via the internal system designed by the mechanical engineer at detailed design stage. Controlled stormwater from the Site will be conveyed to the existing 600 mm diameter storm sewer located on John Street through a proposed 300 mm diameter storm service connection at 2.0%. Flows from the Site also include uncontrolled flows from the frontage along John Street out to the storm sewer in John Street.

Table 6 provides a breakdown of the post-development site areas and associated runoff coefficient with the proposed drainage conditions shown on the Post-Development Drainage Plan (**Figure 2**).

Table 6: Post-Development Land Areas and Runoff Coefficients

Catchment No.	Outlet Location	Pervious (m²)	Impervious (m²)	Weighted Runoff Coefficient (RC)
201	Controlled to Storm Sewer in John Street	4,290	10,972	0.72

EXT1	Controlled to Storm Sewer in John Street Uncontrolled	0	1,370	0.60
UC1	to Storm Sewer in John Street	142	297	0.69
	Total	17	7,070	-

The proposed drainage conditions are illustrated on Figure 2 – Post-Development Drainage Plan.

7.0 Stormwater Management

As the site is in the City of Mississauga, the proposed stormwater management design must comply with the following documents:

- Section 8: Storm Drainage Design Requirements (City of Mississauga Development Requirements Manual, Revised November 2020)
- City of Mississauga Development Requirements Manual (September 2016)
- CVC Stormwater Management Criteria (August 2012)

Water Quantity Control

The Site is located in the Cooksville Creek sub-watershed. The City requires that sites located in the Cooksville Creek sub-watershed requires the 100- year post-development peak flows are controlled to the 2-year pre-development peak flows at a maximum runoff coefficient of 0.5.

Water Quality Control

Private stormwater discharging from the proposed development must achieve Ontario's 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 or watercourse.

Water Balance & Erosion Control

Retention of the first 5 mm of rainfall on impervious areas for private development areas is required by the City of Mississauga Development Requirements Manual (September 2016) to achieve the water balance criteria. and by the CVC Stormwater Management Criteria (August 2012) to achieve the erosion control criteria.

7.1 Stormwater Quantity Control

The Modified Rational Method (MRM) was used to determine the pre-development and post-development stormwater flow rates for the site using the City of Mississauga's intensity, duration and frequency (IDF) rainfall data. These peak stormwater flow rates were then used to determine the required stormwater quantity control for the proposed development.

In accordance with the Storm Drainage Design Requirements, the City of Mississauga standards state that the 100-year post-development runoff rate must be controlled to the 2-year predevelopment flow rate with maximum runoff coefficient of 0.50. The Target Release Rate for the Site area and external area from the CNR Lands is 142.11 L/s. This rate equates to the runoff generated

from the 2-year storm event from catchments 101 and EXT1 in the pre-development conditions. Refer to Pre-Development Drainage Plan (**Figure 1**) for further details.

Under post development condition Catchment 201 and EXT1 will be conveyed to area drains, catchbasins and roof drains proposed within the Site which will connect to the underground stormwater management tank. The allowable release rate from the stormwater tank was calculated by subtracting the long-term groundwater discharge (8.7 L/s) and the 100-year uncontrolled flows from Catchment UC1 (11.83 L/s) from the total target release rate (142.11 L/s). Therefore, the allowable rate from the stormwater tank has been calculated as 121.58 L/s. Additionally, uncontrolled flows (Catchment UC1) from the frontage along John Street and long-term groundwater seepage will also be conveyed to the existing storm sewer in John Street.

Storage will be provided on site by the proposed underground storage tank located in the P1 level, which provides a total active storage of 689.9 m³. Flows from the tank will be pumped to a secondary manhole (STM MH2) and then controlled via a 225 mm orifice tube before outletting through the storm control manhole (STM MH1) and the gravity draining storm connection to the existing 600 mm storm sewer in John Street. Flows discharging from the underground storage will be controlled to 117.63 L/s by the orifice tube. As shown in the table below, the total post-development flow (Controlled + Uncontrolled + Long-Term Groundwater) discharging from the Site is 138.15 L/s, which is less than the allowable release rate of 142.11 L/s.

A summary of the flows and required storage volume have been provided in Table 7.

Table 7: Summary of 100-year Peak Stormwater Flow Rates and Storage

	Peak Flow Rate (L/s)						Stor	age
Q pre(101)	Q _{pre(EXT1)}	Qtarget	Qpost(UC1)	Q _{long-term}	Qallowable -	Qacutal - orifice	Storage Required (m³)	Storage Provided (m³)
130.70	11.41	142.11	11.83	8.70	121.58	117.63	394.5	689.9

Refer to **Appendix C** for the detailed calculations. Refer to **Drawing C102** for the proposed size and location of the underground storage tank.

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 MOECP (March 2003) guidelines. Enhanced water quality protection involves the removal of at least 80% of TSS from 90% of the annual runoff volume.

A Jellyfish Filter (JF6-4-1) is proposed to provide the requisite water quality control for the entire site, excluding the roof as runoff from the roof is considered clean and therefore requires no treatment. Runoff from Catchment EXT1 will also be treated by the Jellyfish Filter. The Jellyfish is proposed to be installed upstream of proposed tank and will treat the stormwater runoff prior to being captured in the stormwater storage tank.

7.3 Water Balance & Erosion Control

Water balance and erosion control criteria for the City of Mississauga, are satisfied through retention of the first 5 mm of a rainfall event:

 Per the City of Mississauga Development Requirements Manual (September 2016), the minimum requirement to promote <u>water balance</u> is retention of the first 5 mm of a rainfall event.

The City of Mississauga's water balance criteria to retain the first 5 mm of a rainfall event was taken as the governing criteria because it requires a more stringent stormwater control strategy to be implemented. The required water balance and erosion control retention volume was calculated considering initial abstraction of runoff based on impervious areas from Catchment 201, UC1 and EX1.

Table 6 depicts the volume required to be retained to satisfy the water balance and erosion control criteria.

Table 8: Water Balance and Erosion Control Storage Requirement

Standard	Criteria	Impervious Area (ha)	Volume Required (m³)
City of Mississauga Development Requirements Manual (September 2016) to achieve water balance	Retention of first 5 mm ¹	1.26	63.2

Note 1: The City of Mississauga's water balance criteria to retain the first 5 mm is the governing constraint.

Water balance will be achieved using water re-use methods such as irrigation. The water re-use method will be confirmed and designed at the detailed design stage.

8.0 Erosion and Sediment Control During Construction

Erosion and sediment controls will be installed prior to the commencement of any construction activities and will be maintained until the site is stabilized or as directed by the site engineer and/or the City of Mississauga. Controls will be inspected after each significant rainfall event and maintained in proper working conditions.

The following erosion and sediment controls will be provided during construction:

Silt Fencing

Silt fencing will be installed on the perimeter of the site to intercept sheet flow. Additional silt fence 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 of the construction zone to prevent mud tracking from the site onto the surrounding lands and perimeter roadway network. All construction traffic will be restricted to this access only.

Sediment Control Devices

C.F. Crozier & Associates Inc. Project No. 2378-6557

The existing catchbasins fronting the property along John Street shall be equipped with silt sacks in accordance with City standards.

9.0 Conclusions and Recommendations

The proposed development can be serviced for water, sanitary, and stormwater in accordance with the City of Mississauga, Region of Peel, and CVC requirements and standards. Our conclusions and recommendations include:

- Water servicing is proposed to be provided by the existing 300 mm diameter watermain on John Street through a 200 mm diameter water service connection which splits at the property line to a 150mm diameter domestic water service and a 200mm diameter fire line. An additional 200mm diameter fire service connection is proposed as the Ontario Building Code requires a second water supply feed if the proposed building is 84 meters or higher.
- 2. Sanitary servicing for the new development is proposed through a 200 mm diameter sanitary service with a connection to the existing 375 mm diameter sanitary sewer on John Street.
- 3. The Site will be graded to promote positive drainage away from the building and to convey stormwater towards the proposed area drains located throughout the property. Stormwater management is proposed to be provided through a stormwater tank located on the P1 level.
- 4. The water quality requirement of 80% TSS removal from the Site is achieved through the use of a Jellyfish filtration system.
- 5. Site water balance objective will be achieved through water re-use methods such as irrigation. The water re-use method will be confirmed at detailed design stage.

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

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

C.F. CROZIER & ASSOCIATES INC.

