FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

3085 Hurontario

City of Mississauga

Prepared for

Equity Three Holdings Inc.
Project #: 20-653

First Submission: June 2021

Second Submission: August 2023

Third Submission: September 2024

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1. INTRODUCTION

Urbantech has been retained as consulting engineers by Equity Three Holdings Inc. to complete a Functional Servicing Report in support of an official plan amendment and zoning bylaw amendment for the proposed 1.5 ha development located at 3085 Hurontario Street in the City of Mississauga.

The site is bounded:

- To the north by commercial buildings and Kirwin Avenue
- To the south by commercial and residential buildings
- To the east by residential buildings and Jaguar Valley Drive
- To the west by Hurontario Street

The site is comprised of Lot 9 in registered plan TOR-12, Lot 15, Concession 1 North of Dundas Street and Block A Registered Plan 645 as shown on R-PE Surveying Sketch Showing Elevations, dated November 25th, 2020.

The site is currently occupied by commercial businesses and a parking garage.

The subject development lies within the limits of the Lake Ontario Shoreline East (Cooksville Creek) subwatershed, under the Credit Valley Conservation Authority (CVC) jurisdiction. The site falls within the City of Mississauga Hurontario/Main Street Corridor Master Plan area.

1.1 Study Purpose

The objective of this study is to outline the servicing requirements of the subject lands at a functional design level. This study will:

1. Recommend site grading, water supply and wastewater servicing strategies for the site.
2. Demonstrate compliance with City, Conservation and MECP design criteria for municipal services and stormwater management (SWM) measures.

The functional servicing design has been prepared in accordance with design criteria and requirements of the City of Mississauga, Region of Peel and Credit Valley Conservation Authority. The information in this report is intended to assist the regulatory agencies in their review of the planning applications for the proposed development.

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2. DEVELOPMENT CONCEPT

Refer to the development concept plan prepared by 3XN. The development plan consists of:

1. Tower 1 with 461 units and 9,796 ft^2 of retail.
2. Tower 2 with 488 units and 3,277 ft^2 of retail.
3. Tower 3 with 417 units.
4. Tower 4 with 325 units.
5. 3 levels of underground parking.

The proposed development will connect to both Hurontario Street and Kirwin Avenue via private driveways.

2.1 Background Studies

The servicing and development concepts presented within this report are an extension of the information contained in the following reports:

1. Geohydrology Assessment - 3085-3105 Hurontario Street (September 2024) - MCR Engineers
2. Cooksville Creek Flood Evaluation Master Plan EA (July 2012) by Aquafor Beech
3. Hurontario/Main Street Corridor Master Plan (October 2010) by MMM Group

3. EXISTING CONDITIONS

3.1 Land Use

The site is fully developed under existing conditions and consists of commercial businesses and an above grade parking garage.

3.2 Geotechnical and Hydrogeology

In support of the draft plan application, a geohydrology study was prepared by MCR Engineers Ltd. in September 2024. This study is reproduced in **Appendix E**.

The report states that the site's soil stratigraphy is generally characterized by native clayey silt till overlain by native sand. Underlying bedrock was found to be Dundas Shale.

- The parking lot was found to consist of approximately 100 to 200 mm of asphaltic concrete overlying 150 to 250 mm of granular fill.
- Beneath the pavement was loose to very dense sand/silty sand till which extended to depths of 1.75 to 3.65 m.
- Stiff to hard clayey silt overburden that was encountered up to a depth of 2.45-4.3 m below the existing grade.
- The overburden was underlain by weathered Dundas shale bedrock.

The report found the site's average groundwater level to be at a depth of approximately 3.28 m below the existing grade.

The report also indicated the following:

- Discharging groundwater to municipal storm sewers would require filtration/treatment for Biological Oxygen Demand. This treatment will be developed by a dewatering contractor.
- Dewatering during construction would require a daily dewatering rate of 210 m^3/day during steady state conditions when incorporating a factor of safety.
- A Permit to Take Water will be required for pumping during the excavation.
- Permanent dewatering of 183 m^3/day is estimated.

4. GRADING DESIGN

4.1 Design Standards

The proposed grading design for the site takes into consideration the following requirements and constraints:

1. Conforms to the City of Mississauga design criteria.
2. Match existing boundary lot and road grading conditions to be compatible with abutting properties.
3. Provides overland flow conveyance for major storm conditions.
4. Minimizes the need for retaining walls.
5. Provides appropriate cover on proposed servicing.
6. Ensures compatibility of driveway access to surrounding public streets.

4.2 Grading Design

A grading plan for the subject property has been prepared in conjunction with the storm, sanitary, and water servicing system design for the subject development.

Drawing GR-1 illustrate the proposed grading plan for the site.

Trench drains are proposed along the property line to capture all sheet flows before entering the ROW. Marginal uncontrolled flow is proposed to Kirwin Avenue (0.003 ha) and 0.017 ha will continue to drain to the east.

5. STORM DRAINAGE AND STORMWATER MANAGEMENT

5.1 Drainage Criteria

The City of Mississauga and Credit Valley Conservation outline the following design criteria for the site as follows:

1. Meeting Cooksville Creek Subwatershed quantity control criteria of 100-year post development to 2-year predevelopment control.
2. Pre-development runoff coefficients are to not exceed 0.5 for a site that is already developed.
3. Ensure minimum 80% TSS removal on site for quality control.
4. First 5 mm of runoff to be retained on-site.
5. Provide safe overland flow conveyance of the 100-year event.

5.2 Storm Sewer Design

Storm sewers within the site will be sized to convey the 10-year storm in accordance with the City of Mississauga standards. The site is full coverage with underground parking. All surface drainage will be collected by area drains and catchbasins that are connected to the building plumbing system.

Routing of the storm sewers within the building will be determined at a later date as the building design is advanced. All stormwater within the site is conveyed to the storage tank, which is situated in the west portion of the site within the P1 level of the underground parkade.

The site will connect to the 450 mm storm sewer in Hurontario Street being installed by Metrolinx as part of the Hurontario Light Rail Transit project.

Flows from 0.02 ha of the site along the boundary are not able to be captured by area drains and will flow uncontrolled Avenue (0.003 ha) and 0.017 ha will continue draining east.

5.3 Quality Control

As identified in section 5.1 above, the site is required to meet a minimum of 80% TSS removal on site for quality control.

To achieve the required TSS removal an Oil Grit Separator (OGS) will be used downstream of the proposed storage tanks. An Stormceptor OGS is proposed, which is ETC certified, to provide quality control for the development.

Table 1 below outlines preliminary sizing for the OGS. Sizing specifications are to be verified by the manufacturer during detailed design.

Table 1: OGS Parameters

OGS #	Size	Area (ha)	Efficiency (%)
1	EFO6	1.35	82
2	EFO4	0.14	96

Refer to **Appendix B** for the Stormceptor Sizing Report. Refer to **Drawing STM-1** for the location of the OGS.

5.4 Quantity Control

A Visual Otthymo (VO6) model was created to determine the pre-development 2-year flow from the subject property. A 24-hour Chicago rainfall distribution was used to simulate the rainfall on the site using the Pearson International Airport IDF parameters. As the site is fully developed under existing conditions, a runoff coefficient of 0.5 was used as prescribed by the City of Mississauga standards. Under existing conditions 0.29 ha of external drainage flow south into the subject lands, the target flow rate for these lands was also calculated using VO6. **Table 2** below outlines the pre-development 2-year flow.

Table 2: 2-year Pre-development Target

Name	Area (ha)	Runoff Coefficient	2-year Target (m^3/s)
3085 Hurontario	1.5	0.5	0.176
External Area	0.29	0.5	0.037

As the properties allocation in the 450 mm storm sewer being constructed by Metrolinx is unknown at this time, quantity control has been designed to conservatively release the flows from the tank over a 24 hour period.

One tank is proposed within the underground parking where flows will be pumped to Hurontario over 24 hours, with an emergency overflow. A second tank is proposed within the road that is connect to Hurontario. VO6 has indicated a runoff volume of 118 mm in the 100-year storm, so for the 1.49 ha site that is to be controlled and 0.29 ha of external area, the required flow rate over 24 hours would be approximately 24 L/s. **Table 3** summarizes the flow and storage required based on the VO6 model.

Table 3: Flow and Required Storage Volume Results

Outlet	Area (ha)	Post Development Flows (m^3/s)	Required Volume (m^3)
Tank 1 - Building	1.64	0.022	983
Tank 2 - Road	0.14	0.002	103

In addition to the stormwater flows from the development, there is also a permanent dewatering of approximately 3 L/s. The total flow to the 450 mm pipe is proposed to be 27 L/s from the subject property which represents only approximately 11% of the pipe capacity.

When the site's allocation in the 450 mm storm sewer is known the target release rate and proposed storage will be revised as required.

Refer to SWM Calculations in **Appendix B** for supporting calculations.

5.5 Water Balance/Water Re-use

As shown in section 5.1 above, the first 5 mm of a rain event are required to be retained onsite. For a site of 1.5 ha this results in a total volume of 74.95 m^3. Due to the high groundwater table and extent of the underground parking garage, there are no options for infiltrating the water so rainwater will be retained through the use of green roofs or rainwater harvesting. The storage tank will be designed to capture the first 5 mm for reuse in a sump. The end use of this water will be determined at detailed design.

Refer to the Water Balance in **Appendix B** for the supporting calculations.

6. WASTEWATER SERVICING

6.1 Existing Conditions

The existing sanitary sewer in proximity to the site is as follows:

1. 300 mm diameter located within Hurontario Street flowing south.

The location of the existing is sewer is shown on **Drawing SER-1**.

6.2 Design Criteria

Wastewater sewers will be designed in accordance with Region of Peel standards and specifications. The following criteria were used:

- 1.7 people/unit for small apartments (less than or equal to one bedroom)
- 3.1 people/unit for larger apartments (greater than 1 bedroom)
- 50 people/ha for commercial areas
- 0.26 L/s/ha for infiltration
- 290 L/person/day for domestic sewage flow

6.3 Local Wastewater Design

The estimated sanitary flow from the subject lands is 43.36 L/s. Refer to Wastewater Demand Calculations in **Appendix C** for calculations.

Sanitary servicing within the site will be designed by the project mechanical engineer as the building design advances. Proposed sanitary flows from the subject property have an outlet to Hurontario Street as confirmed by Metrolinx via a new 250 mm service connection to the existing public sewer on Hurontario Street. A second outlet via Kirwin Avenue is proposed based on discussions with the Region of Peel. Refer to **Drawing SER-1** for the anticipated connection locations.