Gamsa Sivanantham, P.Eng. Project Engineer Mena Iskander, P.Eng. Project Manager

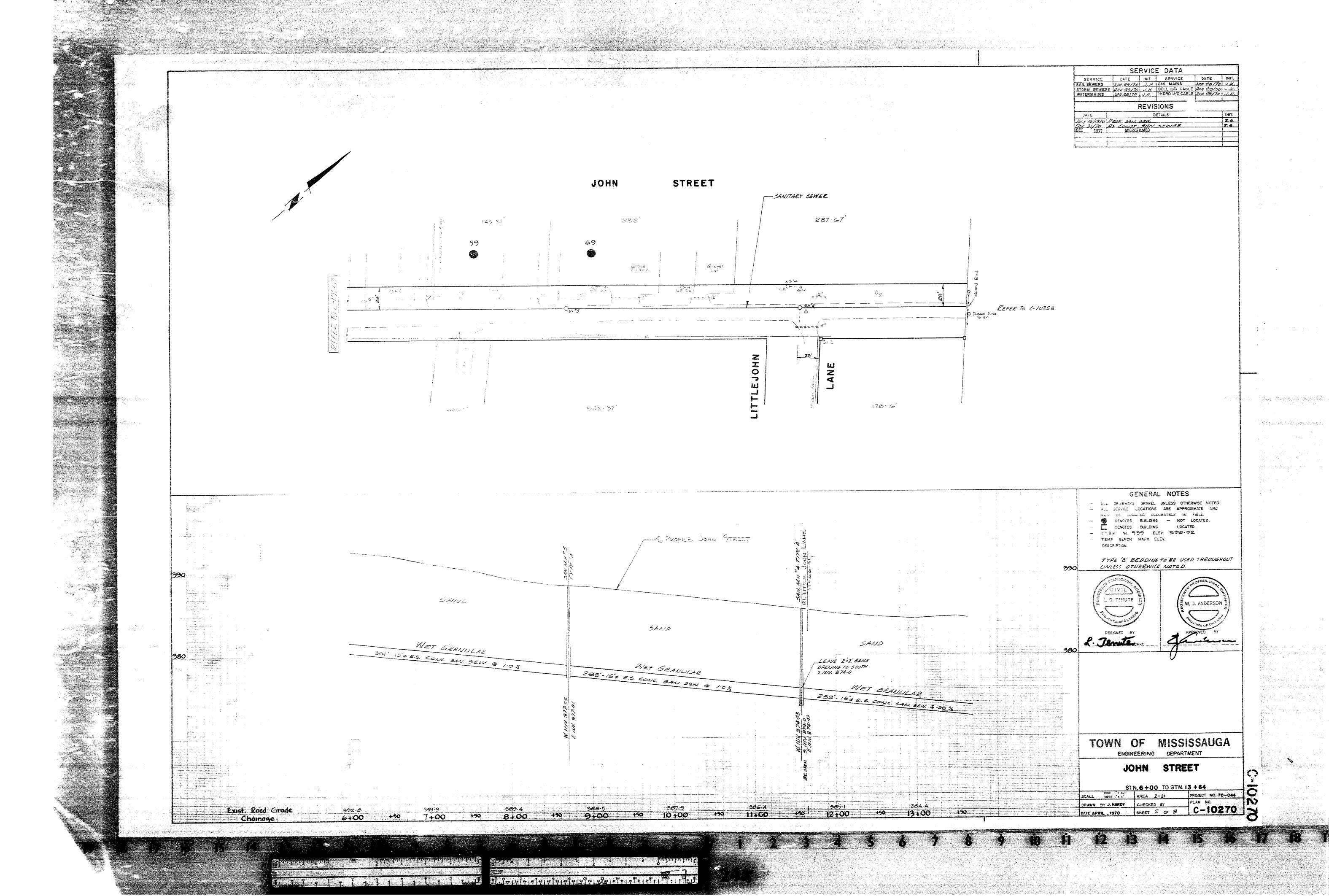
gs

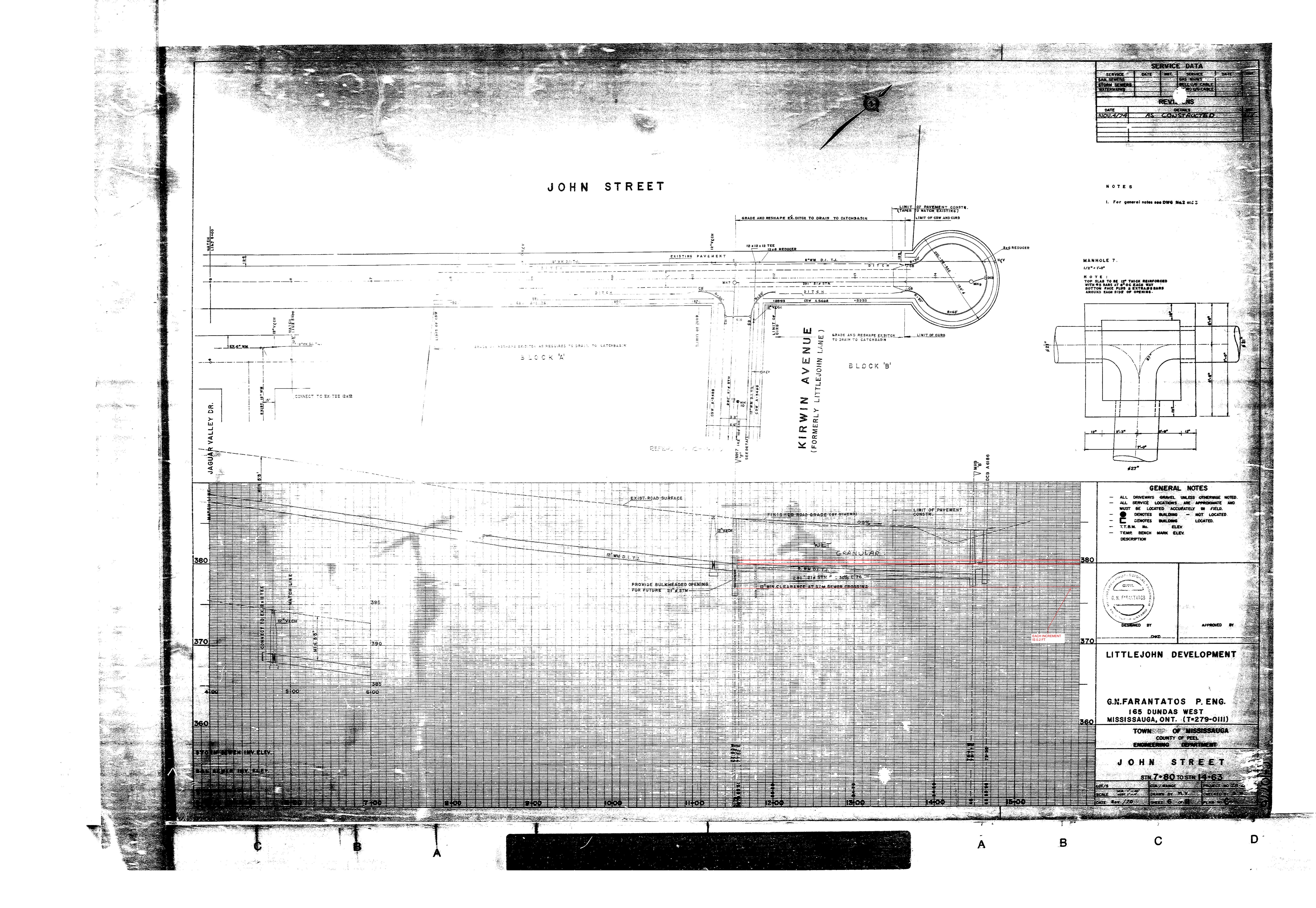




APPENDIX A

As-Constructed Drawings & Background Materials





VOLTARIE CR SHEET JOHN ST BELL RECORDS NOT RECEIVED AT TIME OF INVESTIGATION. BELL WAS NOTIFIED MULTIPLE TIMES FOR REQUEST OF RECORD INFO WITHIN THESE LIMITS. BELL PLANT SHOWN AS FIELD VERIFIED. NOT TO SCALE ` .THE FIELD INVESTIGATION WAS COMPLETED IN JAN 2024. 2.THE LIMITS OF THE INVESTIGATION ARE AS PER SHOWN ON THE DRAWING. 3.THE BASE PLAN FOR THIS DRAWING WAS PROVIDED BY THE CLIENT AND 4SIGHT IS NOT RESPONSIBLE FOR ITS ACCURACY. -CENTURY LINK RECORDS INDICATE A PLANT IN 4.UTILITY SIZES AND MATERIALS ARE SHOWN IF AVAILABLE FROM A NORTH EAST/SOUTH WEST ALIGNMENT AT CANADIAN PACIFIC RAILWAY RECORD INFORMATION. THIS LOCATION. PLANT OUTSIDE OF LIMITS. 5.KNOWN UTILITY OWNERS IDENTIFIED WITHIN PUBLIC RIGHT OF WAY INCLUDE: a.WATER & SANITARY - REGION OF PEEL b.STORM - CITY OF MISSISSAUGA c.ELECTRICAL - ALECTRA d.TELECOM — BELL & ROGERS e.GAS - ENBRIDGE SEE PROJECT REPORT FOR ADDITIONAL DETAILS. BELL TELECOMMUNICATIONS ──── TV ──── ROGERS COAXIAL PRIVATE COMMUNICATIONS ——— FO ———— FIBER OPTIC BELL FIBER OPTIC RF ROGERS FIBER OPTIC ----- CF ----- COGECO FIBER OPTIC ZF ZAYO FIBER OPTIC H HYDRO STREETLIGHT TL TRAFFIC LIGHT -ENBRIDGE RECORDS INDICATE GAS PRIVATE ELECTRICAL MAIN PRESENT IN THIS APPROXIMATE _____ G ____ GAS PL PIPELINE WATER WATER SERVICE — SANITARY SEWER — SANITARY FORCEMAIN FIELD OBSERVED SMALL CONDUIT FIELD VERIFIED AN UNKNOWN CONDUCTIVE ———— ST ———— STORM SEWER ABOVE GROUND IN THIS ALIGNMENT. SIGNAL ALONG THIS ALIGNMENT. UNABLE TO — UNKNOWN CONDUCTIVE SIGNAL DETERMINE OWNERSHIP/TYPE OF PLANT AT ———— QUALITY LEVEL "B" TIME OF INVESTIGATION. IF CRITICAL, —— — QUALITY LEVEL "C" FURTHER INVESTIGATION (TEST HOLES) MAY —---- QUALITY LEVEL "D" BE REQUIRED. POSSIBLE OLD STREET LIGHT. ————LIMIT———— LIMIT OF INVESTIGATION ∠CB1006 117.58 CONTINUES OUT OF LIMITS SE INV 116.04 200 CON (1.54m) FLOW ARROW rWC3001 117.52 FIELD VERIFIED AN UNKNOWN CONDUCTIVE~ END CAP TOP OF PIPE 116.11 (1.41m) PRIVATE ELECTRICAL ENDS AT A BOX SIGNAL ALONG THIS ALIGNMENT. UNABLE TO FIELD VERIFIED AN UNKNOWN CONDUCTIVE BOTTOM OF CHAMBER 115.67 (1.85m) LOCATION BASED ON RECORD INFO SIGNAL ALONG THIS ALIGNMENT. UNABLE TO DETERMINE OWNERSHIP/TYPE OF PLANT AT FIELD OBSERVED CHAMBER FULL OF WATER. FIELD OBSERVED BURNT HYDRO TIME OF INVESTIGATION. IF CRITICAL, DETERMINE OWNERSHIP/TYPE OF PLANT AT LOCATION BASED ON FIELD OBSERVATION CABLES STICKING OUT OF THE FURTHER INVESTIGATION (TEST HOLES) MAY TIME OF INVESTIGATION. IF CRITICAL, _CSTMH1007 117.52 GROUND IN THIS LOCATION. POSSIBLE FURTHER INVESTIGATION (TEST HOLES) MAY BE REQUIRED. POSSÌBLE GAS SERVICE. LOSS OF SIGNAL SITE OF OLD TRANSFORMER. NE INV 115.04 525 CON (2.48m) BE REQUIRED. POSSIBLE WATER SERVICE AS FIELD OBSERVED HYDRO POLE WITH-BLUE PAINT WAS OBSERVED ON FENCE AT SE OBV 114.88 (2.61m) STORM MAINTENANCE HOLE LIGHT AND 2 EMPTY VISIBLE CONDUITS. SW OBV 115.02 600 CÓN (2.47m) THIS LOCATION. UNABLE TO MEASURE SIZE OF SOUTH EAST SANITARY MAINTENANCE HOLE FIELD OBSERVED CONDUIT WITH PIPE DUE TO CHAMBER CONFIGURATION SMALL CABLES STICKING OUT OF THE (PIPE TOO OFFSET). CATCH BASIN GROUND AT THIS LOCATION. WATER CHAMBER √SAMH2002 117.48 -STMH1004 118.31 / NE OBV 114.49 375 CON (2.99m) ✓ENBRIDGE RECORDS INDICATE GAS FIRE HYDRANT NE INV 115.89 600 CON (2.42m) STORM SEWER (QLD)~ SE OBV 114.96 300 CON (2.96m) MAIN ENDS IN THIS APPROXIMATE SW INV 115.92 500 CON (2.39m) LOCATION. SW OBV 114.53 375 CON (2.95m) CONCRETE PANEL FENCE WATER VALVE ELD OBSERVED SOUTH EAST PIPE APPEARS -CB1009A 116.92 GAS VALVE SE INV 115.73 250 CON (1.19m) STORM SEWER (QLD)~ STORM SEWER (QLD)~ SHARED CHAMBER WITH CB1009B UTILITY POLE -CB1009B 116.92 LIGHT STANDARD SHARED CHAMBER WITH CB1009A HAND WELL -SAMH2003 117.14 E OBV 110.52 375 CON (3.62m) HYDRO MAINTENANCE HOLE SW OBV 110.74 375 CON (3.40m) HYDRO VAULT / TRANSFORMER TELECOM PEDESTAL 350 CON ST JOHN STREE FLUSH-TO-GRADE BELL MAINTENANCE HOLE `STMH1010 116.96 ROGERS MAINTENANCE HOLE NE INV 115.34 300 CON (1.62m) STMH1001 119.36-/ SW OBV 115.80 525 CON (1.16m) UNKNOWN MAINTENANCE HOLE NW INV 116.76 300 CON (2.60m) TEST HOLE NE INV 116.6 500 CON (2.76m) [\]SAMH2001 118.52 CB1005 117.51 W INV 116.88 350 CON (2.48m) ASCE QUALITY LEVELS NE OBV 115.40 375 CON (3.12m) NW INV 115.97 250 CON (1.54m) SW INV 116.99 350 CON (2.37m) SE OBV 115.45 375 CON (3.07m) CB1008A 116.92 THE UTILITY INFORMATION SHOWN ON THIS DRAWING WAS NW OBV 115.90 300 CON (1.02m) COLLECTED IN ACCORDANCE TO ASCE STANDARD 38-22. FIELD VERIFIED AN UNKNOWN CONDUCTIVE CB1003 118.5 SHARED CHAMBER WITH CB1008B THE INFORMATION IS SHOWN BY QUALITY LEVEL WHICH SIGNAL ALONG THIS ALIGNMENT. UNABLE TO SE INV 116.83 250 CON (1.67m) INDICATES THE LEVEL OF EFFORT USED TO DETERMINE DETERMINE OWNERSHIP/TYPE OF PLANT AT └WC3002 ~116.49 CB1008B 116.92 THE LOCATION OF THE DATA TIME OF INVESTIGATION, HOWEVER IT SHARED CHAMBER WITH CB1008A TOP OF PIPE ~114.45 300 MET (2.04m) STORM SEWER (QLD) UNABLE TO OPEN CHAMBER DUE TO ALIGNS WITH BELL RECORDS. IF CRITICAL, QUALITY LEVEL "D" - INFORMATION DERIVED CAR PARKED ON CB. FURTHER INVESTIGATION (TEST HOLES) MAY CB1002 118.51 FROM EXISTING RECORDS OR VERBAL BE REQUIRED. FIELD FIELD FOUND UNKNOWN SIGNAL IN NW INV 116.74 250 CON (1.77m) RECOLLECTIONS. THIS AREA. ALECTRA RECORDS SHOW HYDRO LINE IN THE SAME LOCATION. LINE QUALITY LEVEL "C" - INFORMATION OBTAINED SHOWN AS HYDRO AT QLB ON DRAWING. BY SURVEYING AND PLOTTING VISIBLE ABOVE GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO THE QUALITY LEVEL "D" QUALITY LEVEL "B" - INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF THE UTILITIES. QUALITY LEVEL "A" - PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES. PREPARED BY. DISCLAIMER. CLIENT. REVISIONS (MM/DD/YY THIS DRAWING WAS PRODUCED BY 4SIGHT 69 & 117 JOHN STREET HE ENGINEER'S SEAL M. KAZI 01/26/24 DRAWN CROZIER CONSULTING INC FOR THE USE OF THE CLIENT. 4SIGHT INC HEREON IS TO CERTIFY THAT MISSISSAUGA, ON DOES NOT ACCEPT ANY RESPONSIBILITY FOR THE UTILITIES SHOWN HAVE **ENGINEERS** CHECKED A. MCDERMOTT 02/16/24 ANY UNAUTHORIZED USE BY THIRD PARTIES, BEEN INVESTIGATED IN LE ARCAND OR ANY MODIFICATION MADE TO THIS ACCORDANCE WITH STANDARD \PPROVED L. ARCAND 90538158 02/23/24 DRAWING. UE INDUSTRY PRACTICES. DRAWING. ALL OTHER INFORMATION PROJECT NO. 23-0179 SUBSURFACE UTILITY ENGINEERING HEREON HAS BEEN PROVIDED BY OTHERS AND IS NOT A INVESTIGATION PART OF THIS CERTIFICATION. SHEET NO. 01 OF 01 1: 250

APPENDIX B

Water Demand Calculations



Project No.: 2378-6557

Created By: GS Checked By: MI **Date:** 2024.04.02 **Updated:** 2024.10.16

Proposed Domestic Water Demand

Site Area: 1.87 ha

Units: 1,342 units
People Per Unit: 2.7 people/unit
Population 3624 persons

Notes & References

Region of Peel, Public Works Design Criteria Manual -Per Site Statistics provided by Tregebov Cogan

Architecture (November 23, 2023)

Design Parameters:

Avg. Consumption Rate (L/capita/day)

Region of Peel, Public Works Watermain Design Criteria Manual (June 2010)

Water Demand:

Average Daily Demand = 1,014,720 L/day

11.7 L/s

Peaking Factors

Max Day = 2.0 Peak Hour = 3.0

Average Day = 11.7 L/s Max Day = 23.5 L/s

Peak Hour = 35.2 L/s

Max Day = Average Day Demand * Max Day Factor
Peak Hour = Average Day Demand * Peak Hour Factor

Municipality	Average Daily	Max Day	Peak
	Water Demand	Demand	Hourly Demand
	(L/s)	(L/s)	(L/s)
Region of Peel	11.7	23.5	35.2



69 & 117 John Street Fire Protection Volume Calculation CFCA File: 2378-6557

Design: GS Check: MI

Date: 2024-10-16

Water Supply for Public Fire Protection - 2020 **Fire Underwriters Survey**

Part II - Guide for Determination of Required Fire Flow

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

F = 220 * C * sqrt A

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

1.5 for wood frame construction (structure essentially all combustible)

1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)

for non-combustible construction (unprotected metal structural components) 0.8

for fire-resistive construction (fully protected frame, floors, roof) 0.6

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

Proposed Buildings

Floor 3	5,935	sq.m	100%	
Floor 2	5,935	sq.m	25%	
Floor 4	5.066	sa.m	25%	

8.685 sa.m Area of the largest floor plus 25% of each of the two immediately adjoining floors Area =

C =0.8 Assumes non-combustible construction (unprotected metal structural components)

Therefore F = 16,402 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 Free Burning 15%

Limited Combustible -15% Rapid Burning 25% Combustible 0% (No Change)

Limited-Combustible -15% reduction

-2,460 L/min reduction

13.942 L/min

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

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.

> 30% As part of this analysis, building is assumed to have standard (adequately designed) sprinkler protection:

> > 4,183 L/min reduction

69 & 117 John Street Fire Protection Volume Calculation

Designed By: CM/AC CFCA File: 2378-6557 Checked By: MI Page 2

Date: 2024-10-16

Water Supply for Public Fire Protection - 2020 **Fire Underwriters Survey**

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	0%
10.1 to 20 m	15%		

Exposed buildings

Name		Distance (m)	Charge (%)	Surcharge (L/s)
Ν	Residences	>30	0%	-
E	John Street/Residences	25	10%	1,394
S	John Street/Commercial	20	15%	2,091
W	CPR	>30	0%	_

3,485 L/min Surcharge

Determine Required Fire Flow

16,402 No.1 No. 2 -2,460 reduction No. 3

-4,183 reduction No. 4 3,485 surcharge

Required Flow: 13.245 L/min

Rounded to nearest 1000 L/min: 216.7 L/s 13,000 L/min 3,434 USGPM

Determine Required Duration

Rounded to nearest 1000 L/min: 13,000 L/min Duration for 11,000 L/min: 2.75 hours



Hydrant Testing Ontario

REPORT #2275

Tel: 289-354-1942 Date: November 8, 2022

To: Bashar Ghreiwati

2200-1250 Boul Rene Levesque O

Montreal, QC H3B 4WB

RE: Watermain Capacity Testing - 69 to 117 Johns St Mississauga.

Please find watermain capacity testing report for 69 - 117 John Street conducted on November 8^{th} 2022 as per NFPA291/AWWA-M17.

Hydrant Test Plan:

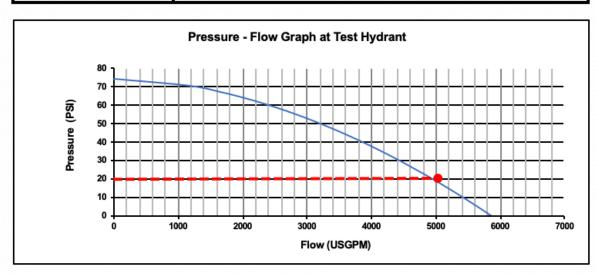


HYDRANT TEST REPORT



Zone ID	PE	EL REGION	TES	Т#	1
DATE: 08-Nov-22	TIME:	11:52 AM	OPERATOR:	ROB	GAMACHE
R -TEST HYDRANT	117 JOHN STREE	T	HYDRAM	NT No.	N/A
HYDRANT MODEL:	DARLING		COLO	UR:	BLUE
STATIC PRESSURE: 74.51 AWWA 2.27% RESIDUAL PRESSURE: 72.82					
Q - FLOW HYDRANT	19 JOHN STREET	,	HYDRAM	NT No.	N/A
HYDRANT MODEL:	DARLING		COLO	UR:	BLUE
Logger Type	Outlet Dia. (in.)	Coefficient (~0.9)	Pitot Gauge Reading (psi)		Flow JSGPM)
Hose Monster Little Boy	2	1.31	23.53		758
		Total Flow	(USGPM)		758
PROJECTED Flow @	20 psi	4948 312	USGPM L/s	4089	IGPM

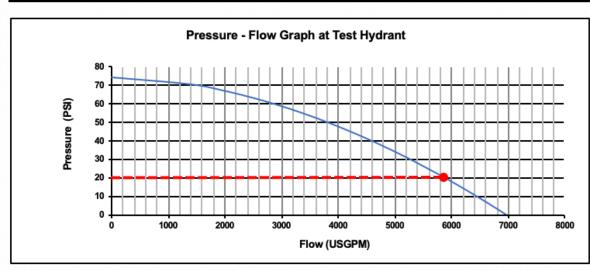
NFPA Rating: CLASS AA - BLUE



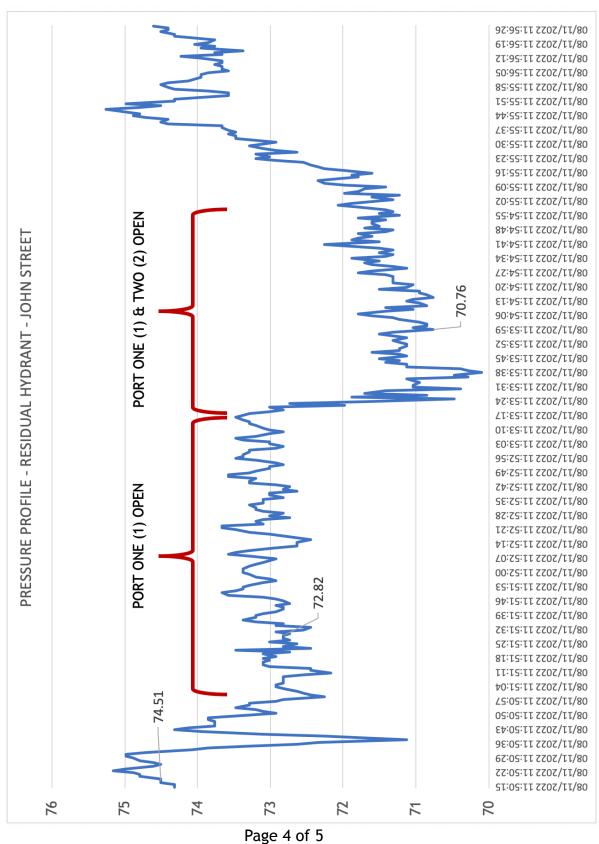
HYDRANT TEST REPORT



Zone ID	PE	EL REGION	TEST	# 2	
DATE: 08-Nov-22	TIME:	11:54 AM	OPERATOR:	ROB GAMACHE	
R -TEST HYDRANT	117 'JOHN STREE	T	HYDRAN	Γ No. N/A	
HYDRANT MODEL:	DARLING		COLOU	R: BLUE	
STATIC PRESSURE: 74.51 AWWA 5.03% RESIDUAL PRESSURE: 70.76					
Q - FLOW HYDRANT	19 JOHN STREET		HYDRAN	Γ No. N/A	
HYDRANT MODEL:	DARLING		COLOU	R: BLUE	
Logger Type	Outlet Dia. (in.)	Coefficient (~0.9)	Pitot Gauge Reading (psi)	Flow (USGPM)	
Hose Monster Little Boy	2	1.31	19.68	693	
Hose Monster Little Boy	2	1.31	19.68	693	
		Total Flov	w (USGPM)	1387	
PROJECTED Flow @	20 psi	5885 371	USGPM L/s	4864 IGPM	
NFPA Rating: CLASS AA - BLUE					
Pressure - Flow Graph at Test Hydrant					



Residual Hydrant - Pressure Profile



Test Conclusion

The system at the time of testing produced a projected flow rate of **371** L/s at 20 psi with both hydrant ports open at full bore.

Hydrants are classified in accordance with their rated capacities as per NFPA291.

COLOUR	CLASS	Available Flow@20psi residual
BLUE	AA	1500 GPM or more
GREEN	Α	1000 - 1499 GPM
ORANGE	В	500 - 999 GPM
RED	С	Below 500 GPM

Hydrants tested are rated **BLUE**.

We strongly feel that all attempts have been made to ensure that the required data as stipulated was captured, stored and presented in an accurate, efficient and timely manner for the required period.

We look forward to working with you in the future.

Please feel free to contact the undersigned should you require any further information.