The estimated flow was provided to the Region of Peel to verify sewer capacity using their model. The Region of Peel has previously advised that two lengths of public downstream sanitary sewer will be at or above capacity.

Region of Peel indicated the following external upgrades may be required:

- replacement of 15m of existing 375 mm diameter sanitary sewer at Jaguar Valley at Dundas Street.
- The upgrade and new construction of the 525 mm diameter sanitary sewer will be required along Kirwin to Cooksville Creek trunk. The construction of this sewer is not at a developer expense.

Consideration should be given to monitoring the capacity of the existing sewers to confirm the actual existing utilization. Due to the conservative nature of flow calculations and population estimates, the degree of surcharge could be overstated.

7. WATER SERVICING

7.1 Existing Conditions

The existing water network, which falls under the jurisdiction of the Region of Peel, in the vicinity of the site includes:

1. A 400 mm local watermain on Hurontario Street
2. A 300 mm local watermain on Kirwin Avenue

7.2 Design Criteria

The proposed watermain design will comply with the Region of Peel design criteria as follows:

- Residential Consumption = 280 l/c/day, max day = 3
- Commercial Consumption = 300 l/employee/day, max day = 1.4
- Residential and Commercial Peak Hour = 3
- Minimum operating pressure = 40 psi
- Maximum operating pressure = 100 psi

7.3 Local Watermains

Water servicing will be provided to the site via two new water services as shown on **Drawing SER-1**. Region of Peel has indicated that a redundant water service with isolation between the services will be required. The water service size is estimated to be 200 mm which will be confirmed as the project advances. A 250 mm connection will be made to the existing 300 mm watermain on Kirwin Avenue and a 300 mm connection will be made to the proposed 600 mm on Hurontario Street. The onsite water supply system will be designed by the project mechanical engineer as the building design advances.

The total proposed fire flow from the subject lands is estimated to be 100 L/s (1585 USGPM) and the average day demand is approximately 11.46 L/s (181 USGPM).

A hydrant flow test was conducted on the hydrant adjacent to the site on Hurontario Street as well as at 3094 Jaguar Valley Drive. The results of the test are shown in **Table 4**.

Table 4: Fire Flow Tests

Pressure (psi)	Flow (USGPM)
3085 Hurontario Street	
80.2	0
73.2	4725
20	15139
Jaguar Valley Drive	
82.6	0
78.7	5586
20	25144

Water demand and the results of the hydrant flow test were provided to the Region of Peel and no water capacity constraints were found.

Refer to **Appendix D** for water demand calculation and hydrant flow test results.

8. EROSION AND SEDIMENT CONTROL AND CONSTRUCTION DEWATERING

Erosion and sediment controls measures as follows:

1. Installing heavy duty silt control fencing along the perimeter of the site at strategic locations.
2. Installing a temporary mud mat at the construction site entrance.
3. Wrapping the tops of all inlet structures with filter fabric and using install silt sacks.
4. Inspecting all sediment and erosion control controls to maintain them in good repair until such time as the Engineer or the City approves their removal.
5. Safe discharge of construction water in accordance with City and provincial guidelines.

Site-specific ESC and Groundwater disposal measures will be determined during the detailed design / site alteration application stage of the project.

9. CONCLUSIONS

This report has demonstrated that:

- The proposed site will be graded to match to existing elevations at all property lines. A retaining wall will be required at the east property limit.
- Building Storm drains will be designed by the project mechanical engineer at the building permit stage.
- Water quality will be provided through the use of an OGS device.
- Storm water quantity control estimated to be 1,086 m^3 will be required for post development 100 year storm. The target flow is less than that of the predevelopment 2 year storm in accordance with Mississauga standards.
- Storage will be provided with two tanks, one located at the west portion of the building, adjacent to Hurontario Street, that will be integrated with the building parking structure and one within the proposed municipal road.
- The site will utilize the 450 mm storm sewer connection proposed by Metrolinx; target release rates and storage will be updated based on the site's allocation in this sewer, when known.
- Water balance objectives will be met by retaining the first 5 mm of rain events onsite through green roofs or rainwater harvesting in the storage tank. Retained water will be re-used for irrigation purposes.
- Wastewater servicing to the site will be provided by a new 200 mm diameter connection to the 250 mm diameter existing sewer on Hurontario Street. A second connection has also been considered via the proposed sanitary sewer on Kirwin Avenue.
- Region of Peel has indicated that some of the existing sewers in the vicinity if the site may require capacity augmentation.
- Water servicing to the site will be provided by the existing 300 mm watermain on Kirwin Avenue as directed by the Region as well as the proposed 600 mm watermain on Hurontario Street.
- Erosion and sediment control and groundwater control measures will be implemented during construction in accordance with City and Provincial requirements.

Report Prepared by:

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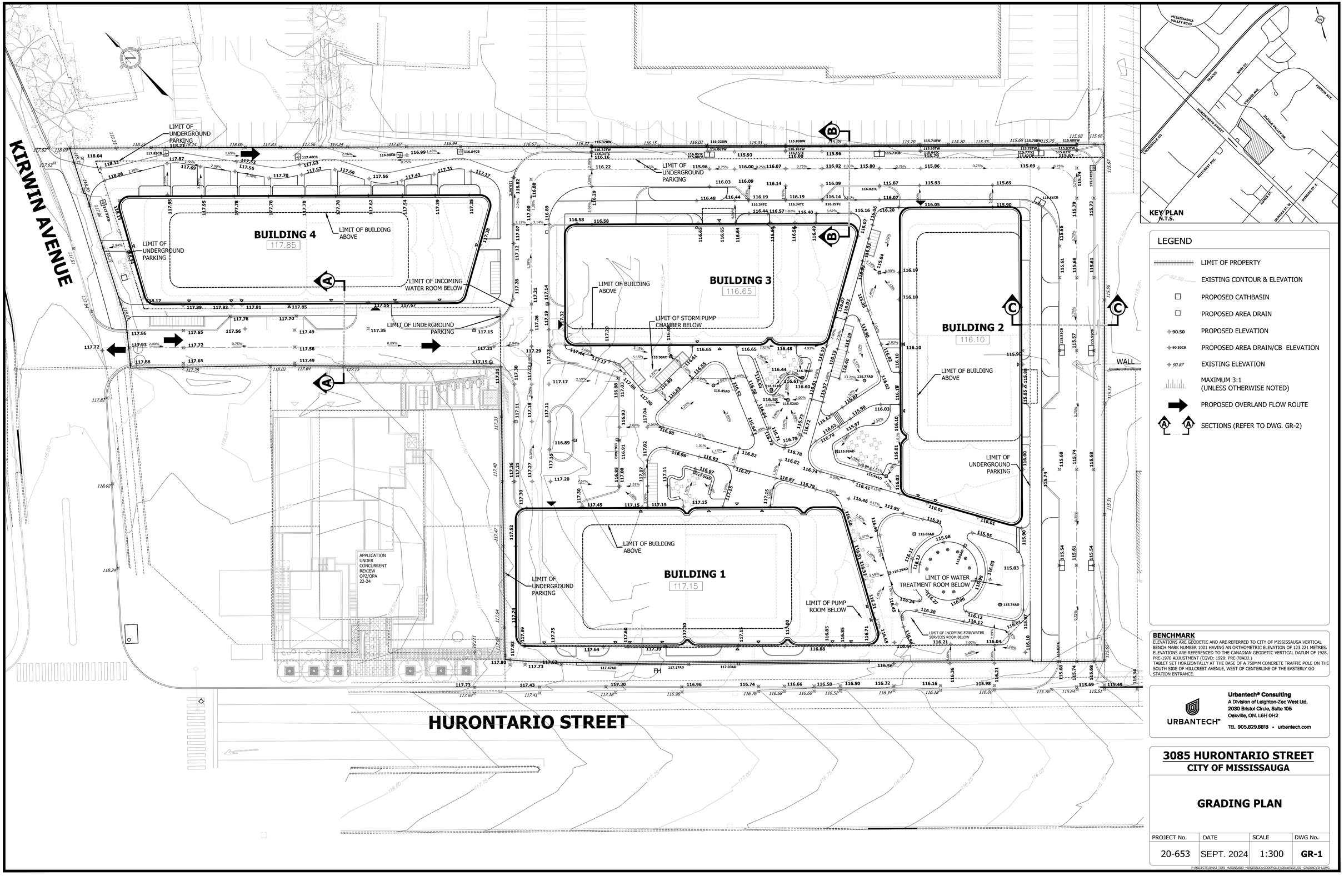
Project Manager

Rob Merwin, P. Eng.
Senior Associate, Land Development

APPENDIX A
Drawings and Figures

Drawing GR-1 Grading Plan
Drawing GR-2 Grading Sections
Drawing STM-1 Storm Drainage Plan
Drawing SER-1 Servicing Plan



LEGEND

- LIMIT OF PROPERTY
- EXISTING CONTOUR & ELEVATION
- PROPOSED CATHBASIN
- PROPOSED AREA DRAIN
- PROPOSED ELEVATION
- PROPOSED AREA DRAIN/CB ELEVATION
- EXISTING ELEVATION
- MAXIMUM 3:1 (UNLESS OTHERWISE NOTED)
- PROPOSED OVERLAND FLOW ROUTE
- SECTIONS (REFER TO DWG. GR-2)

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA VERTICAL BENCH MARK NUMBER 1001 HAVING AN ORTHOMETRIC ELEVATION OF 123.221 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, PRE-1978 ADJUSTMENT (CGVD: 1928: PRE-78ADJ.)

TABLET SET HORIZONTALLY AT THE BASE OF A 750MM CONCRETE TRAFFIC POLE ON THE SOUTH SIDE OF HILLCREST AVENUE, WEST OF CENTERLINE OF THE EASTERLY GO STATION ENTRANCE.