Best Regards

Rob Gamache E.P Manager of Operations HTO

(289) 354-1942

APPENDIX C

Sanitary Flow Calculations



units

Project No.: 2378-6557

Created By: GS Checked By: MI

Date: 2024-10-16

Updated: -

Proposed Domestic Sanitary Design Flow

Site Area: 1.57 ha

> Units: 1,342

people/unit People Per Unit: 2.7

Population: 3623 people Notes & References

Region of Peel, Public Works Design Criteria

Manual - Sanitary Sewer (2017)

Per Site Statistics provided by Tregebov Cogan

Architecture (September 11, 2024)

Design Parameters

Peak Flow (L/sec) 42.8

Region of Peel Standard Drawing 2-9-2, Sewage

Flows (Excluding Infiltration)

Infiltration Flow: Infiltration Rate = 0.0002 m³/sec/ha

> Infiltration = 0.00031 m³/sec

Infiltration = 0.3 L/s

Total Peak Flow = 43.1 L/s Total Peak Flow = Peak Flow + Total Infiltration

Summary Table

Average Daily Flow	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)
12.7	3.4	42.8	0.3	43.1

APPENDIX D

Stormwater Management Calculations



Project No.: 2378-6557 Created By: GS Checked By: MI

Date: 2024.04.02 **Updated:** 2024.10.16

Modified Rational Calculations - Input Parameters

Storm Data: City of Mississauga

Time of Concentration: $T_c = 15.00$ mins

Return Period	Α	В	С	l (mm/hr)
2 yr	610.0	4.6	0.78	59.89
100 yr	1450.0	4.9	0.78	140.69

Pre-Development Conditions						
Land Use	Area (ha)	Area (m²)	С	Weighted Average C		
Catchment 101 Over	Catchment 101 Overland to Storm Sewer in John Street					
Pervious	0.00	0	0.90	0.00		
Impervious	1.57	15700	0.90	0.90		
Total Subcatchment	1.57	15700	-	0.90		
Catchment EXT1 Ove	rland to St	orm Sewe	r in John S	treet		
Pervious	0.00	0	0.25	0.00		
Impervious	0.14	1370	0.60	0.60		
Total Subcatchment	0.14	1370	-	0.60		
Total	1.71	17070	-	0.50*		

Post-Development Conditions					
Land Use	Area (ha)	Area (m²)	С	Weighted Average C	
Catchment 201 to Storm Sewer in John Street					
Pervious	0.43	4290	0.25	0.07	
Impervious	1.10	10972	0.90	0.65	
Total Subcatchment	1.53	15262		0.72	
Catchment EXT1	to Storm	Sewer in Jo	ohn Street		
Pervious	0.00	0	0.25	0.00	
Impervious	0.14	1370	0.60	0.60	
Total Subcatchment	0.14	1370		0.60	
Catchment UC1	to Storm S	Sewer in Jo	hn Street		
Pervious	0.01	142	0.25	0.08	
Impervious	0.03	297	0.90	0.61	
Total Subcatchment	0.04	438	-	0.69	
Total	1.71	17070	-	0.69	

References

Development Requriments Manual (Nov 2020)

Intensity
I = A/(T+B)^C

Peak Flow **Q = 0.0028 • C • I • A**

*Max C in Mississauga for pre-development = 0.50



Project No.: 2378-6557 Created By: GS Checked By: MI

Date: 2024.04.02 **Updated:** 2024.10.16

Modified Rational Calculations - Peak Flow Summary

Pre-Development

Catchment 101 Overland to Storm Sewer in John Street						
Storm Event C i (mm/hr) A (ha) Q (m³/s) Q (L/s)						
2 yr	0.50	59.89	1.57	0.131	130.70	
100 yr	0.50	140.69	1.57	0.307	307.03	

Catchment EXT1 Overland to Storm Sewer in John Street						
Storm Event	С	i (mm/hr)	A (ha)	Q (m ³ /s)	Q (L/s)	
2 yr	0.50	59.89	0.14	0.011	11.41	
100 yr	0.50	140.69	0.14	0.027	26.79	

Allowable Release Rate (from site) = 2-Year Pre-Devlopment Flows

Allowable Release Rate =

142.11

L/s

Allowable Release Rate (from tank) = 2-Year Pre-Devlopment Flows - 100-Year Post-Development Uncontrolled Flows - Long-term Dewatering Rate

Allowable Release Rate = 121.58 L/s

Post-Development

Catchment 201 to Storm Sewer in John Street							
Storm Event C i (mm/hr) A (ha) Q (m³/s) Q (L/s)							
2 yr	0.72	59.89	1.53	0.182	182.3		
100 yr	0.72	140.69	1.55	0.428	428.2		

Catchment EX1 to Storm Sewer in John Street							
Storm Event	Storm Event C i (mm/hr) A (ha) Q (m³/s) Q (L/s)						
2 yr	0.69	59.89	1.71	0.182	182.3		
100 yr	0.69	140.69	1.71	0.412	411.5		

Catchment UC1 to Storm Sewer in John Street							
Storm Event C i (mm/hr) A (ha) Q (m³/s) Q (L/s)							
2 yr	0.69	59.89	0.04	0.005	5.0		
100 yr	0.69	140.69	0.04	0.012	11.8		

Peak Flows (L/s)								
Q _{pre101}	Q _{preEX1}	Q _{target}	Q _{postUC1}	Q _{long-term gw}	Q _{allowable(from tank)}	Q _{actual (from orifice)}		
130.70	11.41	142.11	11.83	8.70	121.58	117.63		



Project No.: 2378-6557 Modelled By: GS

Date: 2024.10.16

MODIFIED RATIONAL METHOD

Rainfall IDF Coefficients 100-Year 1450.0 A = B =4.9 C= 0.78 Rational Method Calculation 1.66 Area = ha Runoff Coefficient, C = 0.71 C*A = 1.18 Time of Concentration, $t_c =$ 15.0 min Storm Duration Increment = 15.0 min Release Rate = L/s

117.63

100-Year								
Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m³)	Released Volume (m³)	Storage Volume (m³)	Max. Storage Volume Required (m³)	Notes	
15.0	140.69	459.94	414	106	308.1	(111)		
30.0	90.77	296.76	534	159	375.4			
45.0	68.68	224.54	606	212	394.5	394.5		
60.0	55.95	182.92	659	265	393.9	374.3		
75.0	47.58	155.53	700	318	382.3			
90.0	41.60	136.00	734	371	363.9			
105.0	37.10	121.29	764	423	340.7			
120.0	33.58	109.77	790	476	314.0			
135.0	30.73	100.48	814	529	284.6			
150.0	28.39	92.80	835	582	253.0			
165.0	26.41	86.35	855	635	219.7			
180.0	24.73	80.84	873	688	184.9			
195.0	23.27	76.06	890	741	148.9			
210.0	21.99	71.89	906	794	111.8			
225.0	20.86	68.20	921	847	73.9			
240.0	19.86	64.92	935	900	35.1			
255.0	18.96	61.98	948	953	0.0			
270.0	18.15	59.33	961	1006	0.0			
285.0	17.41	56.92	973	1059	0.0			
300.0	16.74	54.72	985	1112	0.0			
315.0	16.12	52.71	996	1164	0.0			
330.0	15.56	50.86	1007	1217	0.0			
345.0	15.03	49.15	1017	1270	0.0			



Project No: 2378-6557 Created By: GS Checked By: MI

Date: 2024.04.02 **Updated:** 2024.10.16

TANK SIZING

	100-Yea	r	
Allowable Release Rate =	121.58	L/s	
Maximum Pumped Release Rate =	117.63	L/s	
Tank Sizing			
Poquirod Activo Storago	394.5	1	m ³
Required Active Storage			
Required Dead Storage	63.2		m ³
Top of Tank	117.65		m
100-yr HWL	116.09		
Pump Elevation	114.00		m
Bottom of Tank	113.62		m
Height to Top of Tank	3.65		m
Free Board	0.00		m
Maximum Active Height	3.65		m
		'	
Tank Dimensions			
Area	189.0		m ²
'			
Provided Active Storage	689.9		m ³
Provided Dead Storage	71.8		m^3
Total Storage	761.7		m^3



PROJECT: 69 & 117 John Street

PROJECT No.: 2378-6557 FILE: Orifice Design DATE: 2024-10-16

> DESIGN: GS CHECK: JS

Orifice Design Summary

Orifice Type =

Invert Elevation =

Diameter of Orifice =

Area of Orifice (A) =

Orifice Coefficient (Cd) =

Calculation of Head

Centroid Elevation =

Water Elevation =

Upstream Head*, (h) =

	_
116.70	m
117 35	7m

0.65

tube

116.59

225

0.0398

0.830

m

lmm

sq.m

*overflow back to tank

Qa =

Actual Controlled Discharge, Qa =

Qa =

(Cd)(A)(2gh)^0.5

, , , , , , , , , , , , , , , , , , ,	_
0.11763	cms
117.6	L/s



PROJECT: 69 & 117 John Street

PROJECT No.: 2378-6557

DESIGN: GS

DATE: 2024.04.02

CHECK: MI **UPDATED:** 2024.10.16

WATER BALANCE CALCULATIONS

Impervious Area =12639m2Rainfall Depth =0.005mmRequired Retention Volume =63.2m3



STANDARD OFFLINE Jellyfish Filter Sizing Report

Project Information

Date Friday, March 22, 2024
Project Name 69 & 117 John Street

Project Number

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.lmbriumSystems.com for more information.

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF6-4-1 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 model has a sediment capacity of 256 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	High-Flo	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF6-4-1	4	1	1.8	22.7	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 inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on 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.lmbriumSystems.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:

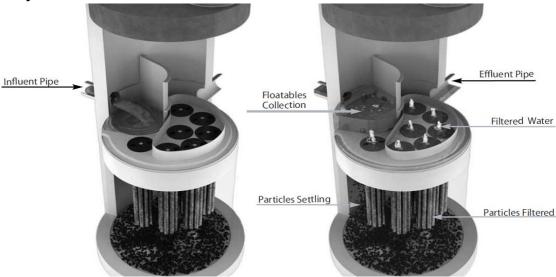
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 77% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

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

- A median TSS removal efficiency of 90%, 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 77%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration



Project Information

Date: Friday, March 22, 2024
Project Name: 69 & 117 John Street

Project Number:

Location: Mississauga

Designer Information

Company: Crozier

Contact: Gamsa Sivanantham 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: 1.17 ha
Runoff Coefficient: 0.62

Upstream Detention

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

Design System Requirements

Flow 9	90% of the Average Annual Runoff based on 18 years	20.3 L/s
Loading 0	of TORONTO CENTRAL rainfall data:	20.3 L/S
Loading 4	Freating 90% of the average annual runoff volume, 4210 m ³ , with a suspended sediment concentration of 60 mg/L.	253 kg

Recommendation

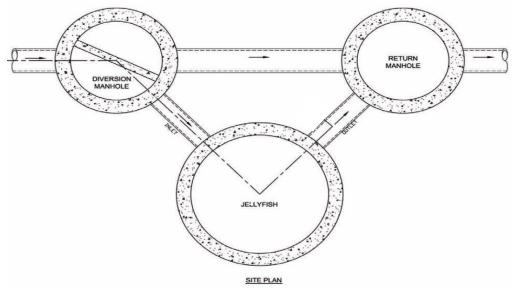
The Jellyfish Filter model JF6-4-1 is recommended to meet the water quality objective by treating a flow of 22.7 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 256 kg,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

Jellyfish	Number of	Number of	Manhole	Wet Vol	Sump	Oil	Treatment	Sediment
Model	High-Flo	Draindown	Diameter	Below Deck	Storage	Capacity	Flow Rate	Capacity
Wiodei	Cartridges	Cartridges	(m)	(L)	(m³)	(L)	(L/s)	(kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	5	1	1.8	5205	0.79	848	27.8	313
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679



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 the 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 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.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

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

- 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 conditions.
- 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

Imbrium Systems www.imbriumsystems.com

Ph 888-279-8826 Ph 416-960-9900

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 <u>Cartridge Deck</u> 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 <u>Backwashing Cartridges</u> 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 <u>Maintenance Access to Captured Pollutants</u> 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 <u>Bend Structure</u> 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 <u>Double-Wall Containment of Hydrocarbons</u> 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 <u>Baffle</u> 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 <u>Sump</u> 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 <u>JOINTS</u> 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 <u>FRAME AND COVER</u> 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 <u>DOORS AND HATCHES</u> If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.
- 2.7 <u>CONCRETE</u> All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.
- 2.8 <u>FIBERGLASS</u> 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 <u>STEPS</u> 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 <u>INSPECTION</u> 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

- Verification The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management Environmental technology verification (ETV).
- 3.1.2 <u>Function</u> 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 <u>Pollutants</u> 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 <u>Bypass</u> 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 <u>Suspended Solids Removal</u> 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 <u>Runoff Volume</u> 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 <u>Fine Particle Removal</u> 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 d₅₀ of 15 microns or lower for all monitored storm events.
- 3.2.4 <u>Turbidity Reduction</u> 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 <u>Metals (Total Zinc & Total Copper) Removal</u> 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 reinstalling 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 <u>Inlet and Outlet Pipes</u> 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 <u>Frame and Cover Installation</u> 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 <u>FILTER CARTRIDGE INSTALLATION</u> 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

Imbrium Systems www.imbriumsystems.com Ph 888-279-8826 Ph 416-960-9900

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Jellyfish® Filter

Developed by Imbrium Systems, Inc., Whitby, Ontario, Canada

Registration: GPS-ETV_V2022-03-01

In accordance with

ISO 14034:2016

Environmental Management —
Environmental Technology Verification (ETV)

John D. Wiebe, PhD Executive Chairman

GLOBE Performance Solutions

March I, 2022 Vancouver, BC, Canada





Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada | V6C 3E2

Technology description and application

The Jellyfish® Filter is an engineered stormwater quality treatment technology designed to remove a variety of stormwater pollutants including floatable trash and debris, oil, coarse and fine suspended sediments, and particulate-bound pollutants such as nutrients, heavy metals, and hydrocarbons. The Jellyfish Filter combines gravitational pre-treatment (sedimentation and floatation) and membrane filtration in a single compact structure. The system utilizes membrane filtration cartridges comprised of multiple detachable pleated filter elements ('filtration tentacles'') that provide high filtration surface area with the associated advantages of high flow rate, high sediment capacity, and low filtration flux rate.



Figure I. Cut-away graphic of a Jellyfish® Filter manhole with 6 hi-flo cartridges and I draindown cartridge

Figure I depicts a cut-away graphic of a typical 6-ft diameter Jellyfish® Filter manhole with 6 hi-flo cartridges and I draindown cartridge (JF6-6-1). Stormwater influent enters the system through the inlet pipe and builds a pond behind the maintenance access wall, with the pond elevation providing driving head. Flow is channeled downward into the lower chamber beneath the cartridge deck. A flexible separator skirt surrounds the filtration zone where the filtration tentacles of each cartridge are suspended, and the volume between the vessel wall and the outside surface of the separator skirt comprises a pre-treatment channel. As flow spreads throughout the pre-treatment channel, floatable pollutants accumulate at the surface of the pond behind the maintenance access wall and also beneath the cartridge deck in the pretreatment channel, while coarse sediments settle to the sump. Flow proceeds under the separator skirt and upward into the filtration zone, entering each filtration tentacle and depositing fine suspended sediment and associated particulate-bound pollutants on the outside surface of the membranes. Filtered water proceeds up the center tube of each tentacle, with the flow from each tentacle combining under the cartridge lid, and discharging to the top of the cartridge deck through the cartridge lid orifice. Filtered effluent from the hi-flo cartridges enters a pool enclosed by a 15-cm high weir, and if storm intensity and resultant driving head is sufficient, filtered water overflows the weir and proceeds across the cartridge deck to the outlet pipe. Filtered effluent discharging from the draindown cartridge(s) passes directly to the outlet pipe, and requires only a minimal amount of driving head (2.5 cm) to provide forward flow. As

storm intensity subsides and driving head drops below 15 cm, filtered water within the backwash pool reverses direction and passes backward through the hi-flo cartridges, and thereby dislodges sediment from the membrane which subsequently settles to the sump below the filtration zone. During this passive backwashing process, water in the lower chamber is displaced only through the draindown cartridge(s). Additional self-cleaning processes include gravity, as well as vibrational pulses emitted when flow exits the orifice of each cartridge lid, and these combined processes significantly extend the cartridge service life and maintenance cleaning interval. Sediment removal from the sump by vacuum is required when sediment depths reach 30 cm, and cartridges are typically removed, externally rinsed, and recommissioned on an annual basis, or as site-specific maintenance conditions require. Filtration tentacle replacement is typically required every 3 – 5 years.

Performance conditions

The data and results published in this Verification Statement were obtained from the field testing conducted on a Jellyfish Filter JF6-6-1 (6-ft diameter manhole with 6 hi-flo cartridges and 1 draindown cartridge), in accordance with the requirements outlined by the Technical Guidance Manual for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol - Ecology (TAPE) as written by the Washington State Department of Ecology, (WADOE, 2011). The drainage area providing stormwater runoff to the test unit was 86 acres and was 32% impervious. Throughout the monitoring period (March 2017 – April 2020), a total of 25 individual storm events were sampled. The Basic Treatment standard outlined in the TAPE requires ≥ 80% total suspended solids (TSS) removal at influent TSS concentrations ranging from 100 to 200 mg/L. In addition, the Phosphorus Treatment standard outlined in the TAPE requires ≥ 50% removal of total phosphorus (TP) at influent concentrations ranging from 0.10 to 0.5 mg/L. For this verification, the performance claim for TSS removal is for influent TSS concentration ≥ 100 mg/L, and the performance claim for TP removal is for influent TP concentration ≥ 0.1 mg/L. Based on these requirements, 15 and 18 sample pairs deemed qualified for evaluating the removal performance of TSS and TP, respectively. Prior to starting the performance testing program, a quality assurance project plan (QAPP) was submitted to and approved by the State of Washington Department of Ecology.

Table I shows the specified and achieved TAPE criteria for storm selection and sampling.

Table I. Specified and achieved TAPE criteria for storm selection and sampling

Description	TAPE criteria value	Achieved value
Total rainfall	> 3.8 mm (0.15 in)	> 3.8 mm (0.15 in) ¹
Minimum inter-event period	6 hours	6 hours
Minimum flow-weighted composite	Minimum 70% including as much of	> 70%
sample storm coverage	the first 20% of the storm	
Minimum influent/effluent samples	10, but a minimum of 5 subsamples	10, except for two events that had
	for composite samples	9 aliquots
Total sampled rainfall	N/A	8.29 in
Number of storms	Minimum 15 (preferably 20)	25

IN.B. Storm event depth was greater than the TAPE rainfall depth guideline of 0.15 inches for all events sampled, except for the 3/21/2017, 3/22/2019, 3/26/2019, and 04/13/2019 events. Given the size of the drainage basin, storm events below this threshold produced adequate runoff volume for sampling. Only two of these events were used to evaluate performance, and all had rainfall depths of 0.11 inches or greater. These events were included as their runoff volumes, precipitation durations, and influent TSS concentrations were all within range of the total data set.

The 6-ft diameter test unit has sedimentation surface area of 2.62 m² (28.26 ft²). Each of the seven filter cartridges employed in the test unit uses filtration tentacles of 137 cm (54 in) length, with filter surface area of 35.4 m² (381 ft²) per cartridge, and total filter surface area of 247.8 m² (2667 ft²) for the seven cartridges combined. The design treatment flow rate is 5 L/s (80 gal/min) for each of the six hi-flo

cartridges and 2.5 L/s (40 gal/min) for the single draindown cartridge, for a total design treatment flow rate of 32.5 L/s (520 gal/min) at design driving head of 457 mm (18 in). This translates to a filtration flux rate (flow rate per unit filter surface area) of 0.14 L/s/m² (0.21 gal/min/ft²) for each hi-flo cartridge and 0.07 L/s/m² (0.11 gal/min/ft²) for the draindown cartridge. The design flow rate for each cartridge is controlled by the sizing of the orifice in the cartridge lid. The distance from the bottom of the filtration tentacles to the sump is 61 cm (24 in).

Performance claim(s)

The Jellyfish® Filter demonstrated the removal efficiencies indicated in **Table 2** for TSS and TP during field monitoring conducted in accordance with the Washington State Department of Ecology's Technology Assessment Protocol – Ecology (TAPE), and using the following design parameters:

- System hydraulic loading rate (system treatment flow rate per unit of sedimentation surface area) of 12.5 L/s/m² (18.4 gal/min/ft²) or lower
- Filtration flux rate (flow rate per unit filter surface area) of 0.14 L/s/m² (0.21 gal/min/ft²) or lower for each hi-flo cartridge and 0.07 L/s/m² (0.11 gal/min/ft²) or lower for each draindown cartridge
- Distance from the bottom of the filtration tentacles to the sump of 61 cm (24 in) or greater
- Driving head of 457 mm (18 in) or greater

Table 2. Bootstrapped mean, median, and 95% confidence interval (median) for removal efficiencies of Total Suspended Solids (TSS) and Total Phosphorus (TP)

Parameter	Mean (%)	Median (%)	Median – 95% Lower Limit	Median – 95% Upper Limit
TSS ¹	87.6	90.1	85. I	91.6
TP ²	77.3	77.5	70.8	85.6

¹ TSS influent concentration ≥ 100 mg/L

N.B. As with any field test of stormwater treatment devices, removal efficiencies will vary based on pollutant influent concentrations and other site-specific conditions.

The performance claims can be applied to other Jellyfish® Filter models smaller or larger than the tested model as long as the untested models are designed in accordance with the design parameters specified in the performance claims.

Performance results

Performance Claims - Removal Efficiency for Total Suspended Solids

Raw data summarizing the percent removal of total suspended solids (TSS) by the Jellyfish® Filter at the design system hydraulic loading rate of I2.5 L/s/m² (18.4 gal/min/ft²) for I5 sample pairs deemed qualified are presented in **Table 3**. Data were analyzed and evaluated using a bootstrap approach of random sampling by replacement to estimate population distribution and thereby the upper and lower limit of the confidence interval.

Table 3. Raw data summarizing the percent removal of total suspended solids (TSS)

Event ID	TSS Influent (mg/L)	TSS Effluent (mg/L)	TSS Removal (%) (Inf≥ 100 mg/L)
3/21/2017	102.0	22.0	78.4
4/7/2017	201.0	30.8	84.7
4/12/2017	108.0	24.4	77.4
4/19/2017	452.0	44.6	90.1
4/26/2017	257.0	10.0	96.1

² TP influent concentration ≥ 0.1 mg/L

6/15/2017	134.0	10.4	92.2
3/8/2018	755.0	47.2	93.8
3/14/2018	181.0	27.0	85.1
3/22/2018	224.0	20.0	91.1
4/5/2019	171.0	23.0	86.6
4/13/2019	117.0	25.0	78.6
5/18/2019	254.0	20.0	92.1
12/7/2019	200.0	17.0	91.5
3/30/2020	605.0	51.0	91.6
4/20/2020	210.0	29.0	86.2
n	15	15	15
Min	102.0	10.0	77.4
Max	755.0	51.0	96.1
Median	201.0	24.4	90.1
Mean	264.7	26.8	87.7
SD	190.9	12.3	5.9

Performance Claims – Removal Efficiency for Total Phosphorus

Raw data summarizing the percent removal of total phosphorus (TP) by the Jellyfish® Filter at the design system hydraulic loading rate of 12.5 L/s/m² (18.4 gal/min/ft²) for 18 sample pairs deemed qualified are presented in **Table 4**. Data were analyzed and evaluated using a bootstrap approach of random sampling by replacement to estimate population distribution and thereby the upper and lower limit of the confidence interval.

Table 4. Raw data summarizing the percent removal of total phosphorus (TP)

Event ID	TP Influent (mg/L)	TP Effluent (mg/L)	TP Removal (%) (Inf≥0.1 mg/L)
4/7/2017	0.706	0.092	87.0
4/12/2017	0.338	0.076	77.5
4/19/2017	0.500	0.036	92.8
4/26/2017	0.504	0.042	91.7
5/13/2017	0.256	0.110	57.0
6/8/2017	0.256	0.104	59.4
6/15/2017	0.362	0.052	85.6
3/8/2018	1.75	0.130	92.6
3/14/2018	0.652	0.094	85.6
3/22/2018	0.364	0.072	80.2
3/27/2019	0.226	0.070	69.1
4/5/2019	0.337	0.092	72.9
4/13/2019	0.249	0.087	65. l
5/18/2019	1.09	0.173	84.1
12/7/2019	0.335	0.105	68.7
12/19/2019	0.211	0.093	56.2
3/30/2020	1.05	0.092	91.2
4/20/2020	0.451	0.112	75.2
n	18	18	18
Min	0.211	0.036	56.2
Max	1.75	0.173	92.8
Median	0.363	0.092	78.9
Mean	0.535	0.091	77.3
SD	0.400	0.032	12.5

Verification

The verification was completed by the Verification Expert, the Centre for Advancement of Water and Wastewater Technologies ("CAWT"), contracted by GLOBE Performance Solutions, using the International Standard ISO 14034:2016 Environmental management -- Environmental technology verification (ETV). Data and information provided by Imbrium Systems to support the performance claim included the performance monitoring report "General Use Level Designation Technical Evaluation Report" prepared by CONTECH Engineered Solutions, Portland, OR, USA, and dated December 28, 2020. This report is based on a field testing completed by CONTECH personnel at a site in Dundee, Oregon between March 2017 and April 2020 in accordance with the Technical Guidance Manual for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) as written by the Washington State Department of Ecology (WADOE, 2011).