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3085 HURONTARIO STREET
CITY OF MISSISSAUGA

GRADING PLAN

PROJECT No.	DATE	SCALE	DWG No.
20-653	SEPT. 2024	1:300	**GR-1**

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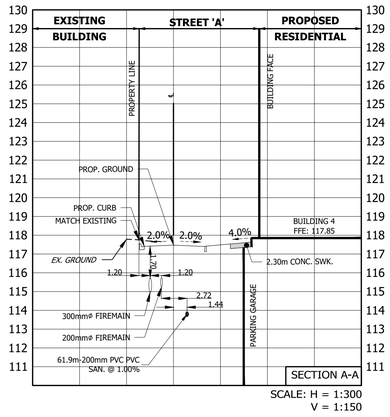

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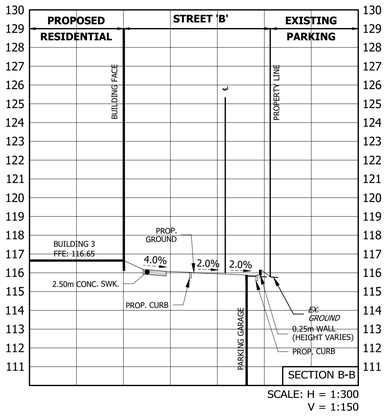

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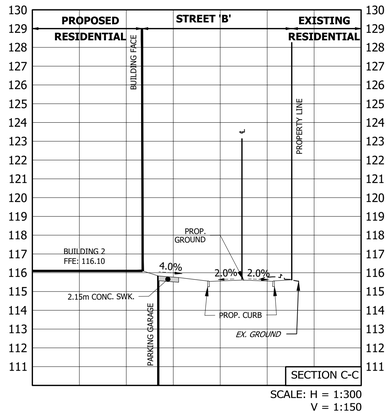

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BENCHMARK
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3085 HURONTARIO STREET
CITY OF MISSISSAUGA

GRADING SECTIONS

PROJECT No.	DATE	SCALE	DWG No.
20-653	SEPT. 2024	1:300	**GR-2**

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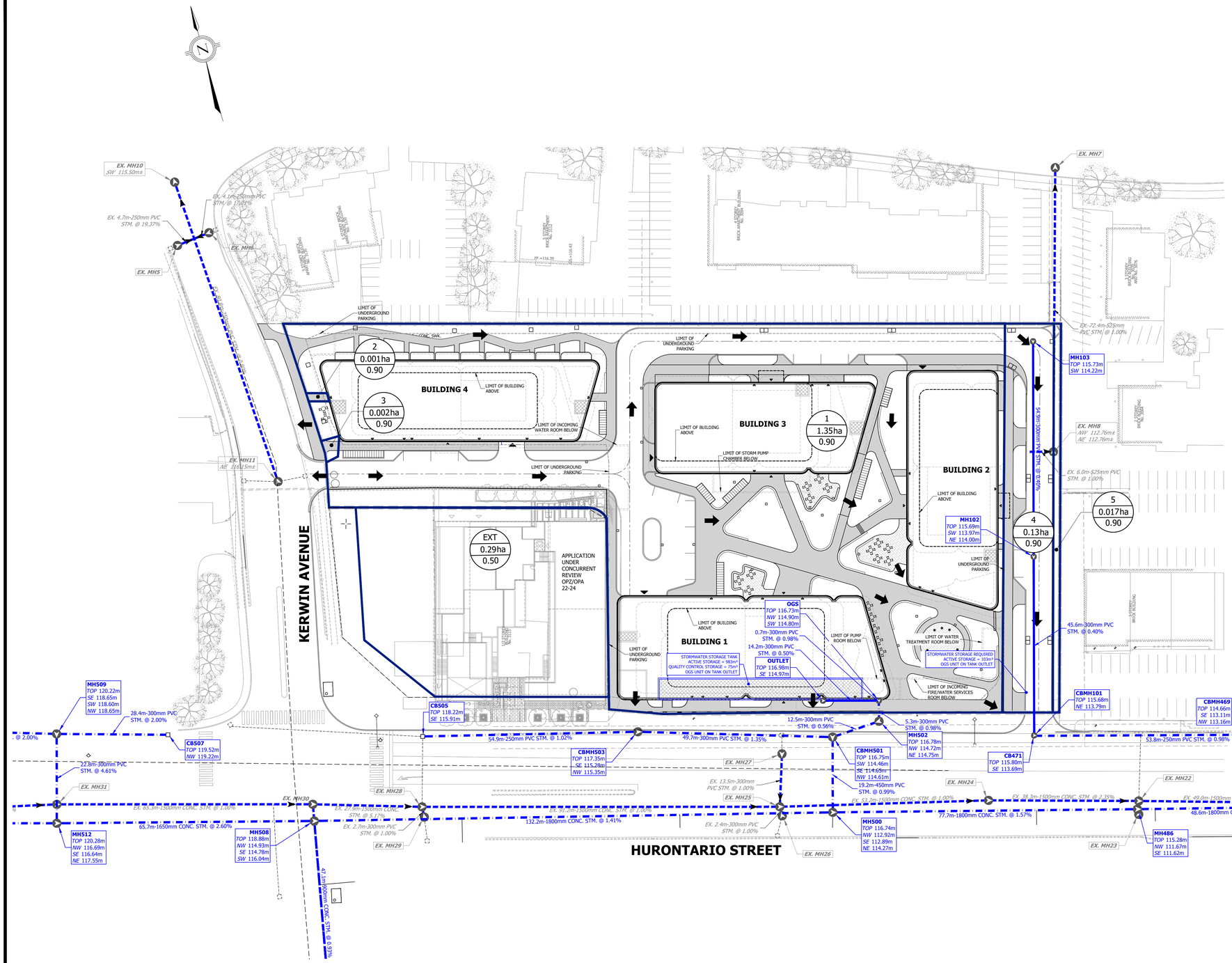

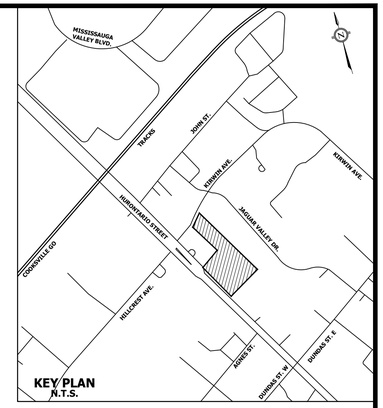

LEGEND

- LIMIT OF PROPERTY
- STORM DRAINAGE AREA BOUNDARY
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER (B.O.)
- EXISTING STORM SEWER
- 41 / 0.26ha / 0.65 — AREA I.D. / AREA Ha. / RUNOFF COEFFICIENT
- STM.MH2 (TOP 90.70m, S 85.00m, E 85.00m, W 85.00m, N 85.00m) — STORM MANHOLE ID / PROPOSED GROUND ELEVATION / PROPOSED SEWER INVERTS
- PROPOSED OVERLAND FLOW ROUTE

BENCHMARK

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3085 HURONTARIO STREET
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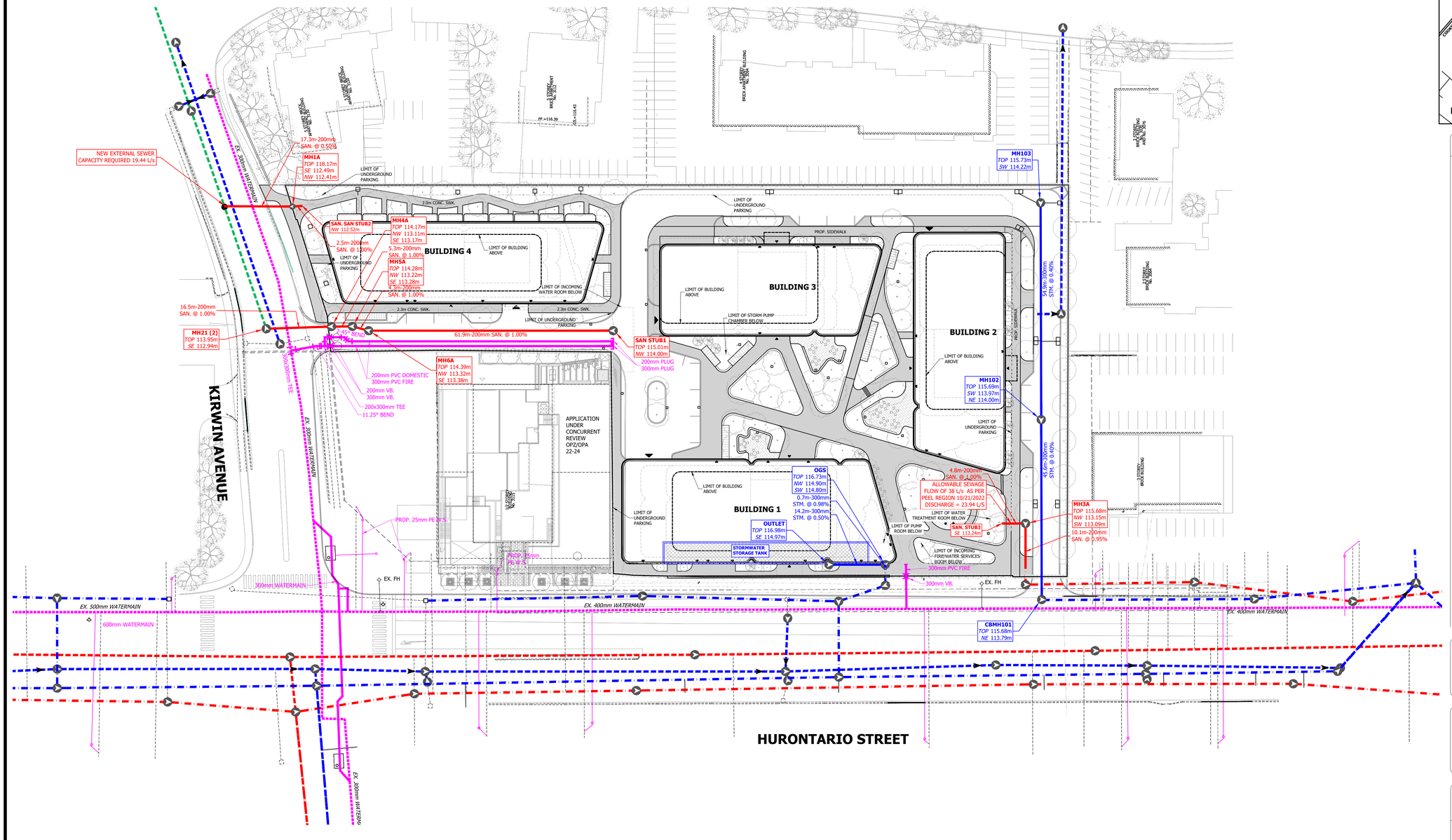
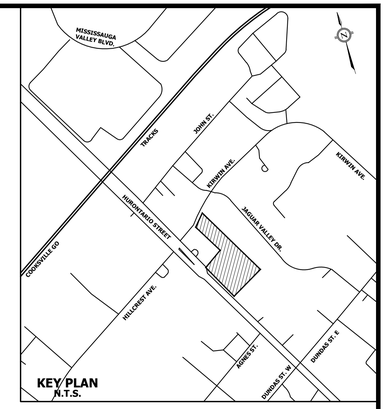
STORM DRAINAGE PLAN