What is ISO 14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV) and was developed and published by the *International Organization for Standardization* (ISO). The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the Jellyfish® Filter please contact:

Imbrium Systems Inc., 407 Fairview Drive Whitby, Ontario LIN 3A9, Canada Tel: 416-960-9900 info@imbriumsystems.com For more information on ISO 14034:2016 / ETV please contact:

GLOBE Performance Solutions
404 – 999 Canada Place
Vancouver, BC
V6C 3E2, Canada
Tel: 604-695-5018 / Toll Free: I-855-695-5018
etv@globeperformance.com
www.globeperformance.com

Limitation of verification - Registration: GPS-ETV_V2022-03-01

GLOBE Performance Solutions and the Verification Expert provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

GENERAL NOTES

- ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE
- JELLYFISH STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
- UNLESS OTHERWISE NOTED. BYPASS INFRASTRUCTURE. SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE JELLYFISH SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
- DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
- NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECTS BID DATE, OR AS DIRECTED BY THE ENGINEER OF

JELLYFISH STRUCTURE & DESIGN NOTES:

- 762 MM Ø (30") MAINTENANCE ACCESS WALL TO BE USED FOR CLEANOUT AND ACCESS BELOW CARTRIDGE DECK.
- CASTINGS OR DOORS OF THE JELLYFISH MANHOLE STRUCTURE TO EXTEND TO DESIGN FINISH GRADE. DEPTHS IN EXCESS OF 3.65 M (12') MAY REQUIRE THE DESIGN AND INSTALLATION OF INTERMEDIATE SAFETY GRATES OR OTHER STRUCTURAL ELEMENTS.
- CASTINGS AND GRADE RINGS, OR DOORS AND DOOR RISERS, OR BOTH, SHALL BE GROUTED FOR WATERTIGHTNESS.
- STRUCTURE SHALL MEET AASHTO HS-20, ASSUMING EARTH COVER OF 0' 3', AND GROUNDWATER ELEVATION AT. OR BELOW. THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE IMBRIUM LOGO.
- ALL STRUCTURAL SECTIONS AND PARTS TO MEET OR EXCEED ASTM C-478. ASTM C-443, AND ASTM D-4097 CORRESPONDING TO AASHTO SPECIFICATIONS, AND ANY OTHER SITE OR LOCAL STANDARDS.
- CONCRETE RISER SECTIONS FROM BOTTOM TO TOP WILL BE ADDED AS REQUIRED INCLUDING TRANSITION PIECES TO SMALLER DIAMETER RISERS FOR SURFACE ACCESSES WHERE WARRANTED BY SERVICING DEPTH.
- IF MINIMUM DEPTH FROM TOP OF CARTRIDGE DECK TO BOTTOM OF STRUCTURAL TOP SLAB CANNOT BE ACHIEVED DUE TO PIPING INVERT ELEVATIONS OR OTHER SITE CONSTRAINTS. ALTERNATIVE HATCH CONFIGURATIONS MAY BE AVAILABLE. HATCH DOORS SHOULD BE SIZED TO PROVIDE FULL ACCESS ABOVE THE CARTRIDGES TO ACCOMMODATE
- STEPS TO BE APPROXIMATELY 330 MM (13") APART AND DIMENSIONS MUST MEET LOCAL STANDARDS. STEPS MUST BE INSTALLED AFTER CARTRIDGE DECK IS IN PLACE.
- CONFIGURATION OF INLET AND OUTLET PIPE CAN VARY TO MEET SITE'S NEEDS. IT IS THE RESPONSIBILITY OF OTHERS TO PROPERLY PROTECT THE
- TREATMENT DEVICE, AND KEEP THE DEVICE OFFLINE DURING CONSTRUCTION. FILTER CARTRIDGES SHALL NOT BE INSTALLED UNTIL THE PROJECT SITE IS CLEAN AND FREE OF DEBRIS, BY OTHERS. THE PROJECT SITE INCLUDES ANY SURFACE THAT CONTRIBUTES STORM DRAINAGE TO THE TREATMENT DEVICE. CARTRIDGES SHALL BE FURNISHED NEW, AT THE TIME OF FINAL ACCEPTANCE
- . THIS DRAWING MUST BE VIEWED IN CONJUNCTION WITH THE STANDARD JELLYFISH SPECIFICATION, AND STORMWATER QUALITY FILTER TREATMENT

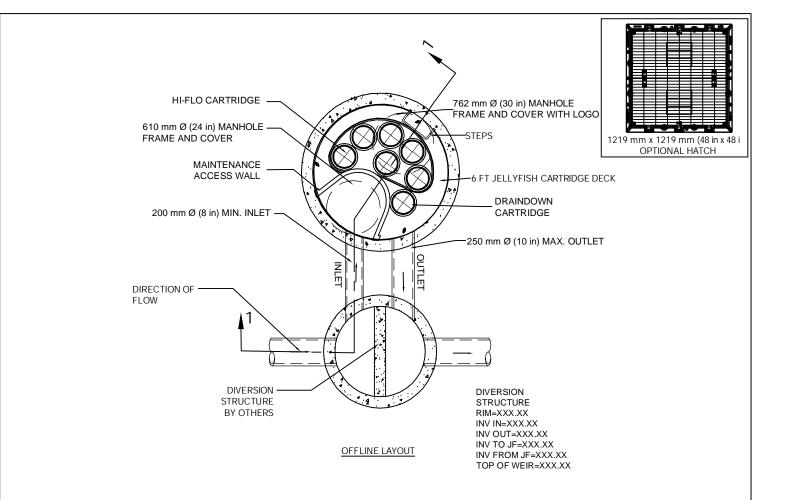
- INSTALLATION NOTES

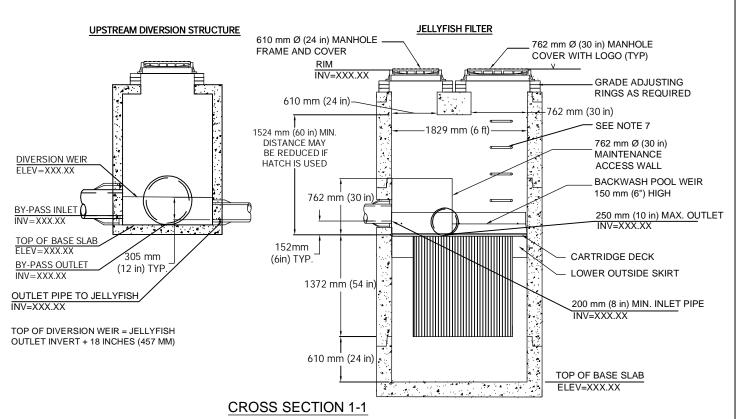
 A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
 CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS,
- LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
- CARTRIDGE INSTALLATION, BY IMBRIUM, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT IMBRIUM TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

S	TANDARD OFF	LINE JELLYFIS	Н		
RE	RECOMMENDED PIPE DIAMETERS				
MODEL DIAMETER (m)	MINIMUM ANGLE INLET/OUTLET PIPES	MINIMUM INLET PIPE DIAMETER (mm)	MINIMUM OULTET PIPE DIAMETER (mm)		
1.2	62	150	200		
1.8	59	200	250		
2.4	52	250	300		
3.0	48	300	450		
3.6	40	300	450		
CONTACTIA	ADDILINA CVCTENIC E	OD ALTERNATE DIDE	DIAMETERS		

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL JELLYFISH FILTER REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE.

DRAWING NOT TO BE USED FOR CONSTRUCTION





provided as a service to the pri and contractor by Imbrium Neither this drawing, nor any	#	t				#	#	#		
The design and information sho provided as a service to the pr	The									
6		16.4			24.6	_	32.8	35	MAX. TREATMENT (L/s)	
_		182			273		370	37	MAX. SEDIMENT CAPACITY (kg)	 S
			6/1	9					MAX. CARTS HIGH-FLO/DRAINDOWN	ΝT
16		28 / 14	;	11	42 / 21		57 / 28	/ 29	SEDIMENT CAPACITY HIGH-FLO / DRAINDOWN (kg) (per cart)	E
1.41	.7	2.55 / 1.27	2.9	.84	3.68 / 1.84		5.09 / 2.55	5.09	FLOW RATE HIGH-FLO / DRAINDOWN (L/s) (per cart)	M
9					.92),,	.06	OUTLET INVERT TO STRUCTURE BASE SLAB	RI
1		27"			40"		54"	27	CARTRIDGE DEPTH	U
									CARTRIDGE SELECTION	EQ
ANDARD MANI RATE IS BASEI	THE ST.	SES. 1 MENT!	F CARTRIDC FS). TREATI	IUMBER O L/s (1.16 C	ND THE N TY IS 32.8	TION A	GE SELEC ATMENT C	RTRID K TRE/	JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANI STYLE IS SHOWN. Ø1829 mm (72") MANHOLE JELLYFISH PEAK TREATMENT CAPACITY IS 32.8 L/s (1.16 CFS). TREATMENT FLOW RATE IS BASEI MM (18") OF HEAD PRESSURE.	ATA RI
				E C	N NC	SIG	JELLYFISH DESIGN NOTES		JELL	D

SITE SPECIFIC DATA REQUIREMENTS						
JELLYFISH M	10DEL		,	k		
STRUCTURE ID				*		
WATER QUALITY FLOW RATE (L/s)					*	
PEAK FLOW RATE (L/s)				*		
RETURN PERIOD OF PEAK FLOW (yrs)					*	
# OF CARTRIDGES REQUIRED (HF / DD)					*	
CARTRIDGE SIZE (inches)					*	
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE	%	HGL
INLET #1	*	*	*	*		*
INLET #2	*	*	*	*		*
OUTLET	*	*	*	*		*
* PER ENGINEER OF RECORD						



IF6 STANDARD Scale = 1:50

Jellyfish

	#
DATE: ########	#
DESIGNED:	DRAWN: BSF
CHECKED: BSF	APPROVED: SP
PROJECT #: #####	PROJECT NAME: #####
SHEET:	OF 2

JELLYFISH® FILTER - SPECIFICATIONS

GENERA

- A. <u>WORK_INCLUDED</u>: SPECIFIES REQUIREMENTS FOR CONSTRUCTION AND PERFORMANCE OF AN UNDERGROUND STORMWATER QUALITY, MEMBRANE FILTRATION, AND TREATMENT DEVICE THAT REMOVES POLLUTANTS FROM STORMWATER RUNOFF THROUGH THE UNIT OPERATIONS OF SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. REFERENCE STANDARDS:
- STM C 891: SPECIFICATION FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES
- ASTM C 478: SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
- ASTM C 990: SPECIFICATION FOR JOINTS FOR CONCRETE MANHOLES USING PREFORMED FLEXIBLE JOINT SEALANTS
 ASTM D 4101: SPECIFICATION FOR COPOLYMER STEPS CONSTRUCTION
- C. <u>SHOP DRAWINGS</u>: 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 PRECAST CONCRETE AND CALL OUT OR NOTE THE FIBERGLASS (FRP)
- D. 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.
- E. HANDLING AND STORAGE: PREVENT DAMAGE TO MATERIALS DURING STORAGE AND HANDLING.

PRODUCTS

- A. 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.
- B. THE CYLINDRICAL CONCRETE DEVICE SHALL INCLUDE A FIBERGLASS CARTRIDGE DECK INSERT. THE RECTANGULAR CONCRETE DEVICE SHALL INCLUDE A COATED ALUMINUM INSERT. IN EITHER INSTANCE, THE INSERT SHALL BE BOLTED AND SEALED WATERTIGHT INSIDE THE PRECAST CONCRETE CHAMBER. THE INSERT 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); (D) A CONDUIT FOR CONVEYANCE OF TREATED WATER TO THE EFFLUENT PIPE.
- C. MEMBRANE 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) OR GREATER 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 FLUX RATE SHALL BE 0.21 GPM/FT2 (0.142 JPS/M2). EACH MEMBRANE FILTER CARTRIDGE FAILL ALLOW FOR MANUAL INSTALLATION AND REMOVAL.
- D. 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.
- E. ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" 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.
- F. 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" MAY HAVE AN IMPACT ON THE TOTAL PERFORMANCE AND/OR LONGEVITY BETWEEN CARTRIDGE MAINTENANCE/REPLACEMENT OF THE DEVICE.
- G. 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.
- H. GASKETS AND/OR SEALANTS TO PROVIDE WATER TIGHT SEAL BETWEEN CONCRETE JOINTS. JOINTS SHALL BE SEALED WITH PREFORMED JOINT SEALING COMPOUND CONFORMING TO ASTM C 990.
- 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.
- J. DOOR AND HATCHES, IF PROVIDED SHALL MEET DESIGNATED LOADING REQUIREMENTS OR AT A MINIMUM FOR INCIDENTAL VEHICULAR TRAFFIC.
- K. ALL CONCRETE COMPONENTS SHALL BE MANUFACTURED ACCORDING TO LOCAL SPECIFICATIONS AND SHALL MEET THE REQUIREMENTS OF ASTM C 478.
- L. 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.
- M. 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.
- N. 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.

PERFORMANCE

- A. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL FUNCTION TO REMOVE POLLUTANTS BY THE FOLLOWING UNIT TREATMENT PROCESSES; SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. 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.
- C. 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 PASS WATER OVER THE CARTRIDGE DECK, AND AVOID PASSAGE THROUGH THE SUMP AND/OR CARTRIDGE FILTRATION ZONE.
- D. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TREAT 100% OF THE REQUIRED WATER QUALITY TREATMENT FLOW BASED ON A MAXIMUM TREATMENT FLUX RATE (SURFACE LOADING RATE) ACROSS THE MEMBRANE FILTER CARTRIDGES NOT TO EXCEED 0.21 GPM/ETZ (0.142 I.P.S.MZ).
- E. AT A MINIMUM, THE STORMWATER QUALITY FILTER DEVICE SHALL HAVE BEEN FIELD TESTED AND VERIFIED WITH A MINIMUM 25 QUALIFYING STORM EVENTS AND FIELD MONITORING CONDUCTED ACCORDING TO THE TARP TIER II OR TAPE FIELD TEST PROTOCOL, AND HAVE RECEIVED NUCAT VERIFICATION.
- F. 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%.
- G. 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 D50 OF 15 MICRONS OR LOWER FOR ALL MONITORED STORM EVENTS, AND AN EFFLUENT TURBIDITY OF 15 NTUS OR I OWER
- H. 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%.
- I. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL ZINC REMOVAL OF 50%, AND A MINIMUM MEDIAN TOTAL COPPER REMOVAL OF 75%.

INSPECTION AND MAINTENANCE

- A. 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.
- B. 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).
- C. 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.
- D. 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 CAPT
- E. MAINTENANCE ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" 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.
- F. FILTER CARTRIDGES SHALL BE ABLE TO BE MAINTAINED WITHOUT THE USE OF ADDITIONAL LIFTING EQUIPMENT.

EXECUTION

- A. 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 MAINHOLES, WHICHEVER IS MORE STRINGENT. SELECTED SECTIONS OF A GENERAL SPECIFICATION THAT ARE APPLICABLE ARE SUMMARIZED BELOW.
- B. THE WATERTIGHT PRECAST CONCRETE DEVICE IS INSTALLED IN SECTIONS IN THE FOLLOWING SEQUENCE:
 - AGGREGATE BAS
 - 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
- C. 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.
- D. 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.
- E. 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.
- F. FILTER CARTRIDGES SHALL BE INSTALLED IN THE CARTRIDGE DECK AFTER THE CONSTRUCTION SITE IS FULLY STABILIZED AND IN ACCORDANCE WITH THE MANUFACTURERS 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.
- G. 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.
- H. THE MANUFACTURER SHALL PROVIDE AN OWNER'S MANUAL UPON REQUEST.
- 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.
- J. 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