PROJECT No.	DATE	SCALE	DWG No.
20-653	SEPT. 2024	1:500	**STM-1**





LEGEND

- LIMIT OF PROPERTY
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER (B.O.)
- EXISTING STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SEWER (B.O.)
- PROPOSED EXTERNAL SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING WATERMAIN

STM.MH2 — STORM MANHOLE ID
TOP 90.70m — GROUND ELEVATION
S 85.00m
E 85.00m
W 85.00m
N 85.00m — STORM SEWER INVERTS

SAN.MH5A — SANITARY MANHOLE ID
TOP 90.75m — GROUND ELEVATION
S 85.00m
N 85.00m
E 85.00m — SANITARY SEWER INVERTS

BENCHMARK

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3085 HURONTARIO STREET
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SERVICING PLAN

PROJECT No.	DATE	SCALE	DWG No.
20-653	SEPT. 2024	1:500	**SER-1**

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APPENDIX B
SWM Calculations

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SWM DESIGN CALCULATIONS
WATER BALANCE

Project Name: 3085 Hurontario
Municipality: City of Mississauga
Project No.: 20-653

Prepared by: JPO
Checked by: SH
Last Revised: 10-Aug-23

For this site, the minimum on-site runoff retention will require the site to retain all runoff from the first 5 mm of rainfall through infiltration, evapotranspiration or rainwater reuse, per CVC SWM Criteria (Section 4.2).

Site Area =	14990	m^2	
Required Water Balance Volume =	74.95	m^3	
Runoff Coefficient [1] =	0.9		
Equivalent Imperviousness =	100%		(based on I = (C - 0.2) / 0.7)

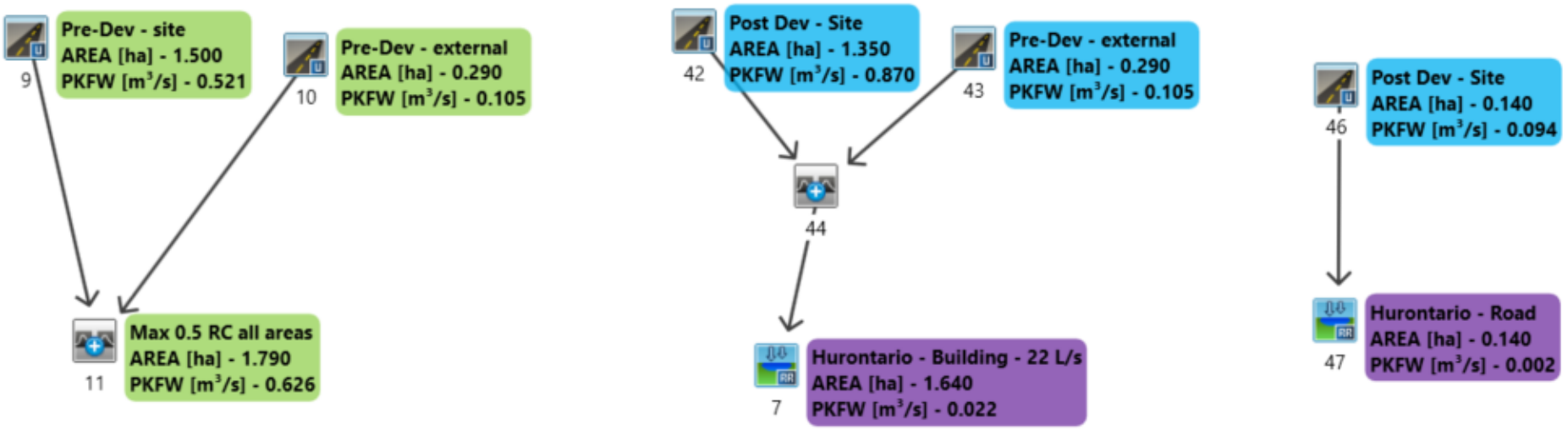
[1] Runoff Coefficient for high density residential
City of Mississauga, *Development Requirements Manual, Section 8*

Proposed Site Area Breakdown			
Cover	A (m^2)	IA (mm)	IA Volume (m^3)
Impervious	14,990	0	0.0
Pervious	0	0	0.0
Total	14,990		0.0

Total Initial Abstraction Volume = 0.0 m^3

Required Reuse Volume = SWM Tank Sump Volume
= 74.95 m^3

VO6 Schematic



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        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
f84b0f83-4cf7-4057-a8cc-71454f30861d\
  Summary filename:
C:\Users\jannaormond\AppData\Local\Civica\VH5\9929ac5f-ba15-45f1-bf52-2a03313dafac\
f84b0f83-4cf7-4057-a8cc-71454f30861d\


DATE: 09-05-2024                          TIME: 02:49:05

USER:



COMMENTS: _____________________________________________________


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  ************************************************
  ** SIMULATION : 100-year chicago - 24 hour -  **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1450.000
| Ptotal=119.37 mm |                          B=   4.900
--------------------                          C=   0.780
```

used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs
Storm time step   = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.12	6.00	3.49	12.00	3.29	18.00	1.59
0.08	1.13	6.08	3.62	12.08	3.24	18.08	1.58
0.17	1.14	6.17	3.76	12.17	3.18	18.17	1.57
0.25	1.15	6.25	3.92	12.25	3.14	18.25	1.56
0.33	1.16	6.33	4.09	12.33	3.09	18.33	1.55
0.42	1.17	6.42	4.27	12.42	3.04	18.42	1.54
0.50	1.18	6.50	4.48	12.50	3.00	18.50	1.53
0.58	1.19	6.58	4.72	12.58	2.95	18.58	1.53
0.67	1.20	6.67	4.98	12.67	2.91	18.67	1.52
0.75	1.21	6.75	5.28	12.75	2.87	18.75	1.51
0.83	1.22	6.83	5.62	12.83	2.83	18.83	1.50
0.92	1.23	6.92	6.02	12.92	2.79	18.92	1.49
1.00	1.24	7.00	6.49	13.00	2.76	19.00	1.48
1.08	1.26	7.08	7.05	13.08	2.72	19.08	1.47
1.17	1.27	7.17	7.72	13.17	2.69	19.17	1.46
1.25	1.28	7.25	8.57	13.25	2.65	19.25	1.45
1.33	1.29	7.33	9.66	13.33	2.62	19.33	1.45
1.42	1.31	7.42	11.12	13.42	2.59	19.42	1.44
1.50	1.32	7.50	13.17	13.50	2.56	19.50	1.43
1.58	1.33	7.58	16.30	13.58	2.53	19.58	1.42
1.67	1.35	7.67	21.69	13.67	2.50	19.67	1.41
1.75	1.36	7.75	33.28	13.75	2.47	19.75	1.40
1.83	1.38	7.83	76.62	13.83	2.44	19.83	1.40
1.92	1.39	7.92	242.53	13.92	2.41	19.92	1.39
2.00	1.41	8.00	98.69	14.00	2.39	20.00	1.38
2.08	1.42	8.08	54.64	14.08	2.36	20.08	1.37
2.17	1.44	8.17	37.73	14.17	2.33	20.17	1.37
2.25	1.46	8.25	28.91	14.25	2.31	20.25	1.36
2.33	1.47	8.33	23.53	14.33	2.29	20.33	1.35
2.42	1.49	8.42	19.90	14.42	2.26	20.42	1.35
2.50	1.51	8.50	17.30	14.50	2.24	20.50	1.34
2.58	1.53	8.58	15.34	14.58	2.22	20.58	1.33
2.67	1.55	8.67	13.80	14.67	2.20	20.67	1.32
2.75	1.57	8.75	12.57	14.75	2.17	20.75	1.32
2.83	1.59	8.83	11.55	14.83	2.15	20.83	1.31
2.92	1.61	8.92	10.71	14.92	2.13	20.92	1.30
3.00	1.63	9.00	9.98	15.00	2.11	21.00	1.30
3.08	1.65	9.08	9.36	15.08	2.09	21.08	1.29
3.17	1.68	9.17	8.82	15.17	2.07	21.17	1.28
3.25	1.70	9.25	8.35	15.25	2.05	21.25	1.28
3.33	1.72	9.33	7.92	15.33	2.04	21.33	1.27
3.42	1.75	9.42	7.55	15.42	2.02	21.42	1.27
3.50	1.78	9.50	7.21	15.50	2.00	21.50	1.26
3.58	1.80	9.58	6.90	15.58	1.98	21.58	1.25
3.67	1.83	9.67	6.62	15.67	1.97	21.67	1.25
3.75	1.86	9.75	6.37	15.75	1.95	21.75	1.24
3.83	1.89	9.83	6.13	15.83	1.93	21.83	1.24
3.92	1.92	9.92	5.92	15.92	1.92	21.92	1.23
4.00	1.96	10.00	5.72	16.00	1.90	22.00	1.22
4.08	1.99	10.08	5.54	16.08	1.89	22.08	1.22
4.17	2.02	10.17	5.37	16.17	1.87	22.17	1.21
4.25	2.06	10.25	5.21	16.25	1.86	22.25	1.21
4.33	2.10	10.33	5.06	16.33	1.84	22.33	1.20
4.42	2.14	10.42	4.92	16.42	1.83	22.42	1.20
4.50	2.18	10.50	4.78	16.50	1.81	22.50	1.19
4.58	2.23	10.58	4.66	16.58	1.80	22.58	1.19
4.67	2.27	10.67	4.54	16.67	1.79	22.67	1.18
4.75	2.32	10.75	4.43	16.75	1.77	22.75	1.18
4.83	2.37	10.83	4.33	16.83	1.76	22.83	1.17
4.92	2.42	10.92	4.23	16.92	1.75	22.92	1.16
5.00	2.48	11.00	4.14	17.00	1.73	23.00	1.16
5.08	2.54	11.08	4.05	17.08	1.72	23.08	1.15
5.17	2.60	11.17	3.96	17.17	1.71	23.17	1.15
5.25	2.67	11.25	3.88	17.25	1.70	23.25	1.14
5.33	2.74	11.33	3.80	17.33	1.68	23.33	1.14
5.42	2.81	11.42	3.73	17.42	1.67	23.42	1.14
5.50	2.89	11.50	3.66	17.50	1.66	23.50	1.13
5.58	2.97	11.58	3.59	17.58	1.65	23.58	1.13
5.67	3.06	11.67	3.53	17.67	1.64	23.67	1.12
5.75	3.16	11.75	3.46	17.75	1.63	23.75	1.12
5.83	3.26	11.83	3.40	17.83	1.62	23.83	1.11
5.92	3.37	11.92	3.35	17.92	1.61	23.92	1.11

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--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0042)|   Area    (ha)=   1.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.34         0.01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      94.87        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.53       107.89
               over (min)       5.00         5.00
     Storage Coeff.  (min)=       1.74 (ii)    2.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.29
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.87         0.00         0.870 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00         8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54        117.92
     TOTAL RAINFALL   (mm)=     119.37       119.37        119.37
     RUNOFF COEFFICIENT   =       0.99         0.62         0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0043)|   Area    (ha)=   0.29
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  43.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.17
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     242.53       107.89
               over (min)       5.00         10.00
     Storage Coeff.  (min)=       1.09 (ii)    7.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.34         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.04         0.105 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.08         8.00
     RUNOFF VOLUME    (mm)=     118.37        73.54        92.81
     TOTAL RAINFALL   (mm)=     119.37       119.37        119.37
     RUNOFF COEFFICIENT   =       0.99         0.62         0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0044)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0042):     1.35   0.870     8.00   117.92
     + ID2= 2 (  0043):     0.29   0.105     8.00    92.81
       ================================================
       ID = 3 (  0044):     1.64   0.975     8.00   113.48

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0007)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0220     0.0983
                          0.0150     0.0010   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0044)      1.640     0.975      8.00     113.48
  OUTFLOW: ID= 1 (  0007)      1.640     0.022     10.50     113.48

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.26
                 TIME SHIFT OF PEAK FLOW         (min)=150.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0983

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area    (ha)=   1.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  43.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.65         0.86
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     100.00        40.00
    Mannings n           =      0.013        0.250

    Max.Eff.Inten.(mm/hr)=     242.53       107.89
                over (min)        5.00        10.00
    Storage Coeff.  (min)=       1.79 (ii)    8.64 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.32         0.12
                                                    *TOTALS*
    PEAK FLOW       (cms)=       0.42         0.18          0.521 (iii)
    TIME TO PEAK    (hrs)=       8.00         8.08          8.00
    RUNOFF VOLUME    (mm)=     118.37        73.54         92.82
    TOTAL RAINFALL   (mm)=     119.37       119.37         119.37
    RUNOFF COEFFICIENT   =       0.99         0.62          0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   0.29
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  43.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.12         0.17
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      43.97        40.00
    Mannings n           =      0.013        0.250

    Max.Eff.Inten.(mm/hr)=     242.53       107.89
                over (min)        5.00        10.00
    Storage Coeff.  (min)=       1.09 (ii)    7.94 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.34         0.13
                                                    *TOTALS*
    PEAK FLOW       (cms)=       0.08         0.04          0.105 (iii)
    TIME TO PEAK    (hrs)=       8.00         8.08          8.00
    RUNOFF VOLUME    (mm)=     118.37        73.54         92.81
    TOTAL RAINFALL   (mm)=     119.37       119.37         119.37
    RUNOFF COEFFICIENT   =       0.99         0.62          0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.29   0.105     8.00    92.81
     + ID2= 2 (  0009):     1.50   0.521     8.00    92.82
       ================================================
       ID = 3 (  0011):     1.79   0.626     8.00    92.82

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0046)|   Area    (ha)=   0.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.14         0.00
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      30.55        40.00
    Mannings n           =      0.013        0.250

    Max.Eff.Inten.(mm/hr)=     242.53       107.89
                over (min)        5.00         5.00
    Storage Coeff.  (min)=       0.88 (ii)    1.67 (ii)
    Unit Hyd. Tpeak (min)=       5.00         5.00
    Unit Hyd. peak  (cms)=       0.34         0.32
                                                    *TOTALS*
    PEAK FLOW       (cms)=       0.09         0.00          0.094 (iii)
    TIME TO PEAK    (hrs)=       8.00         8.00          8.00
    RUNOFF VOLUME    (mm)=     118.37        73.54         117.92
    TOTAL RAINFALL   (mm)=     119.37       119.37         119.37
    RUNOFF COEFFICIENT   =       0.99         0.62          0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0047)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0020     0.0103
                          0.0014     0.0050   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0046)      0.140     0.094      8.00     117.92
  OUTFLOW: ID= 1 (  0047)      0.140     0.002     10.33     111.46

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.14
                 TIME SHIFT OF PEAK FLOW         (min)=140.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0103

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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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  Output  filename:
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DATE: 09-05-2024                          TIME: 02:49:04

USER:
```

COMMENTS: _____

****
** SIMULATION : 2 year - 24 hour chicago - mi **
****

| CHICAGO STORM | IDF curve parameters: A= 610.000
| Ptotal= 50.23 mm | B= 4.600
C= 0.780
used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.47	6.00	1.47	12.00	1.38	18.00	0.67
0.08	0.47	6.08	1.52	12.08	1.36	18.08	0.67
0.17	0.48	6.17	1.58	12.17	1.34	18.17	0.66
0.25	0.48	6.25	1.64	12.25	1.32	18.25	0.66
0.33	0.49	6.33	1.71	12.33	1.30	18.33	0.65
0.42	0.49	6.42	1.79	12.42	1.28	18.42	0.65
0.50	0.49	6.50	1.88	12.50	1.26	18.50	0.65
0.58	0.50	6.58	1.98	12.58	1.24	18.58	0.64
0.67	0.50	6.67	2.09	12.67	1.22	18.67	0.64
0.75	0.51	6.75	2.21	12.75	1.21	18.75	0.63
0.83	0.51	6.83	2.36	12.83	1.19	18.83	0.63
0.92	0.52	6.92	2.52	12.92	1.17	18.92	0.63
1.00	0.52	7.00	2.72	13.00	1.16	19.00	0.62
1.08	0.53	7.08	2.95	13.08	1.14	19.08	0.62
1.17	0.53	7.17	3.23	13.17	1.13	19.17	0.61
1.25	0.54	7.25	3.59	13.25	1.11	19.25	0.61
1.33	0.54	7.33	4.04	13.33	1.10	19.33	0.61
1.42	0.55	7.42	4.65	13.42	1.09	19.42	0.60
1.50	0.55	7.50	5.50	13.50	1.07	19.50	0.60
1.58	0.56	7.58	6.80	13.58	1.06	19.58	0.60
1.67	0.57	7.67	9.03	13.67	1.05	19.67	0.59
1.75	0.57	7.75	13.85	13.75	1.04	19.75	0.59
1.83	0.58	7.83	32.04	13.83	1.02	19.83	0.59
1.92	0.59	7.92	104.51	13.92	1.01	19.92	0.58
2.00	0.59	8.00	41.36	14.00	1.00	20.00	0.58
2.08	0.60	8.08	22.75	14.08	0.99	20.08	0.58
2.17	0.61	8.17	15.69	14.17	0.98	20.17	0.57
2.25	0.61	8.25	12.03	14.25	0.97	20.25	0.57
2.33	0.62	8.33	9.80	14.33	0.96	20.33	0.57
2.42	0.63	8.42	8.29	14.42	0.95	20.42	0.57
2.50	0.63	8.50	7.21	14.50	0.94	20.50	0.56
2.58	0.64	8.58	6.40	14.58	0.93	20.58	0.56
2.67	0.65	8.67	5.76	14.67	0.92	20.67	0.56
2.75	0.66	8.75	5.25	14.75	0.91	20.75	0.55
2.83	0.67	8.83	4.83	14.83	0.90	20.83	0.55
2.92	0.68	8.92	4.47	14.92	0.90	20.92	0.55
3.00	0.69	9.00	4.17	15.00	0.89	21.00	0.55
3.08	0.69	9.08	3.92	15.08	0.88	21.08	0.54
3.17	0.70	9.17	3.69	15.17	0.87	21.17	0.54
3.25	0.71	9.25	3.49	15.25	0.86	21.25	0.54
3.33	0.72	9.33	3.32	15.33	0.86	21.33	0.53
3.42	0.74	9.42	3.16	15.42	0.85	21.42	0.53
3.50	0.75	9.50	3.02	15.50	0.84	21.50	0.53
3.58	0.76	9.58	2.89	15.58	0.83	21.58	0.53
3.67	0.77	9.67	2.77	15.67	0.83	21.67	0.52
3.75	0.78	9.75	2.67	15.75	0.82	21.75	0.52
3.83	0.79	9.83	2.57	15.83	0.81	21.83	0.52
3.92	0.81	9.92	2.48	15.92	0.81	21.92	0.52
4.00	0.82	10.00	2.40	16.00	0.80	22.00	0.51
4.08	0.84	10.08	2.32	16.08	0.79	22.08	0.51
4.17	0.85	10.17	2.25	16.17	0.79	22.17	0.51
4.25	0.87	10.25	2.18	16.25	0.78	22.25	0.51
4.33	0.88	10.33	2.12	16.33	0.77	22.33	0.51
4.42	0.90	10.42	2.06	16.42	0.77	22.42	0.50
4.50	0.92	10.50	2.01	16.50	0.76	22.50	0.50
4.58	0.94	10.58	1.95	16.58	0.76	22.58	0.50
4.67	0.95	10.67	1.91	16.67	0.75	22.67	0.50
4.75	0.97	10.75	1.86	16.75	0.74	22.75	0.49
4.83	1.00	10.83	1.82	16.83	0.74	22.83	0.49
4.92	1.02	10.92	1.77	16.92	0.73	22.92	0.49
5.00	1.04	11.00	1.74	17.00	0.73	23.00	0.49
5.08	1.07	11.08	1.70	17.08	0.72	23.08	0.49
5.17	1.09	11.17	1.66	17.17	0.72	23.17	0.48
5.25	1.12	11.25	1.63	17.25	0.71	23.25	0.48
5.33	1.15	11.33	1.60	17.33	0.71	23.33	0.48
5.42	1.18	11.42	1.57	17.42	0.70	23.42	0.48
5.50	1.21	11.50	1.54	17.50	0.70	23.50	0.48
5.58	1.25	11.58	1.51	17.58	0.69	23.58	0.47
5.67	1.29	11.67	1.48	17.67	0.69	23.67	0.47
5.75	1.33	11.75	1.45	17.75	0.68	23.75	0.47
5.83	1.37	11.83	1.43	17.83	0.68	23.83	0.47
5.92	1.41	11.92	1.40	17.92	0.67	23.92	0.47

| CALIB | STANDHYD (0042) | Area (ha)= 1.35
| ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.34	0.01
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	94.87	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	104.51	24.78
over (min)	5.00	5.00
Storage Coeff. (min)=	2.43 (ii)	3.54 (ii)
Unit Hyd. Tpeak (min)=	5.00	5.00
Unit Hyd. peak (cms)=	0.30	0.26