ISH FILTER SPECIFICATIONS

Jellyfish*

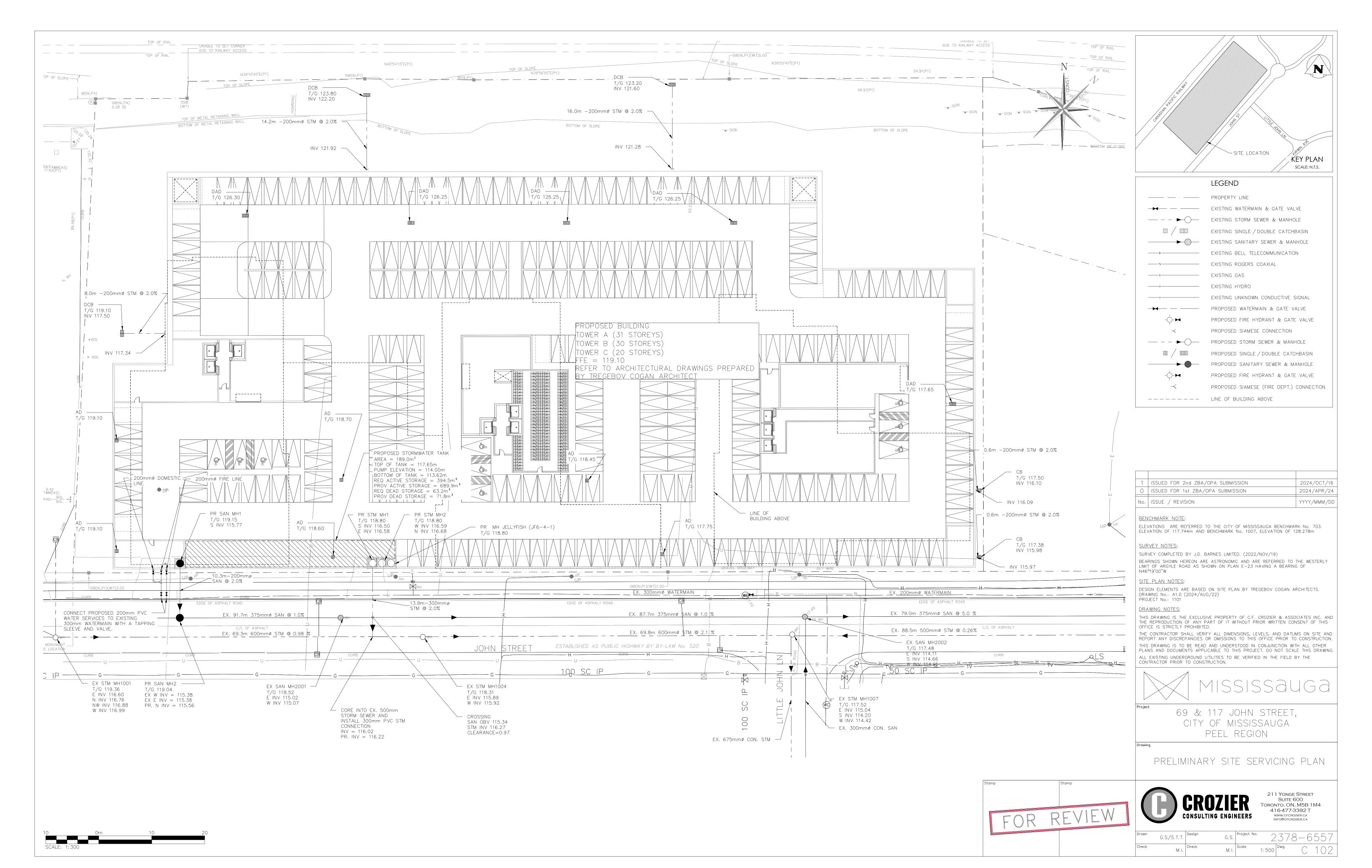
LLYFI

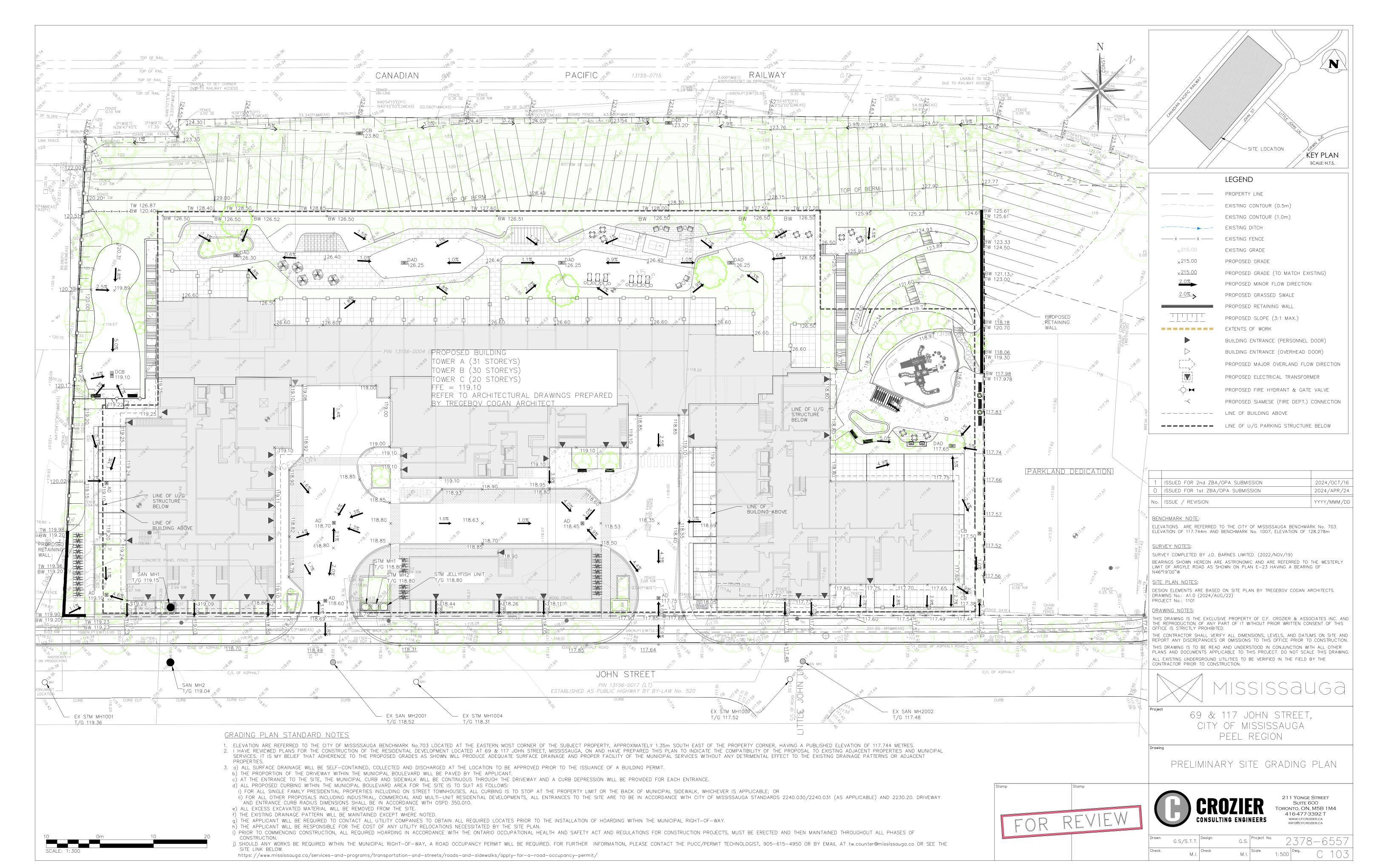
Jellyfish JF6 STANDARD Scale = 1:50

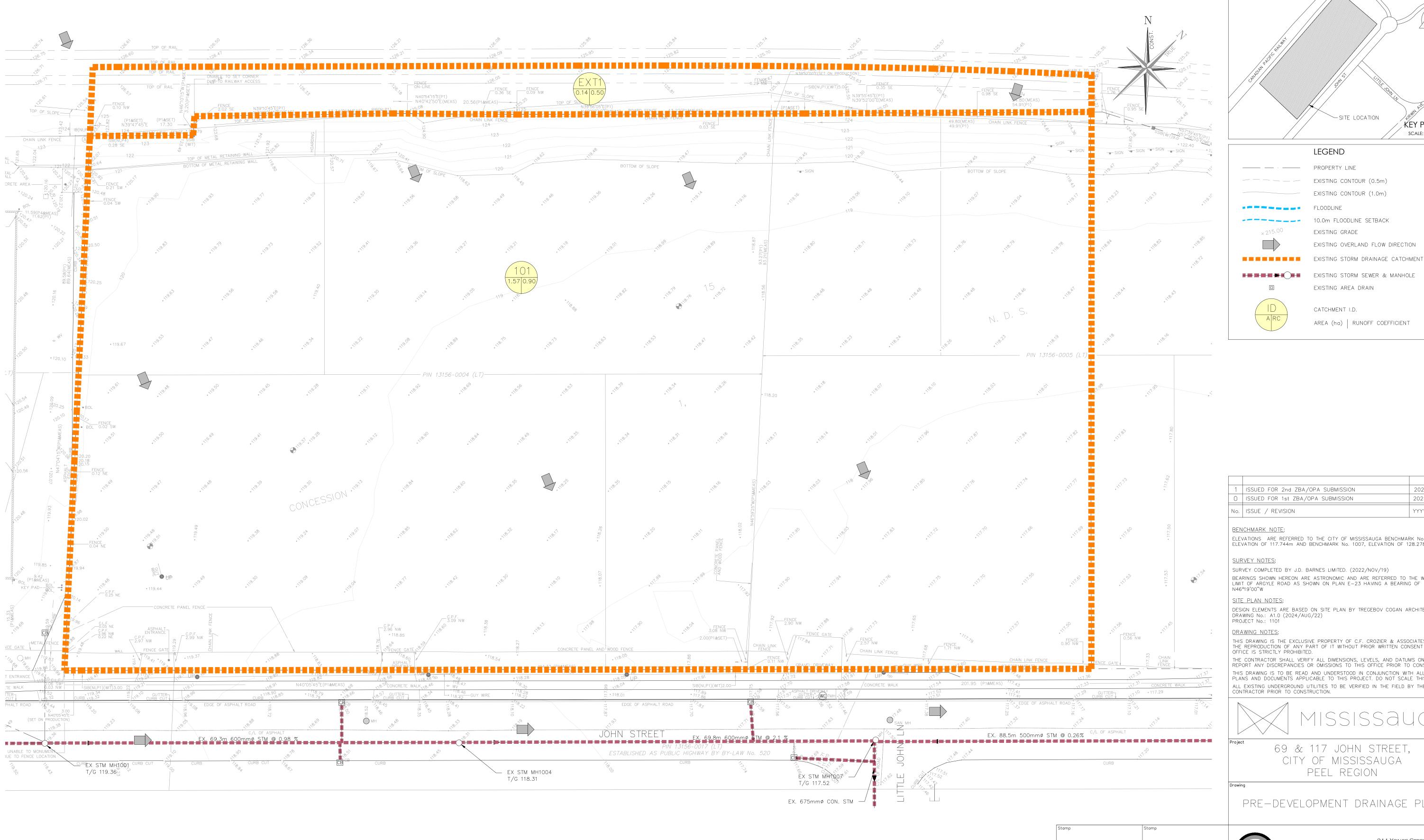


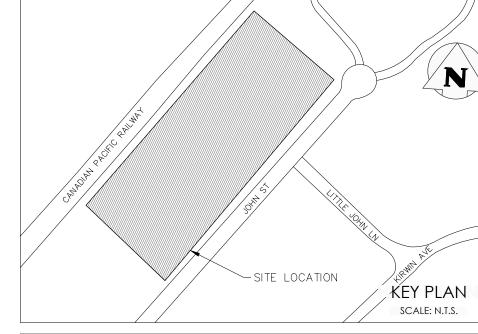
	I
DATE: #######	#
DESIGNED:	DRAWN: BSF
CHECKED: BSF	APPROVED: SP
PROJECT#: #####	PROJECT NAME: #####
SHEET:	05 0

FIGURES









LEGEND
 PROPERTY LINE
EXISTING CONTOUR (0
EXISTING CONTOUR (1.

10.0m FLOODLINE SETBACK

EXISTING OVERLAND FLOW DIRECTION

EXISTING GRADE

CATCHMENT I.D.

EXISTING STORM SEWER & MANHOLE EXISTING AREA DRAIN

AREA (ha) | RUNOFF COEFFICIENT

1	ISSUED FOR 2nd ZBA/OPA SUBMISSION	2024/OCT/16
0	ISSUED FOR 1st ZBA/OPA SUBMISSION	2024/APR/24
No.	ISSUE / REVISION	YYYY/MMM/DC

BENCHMARK NOTE:

ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 703. ELEVATION OF 117.744m AND BENCHMARK No. 1007, ELEVATION OF 128.278m

SURVEY NOTES:

SURVEY COMPLETED BY J.D. BARNES LIMITED. (2022/NOV/19) BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE WESTERLY LIMIT OF ARGYLE ROAD AS SHOWN ON PLAN E-23 HAVING A BEARING OF

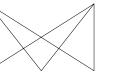
SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY TREGEBOV COGAN ARCHITECTS. DRAWING No.: A1.0 (2024/AUG/22) PROJECT No.: 1101

DRAWING NOTES:

THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.

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.



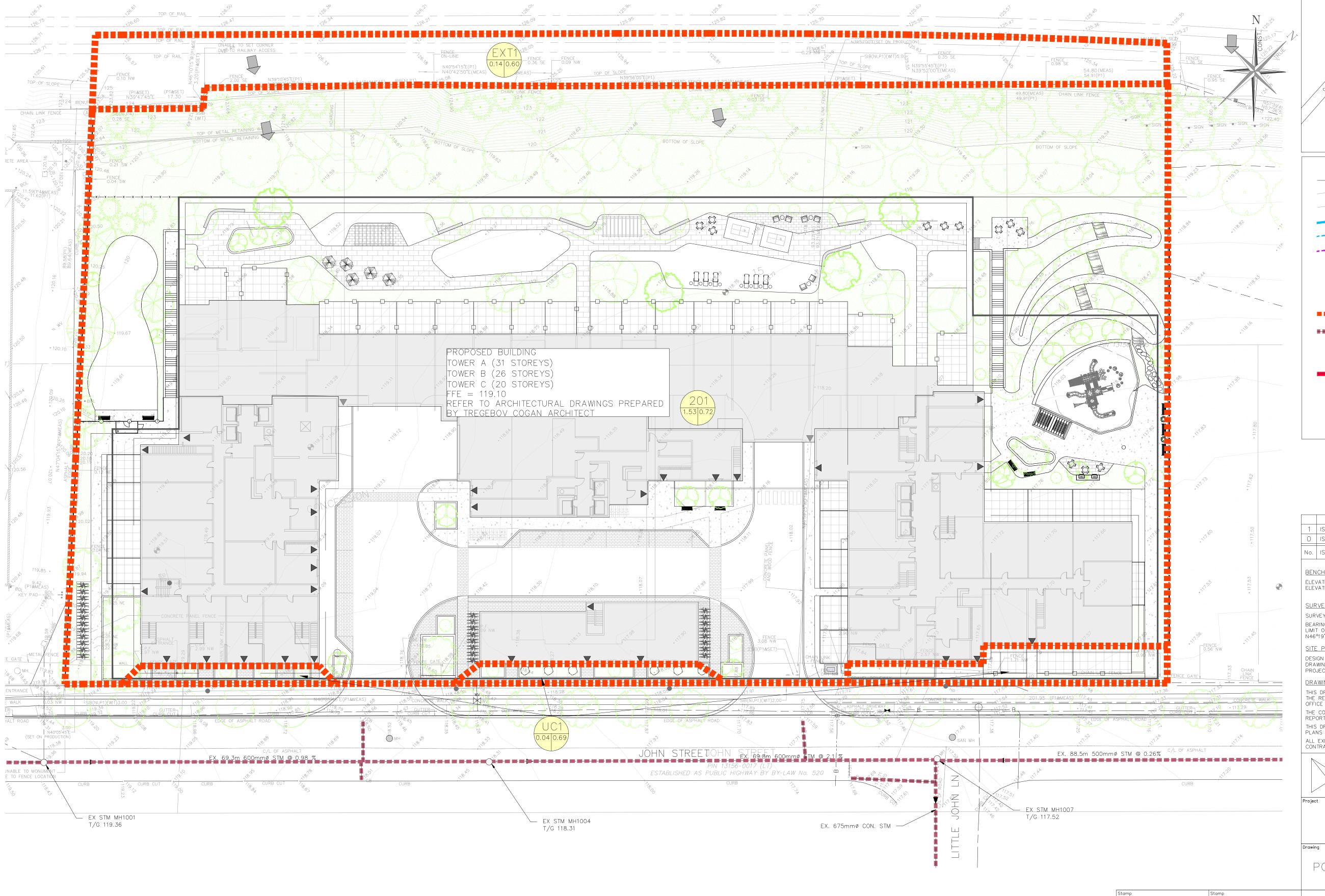
69 & 117 JOHN STREET, CITY OF MISSISSAUGA PEEL REGION

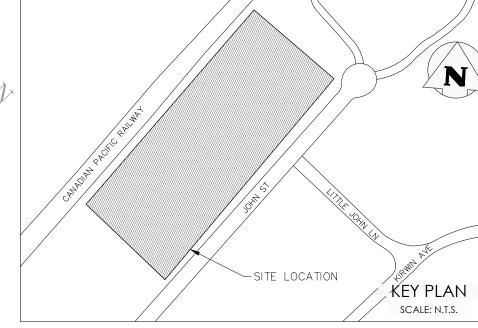
PRE-DEVELOPMENT DRAINAGE PLAN



211 YONGE STREET SUITE 600 TORONTO, ON, M5B 1M4 416-477-3392 T WWW.CFCROZIER.CA INFO@CFCROZIER.CA

G.S/S.T.T.





	LEGEND
	PROPERTY LINE
	EXISTING CONTOUR (0.5m)
	EXISTING CONTOUR (1.0m)
	REGULATORY FLOODLINE ELEV.
	10.0m FLOODLINE SETBACK
	POST-DEVELOPMENT FLOODLINE ELEV.
× 215.00	EXISTING GRADE
	PROPOSED OVERLAND FLOW DIRECTION
	EXISTING OVERLAND FLOW DIRECTION
	PROPOSED STORM DRAINAGE CATCHMENT
	EXISTING STORM SEWER & MANHOLE
	EXISTING SINGLE / DOUBLE CATCHBASIN
	EXISTING AREA DRAIN
	PROPOSED STORM SEWER & MANHOLE
	PROPOSED AREA DRAIN
ID	CATCHMENT I.D.

1	ISSUED FOR 2nd ZBA/OPA SUBMISSION	2024/OCT/16
0	ISSUED FOR 1st ZBA/OPA SUBMISSION	2024/APR/24
No.	ISSUE / REVISION	YYYY/MMM/DD

AREA (ha) RUNOFF COEFFICIENT

BENCHMARK NOTE:

ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 703. ELEVATION OF 117.744m AND BENCHMARK No. 1007, ELEVATION OF 128.278m

SURVEY NOTES:

SURVEY COMPLETED BY J.D. BARNES LIMITED. (2022/NOV/19)

BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE WESTERLY LIMIT OF ARGYLE ROAD AS SHOWN ON PLAN E-23 HAVING A BEARING OF N46°19'00"W

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY TREGEBOV COGAN ARCHITECTS. DRAWING No.: A1.0 (2024/AUG/22) PROJECT No.: 1101

DRAWING NOTES:

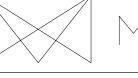
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.

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.



MISSISSAUGA

69 & 117 JOHN STREET, CITY OF MISSISSAUGA PEEL REGION

POST-DEVELOPMENT DRAINAGE PLAN





211 YONGE STREET
SUITE 600
TORONTO, ON, M5B 1M4
416-477-3392 T

WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

G.S./S.T.T. $\frac{\text{G.S.}}{\text{Check}}$ G.S. $\frac{\text{Check}}{\text{M.I.}}$ $\frac{\text{G.S.}}{\text{Scale}}$ 1: 500 $\frac{\text{Dwg.}}{\text{Dwg.}}$ FIG. 2