			TOTALS
PEAK FLOW (cms)=	0.35	0.00	0.353 (iii)
TIME TO PEAK (hrs)=	8.00	8.00	8.00
RUNOFF VOLUME (mm)=	49.23	18.81	48.92
TOTAL RAINFALL (mm)=	50.23	50.23	50.23
RUNOFF COEFFICIENT =	0.98	0.37	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB | STANDHYD (0043) | Area (ha)= 0.29
| ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.12	0.17
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	43.97	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	104.51	19.91
over (min)	5.00	15.00
Storage Coeff. (min)=	1.53 (ii)	14.99 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.33	0.08

			TOTALS
PEAK FLOW (cms)=	0.04	0.01	0.037 (iii)
TIME TO PEAK (hrs)=	8.00	8.25	8.00
RUNOFF VOLUME (mm)=	49.23	18.81	31.86
TOTAL RAINFALL (mm)=	50.23	50.23	50.23
RUNOFF COEFFICIENT =	0.98	0.37	0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 80.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD (0044) | 1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0042):	1.35	0.353	8.00	48.92
+ ID2= 2 (0043):	0.29	0.037	8.00	31.86
ID = 3 (0044):	1.64	0.391	8.00	45.91

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| RESERVOIR(0007) | OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0220	0.0983
0.0150	0.0010	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0044)	1.640	0.391	8.00	45.91
OUTFLOW: ID= 1 (0007)	1.640	0.017	9.17	45.90

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.41
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 0.0321

| CALIB | STANDHYD (0009) | Area (ha)= 1.50
| ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.65	0.86
Dep. Storage (mm)=	1.00	5.00

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     100.00        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     104.51        19.91
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.51 (ii)   15.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.29         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.03          0.176 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.25          8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81         31.89
     TOTAL RAINFALL   (mm)=      50.23        50.23         50.23
     RUNOFF COEFFICIENT   =       0.98         0.37          0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   0.29
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  43.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.12         0.17
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     104.51        19.91
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       1.53 (ii)   14.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.33         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.01          0.037 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.25          8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81         31.86
     TOTAL RAINFALL   (mm)=      50.23        50.23         50.23
     RUNOFF COEFFICIENT   =       0.98         0.37          0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
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       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.29   0.037     8.00    31.86
     + ID2= 2 (  0009):     1.50   0.176     8.00    31.89
       ================================================
       ID = 3 (  0011):     1.79   0.213     8.00    31.88

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  0046)|   Area    (ha)=   0.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.55        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     104.51        24.78
               over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.23 (ii)    2.34 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.30
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.040 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.00          8.00
     RUNOFF VOLUME    (mm)=      49.23        18.81         48.92
     TOTAL RAINFALL   (mm)=      50.23        50.23         50.23
     RUNOFF COEFFICIENT   =       0.98         0.37          0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
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     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0047)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0020     0.0103
                          0.0014     0.0050   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0046)     0.140     0.040      8.00      48.92
   OUTFLOW: ID= 1 (  0047)     0.140     0.001      9.58      42.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.88
                  TIME SHIFT OF PEAK FLOW         (min)= 95.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0041

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Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/05/2024

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Project Name:	3085 Hurontario - Building
Project Number:	65630
Designer Name:	Janna Ormond
Designer Company:	Urbantech
Designer Email:	jannaormond@urbantech.com
Designer Phone:	289-887-3057
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Site Name:	

Drainage Area (ha):	1.35
Runoff Coefficient 'c':	0.90

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	37.78
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1359
Estimated Average Annual Sediment Volume (L/yr):	1105

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	69
EFO6	82
EFO8	89
EFO10	93
EFO12	96

Recommended Stormceptor EFO Model: EFO6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 82

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

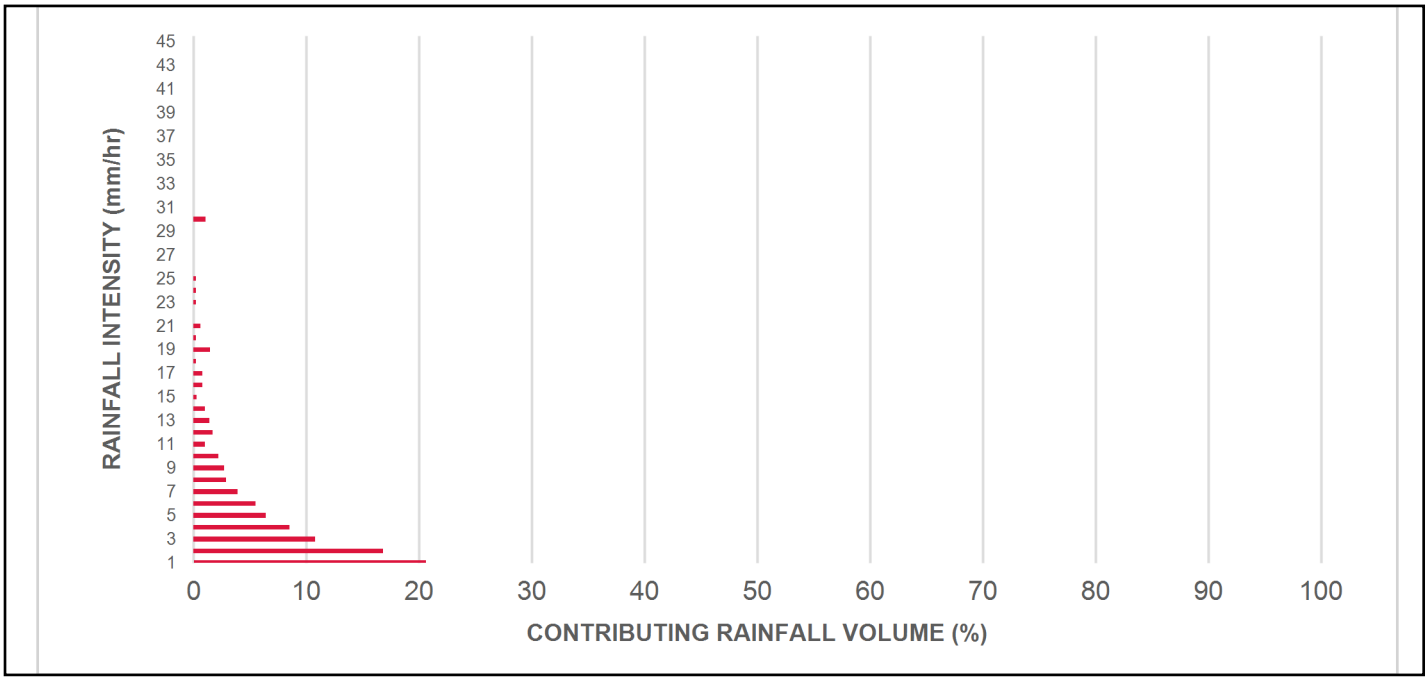
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

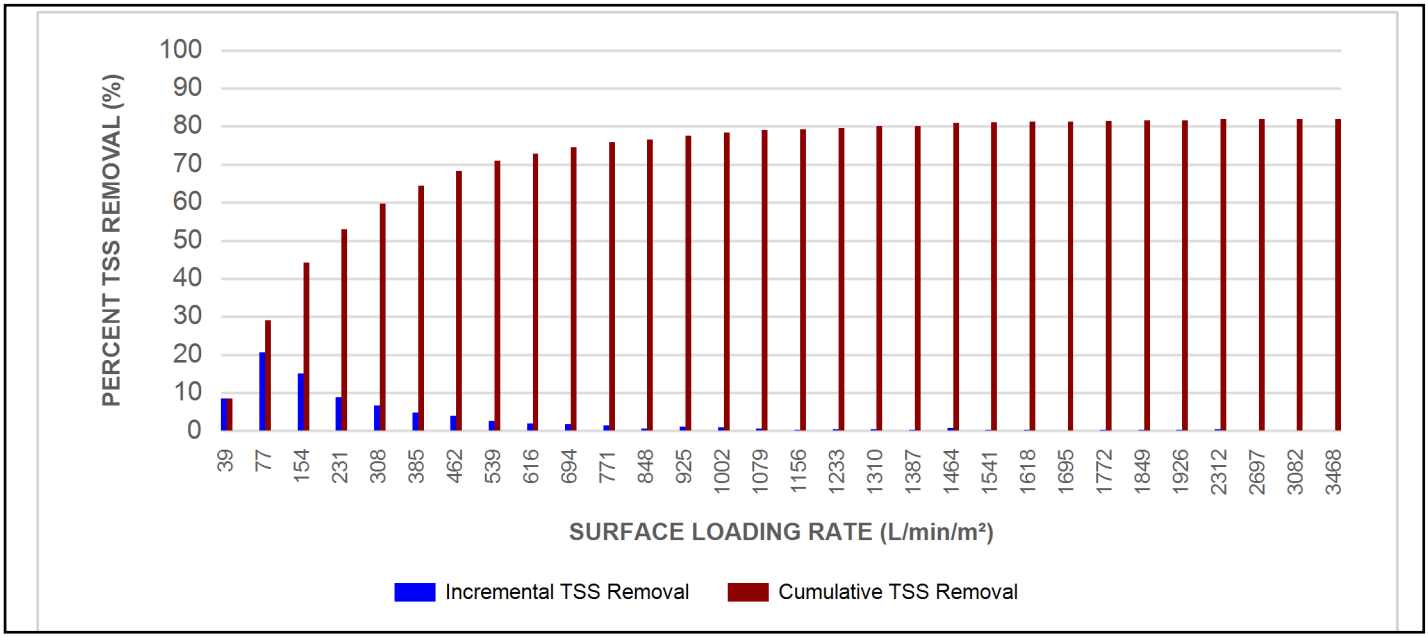
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	1.69	101.0	39.0	100	8.5	8.5
1.00	20.6	29.1	3.38	203.0	77.0	100	20.6	29.1
2.00	16.8	45.9	6.76	405.0	154.0	89	15.0	44.2
3.00	10.8	56.7	10.13	608.0	231.0	82	8.8	53.0
4.00	8.5	65.2	13.51	811.0	308.0	78	6.6	59.6
5.00	6.4	71.6	16.89	1013.0	385.0	75	4.8	64.4
6.00	5.5	77.0	20.27	1216.0	462.0	71	3.9	68.3
7.00	3.9	81.0	23.64	1419.0	539.0	67	2.7	70.9
8.00	2.9	83.9	27.02	1621.0	616.0	65	1.9	72.8
9.00	2.7	86.5	30.40	1824.0	694.0	64	1.7	74.5
10.00	2.2	88.7	33.78	2027.0	771.0	63	1.4	75.9
11.00	1.0	89.7	37.15	2229.0	848.0	63	0.6	76.5
12.00	1.7	91.3	40.53	2432.0	925.0	62	1.0	77.5
13.00	1.4	92.8	43.91	2635.0	1002.0	62	0.9	78.4
14.00	1.0	93.7	47.29	2837.0	1079.0	60	0.6	79.0
15.00	0.3	94.0	50.67	3040.0	1156.0	58	0.2	79.2
16.00	0.8	94.8	54.04	3243.0	1233.0	56	0.4	79.6
17.00	0.8	95.7	57.42	3445.0	1310.0	54	0.5	80.1
18.00	0.2	95.8	60.80	3648.0	1387.0	53	0.1	80.1
19.00	1.5	97.3	64.18	3851.0	1464.0	50	0.7	80.9
20.00	0.2	97.5	67.55	4053.0	1541.0	48	0.1	81.0
21.00	0.6	98.2	70.93	4256.0	1618.0	45	0.3	81.3
22.00	0.0	98.2	74.31	4459.0	1695.0	43	0.0	81.3
23.00	0.2	98.4	77.69	4661.0	1772.0	41	0.1	81.4
24.00	0.2	98.6	81.06	4864.0	1849.0	40	0.1	81.5
25.00	0.2	98.9	84.44	5067.0	1926.0	38	0.1	81.6
30.00	1.1	100.0	101.33	6080.0	2312.0	32	0.4	81.9
35.00	0.0	100.0	118.22	7093.0	2697.0	28	0.0	81.9
40.00	0.0	100.0	135.11	8106.0	3082.0	24	0.0	81.9
45.00	0.0	100.0	152.00	9120.0	3468.0	22	0.0	81.9
Estimated Net Annual Sediment (TSS) Load Reduction =								**82 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

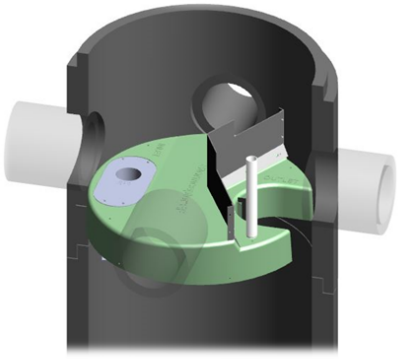
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

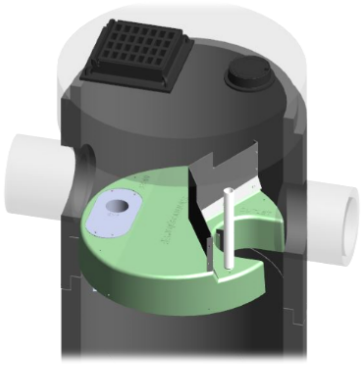
DESIGN FLEXIBILITY

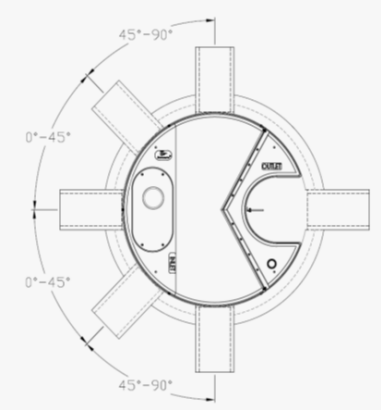
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

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

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/05/2024

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Project Name:	3085 Hurontario - Road
Project Number:	65630
Designer Name:	Janna Ormond
Designer Company:	Urbantech
Designer Email:	jannaormond@urbantech.com
Designer Phone:	289-887-3057
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Site Name:	

Drainage Area (ha):	0.14
Runoff Coefficient 'c':	0.90

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	3.92
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	158
Estimated Average Annual Sediment Volume (L/yr):	129

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	96
EFO6	99
EFO8	100
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 96

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

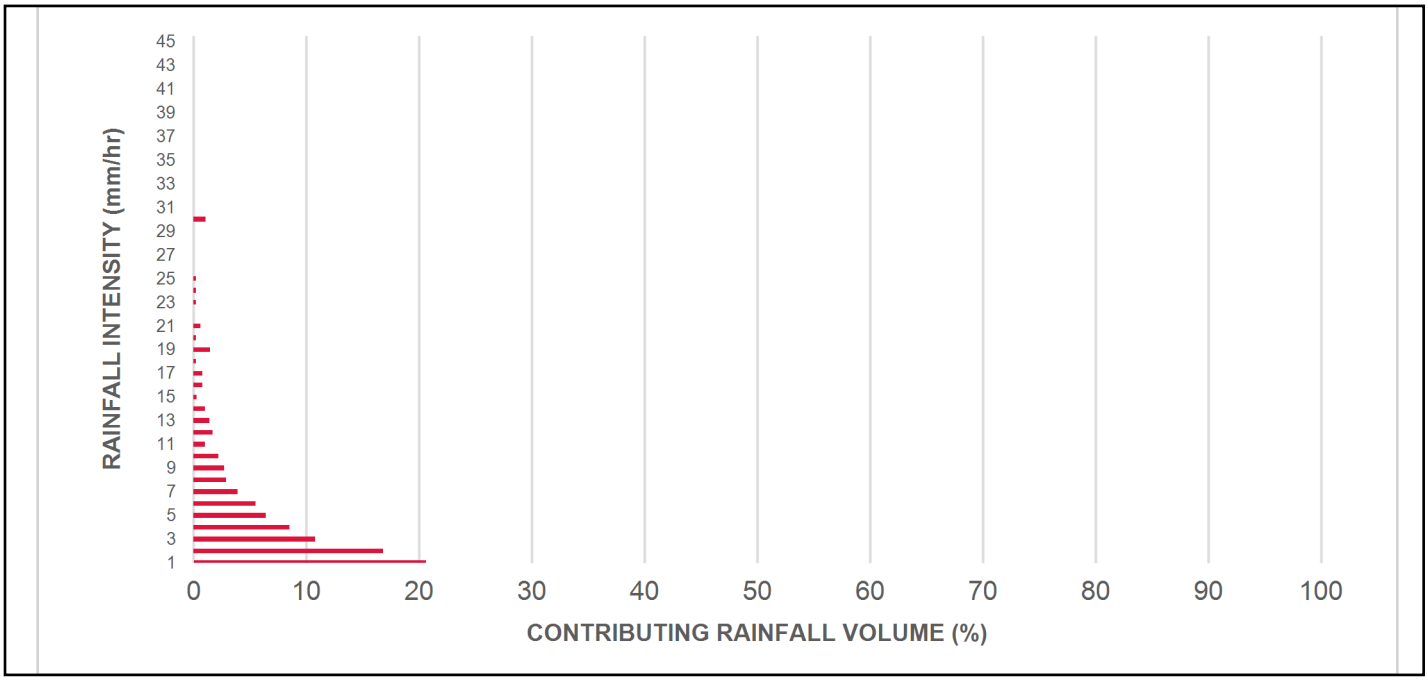
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

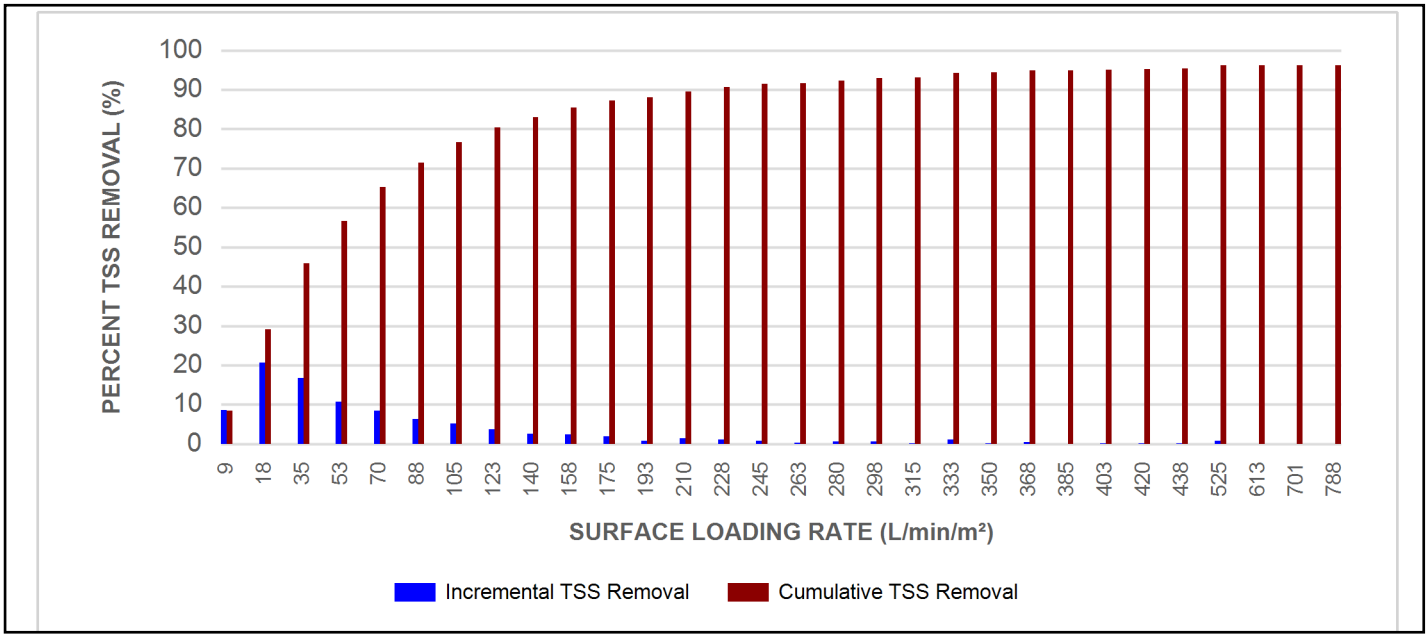
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	0.18	11.0	9.0	100	8.5	8.5
1.00	20.6	29.1	0.35	21.0	18.0	100	20.6	29.1
2.00	16.8	45.9	0.70	42.0	35.0	100	16.8	45.9
3.00	10.8	56.7	1.05	63.0	53.0	100	10.8	56.7
4.00	8.5	65.2	1.40	84.0	70.0	100	8.5	65.2
5.00	6.4	71.6	1.75	105.0	88.0	98	6.3	71.5
6.00	5.5	77.0	2.10	126.0	105.0	96	5.2	76.7
7.00	3.9	81.0	2.45	147.0	123.0	93	3.7	80.4
8.00	2.9	83.9	2.80	168.0	140.0	91	2.6	83.0
9.00	2.7	86.5	3.15	189.0	158.0	89	2.4	85.4
10.00	2.2	88.7	3.50	210.0	175.0	87	1.9	87.3
11.00	1.0	89.7	3.85	231.0	193.0	84	0.8	88.1
12.00	1.7	91.3	4.20	252.0	210.0	83	1.4	89.5
13.00	1.4	92.8	4.55	273.0	228.0	82	1.2	90.7
14.00	1.0	93.7	4.90	294.0	245.0	81	0.8	91.4
15.00	0.3	94.0	5.25	315.0	263.0	80	0.2	91.7
16.00	0.8	94.8	5.60	336.0	280.0	79	0.6	92.3
17.00	0.8	95.7	5.95	357.0	298.0	79	0.7	93.0
18.00	0.2	95.8	6.31	378.0	315.0	78	0.1	93.1
19.00	1.5	97.3	6.66	399.0	333.0	77	1.2	94.3
20.00	0.2	97.5	7.01	420.0	350.0	76	0.2	94.4
21.00	0.6	98.2	7.36	441.0	368.0	76	0.5	94.9
22.00	0.0	98.2	7.71	462.0	385.0	75	0.0	94.9
23.00	0.2	98.4	8.06	483.0	403.0	74	0.2	95.0
24.00	0.2	98.6	8.41	504.0	420.0	73	0.2	95.2
25.00	0.2	98.9	8.76	525.0	438.0	72	0.2	95.4
30.00	1.1	100.0	10.51	631.0	525.0	68	0.8	96.2
35.00	0.0	100.0	12.26	736.0	613.0	65	0.0	96.2
40.00	0.0	100.0	14.01	841.0	701.0	64	0.0	96.2
45.00	0.0	100.0	15.76	946.0	788.0	63	0.0	96.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**96 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

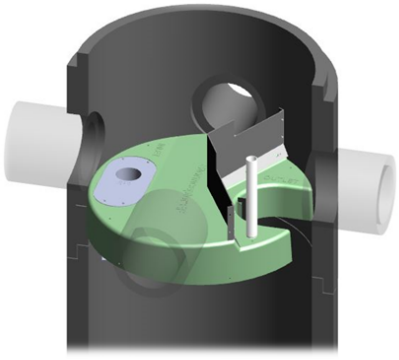
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

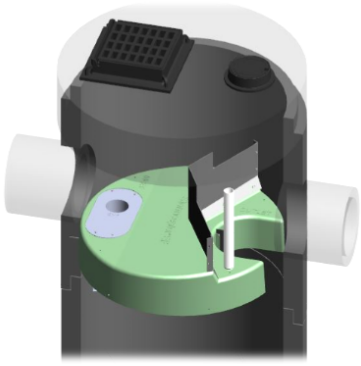
DESIGN FLEXIBILITY

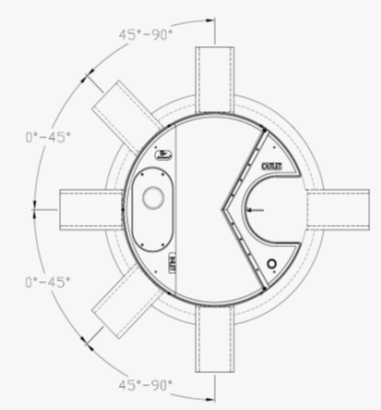
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







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HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
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** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

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

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

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remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

APPENDIX C
Wastewater Servicing

Water and Wastewater Modelling Demand Table - Site Plan applications

Version - January 2023

		units	persons
Proposed Residential[1)]			
	Singles/Semis		
	townhouses		
	large apartments (>750sqft)	467	1448
	small apartments (<=750sqft)	1224	2081
Total Proposed Residential		1691	3529
Proposed Institutional Population[2)]			
Proposed Employment Population[3)]			6
Total			3535

*PPU is updated to the 2022-2023 revised design criteria for the Region of Peel.
Large apartments = 3.1 PPU
Small apartments = 1.7 PPU

Proposed GFA (commercial/retail) (sqm)	1214

WATER CONNECTION

Hydrant flow test							
	Hydrant flow test locations [4)]						
		Jaguar Valley Drive			Hurontario Street		
		Pressure (kPa)	Flow (in l/s)	Time	Pressure (kPa)	Flow (in l/s)	Time
	Minimum water pressure	137	1586	10:10 am	137	955	9:50 am
	Maximum water pressure	542	347	10:10 am	504	303	9:50 am

No.	Water demands				
		Demand (in l/s)			
	Demand type	Use 1 [6)]	Use 2 [6)]	Use 3 [6)]	Total
1	Average day flow	11.44	0.02		11.46
2	Maximum day flow	22.87	0.03		22.90
3	Peak hour flow	34.31	0.06		34.37
4	Fire flow [5)]				100.00
Analysis					
5	Maximum day plus fire flow				122.90

Use 1 - Residential
Use 2 - Retail

WASTEWATER CONNECTION

		Discharge Location[7)]	Flow
6	Wastewater sewer effluent (in l/s)	Kirwin Avenue	19.44
7	Wastewater sewer effluent (in l/s)	Hurontario Street	23.92
8	Wastewater sewer effluent (in l/s)		
9	Total Wastewater sewer effluent (in l/s)		43.36

[1)] For the design flow calculations, please consider the following PPU's, which are found in the Region of Peel 2020 DC Background Study

☐Singles/Semi – 4.2

☐Multiples (Townhouses) – 3.4
☐Large Apartments (larger than 750 square feet) – 3.0
☐Small Apartments (equal to or less than 750 square feet) – 1.6

[2)] refer to Region of Peel design criteria

[3)] For the commercial and industrial design flow calculations, please use your site specific estimated population or the most current Ontario Building Code Occupant Load determination

[4)] Please include the graphs associated with the hydrant flow test information table

[4)] Hydrant flow tests should be performed within 2 years of submisison to the Region.
The Region will not permit hydrant flow tests during the winter, please check with the Region for scheduling

[5)] Please reference the Fire Underwriters Survey Document

[6)] Please identify the flows for each use type, if applicable

[7)] Please include drainage plan for mutliple discharge locations

The calculations should be based on the development proposal
All required calculations must be submitted with the demand table submission
Table shall include Professional Engineer's signature and stamp
Site servicing concept shall be included

This table will be deemed complete when all the above is submitted and/or included. Modelling will commence with a complete table.

URBANTECH

WASTEWATER DEMAND CALCULATIONS

Project Name: 3085 Hurontario Street
Municipality: City of Mississauga
Project No.: 20-653

Prepared by: S.K.
Last Revised: 18-Sep-24

Proposed Conditions

Residential — Buildings 1 & 2 to discharge to Hurontario

	# of Units	PPU*
Small Apartments (less than or equal to 1 bedroom) =	699	1.7
Large Apartment (greater than 1 bedroom) =	250	3.1

*PPU from 2020 Region of Peel DC Background Study

Total Units =	949	
Population =	1964	persons
Harmon Peak Factor for Site, Me =	$(1+14/(4+P^{0.5})$	
	3.59	
Unit Sewage Flow =	290.0	L/person/day
Domestic Sewage Flow =	23.68	L/s

Retail

Population Denstity =	50	p/ha
Area =	0.12	ha
Population =	6	persons
Unit Sewage Flow =	270.0	L/person/day
Commercial Sewage Flow =	0.02	L/s

Site Area =	0.85	ha
Infiltration Allowance =	0.26	L/s/ha
Total Infiltration =	0.22	L/s

Total wastewater flow =	23.92	L/s

Urbantech Consulting, A Division of Leighton-Zec Ltd.
2030 Bristol Circle, Suite 201 Oakville, Ontario L6H OH2
TEL: 905.946.2472 FAX: 905.829.4804
www.urbantech.com

URBANTECH

WASTEWATER DEMAND CALCULATIONS

Project Name: 3085 Hurontario Street
Municipality: City of Mississauga
Project No.: 20-653

Prepared by: S.K.
Last Revised: 18-Sep-24

Proposed Conditions

Residential — Buildings 3 & 4 to discharge to Kirwin

	# of Units	PPU*
Small Apartments (less than or equal to 1 bedroom) =	525	1.7
Large Apartment (greater than 1 bedroom) =	217	3.1

*PPU from 2020 Region of Peel DC Background Study

Total Units =	742	
Population =	1566	persons
Harmon Peak Factor for Site, Me =	$(1+14/(4+P^{0.5})$	
	3.67	
Unit Sewage Flow =	290.0	L/person/day
Domestic Sewage Flow =	19.27	L/s

Retail

Population Denstity =	50	p/ha
Area =	0.00	ha
Population =	0	persons
Unit Sewage Flow =	270.0	L/person/day
Commercial Sewage Flow =	0.00	L/s

Site Area =	0.65	ha
Infiltration Allowance =	0.26	L/s/ha
Total Infiltration =	0.17	L/s

Total wastewater flow =	19.44	L/s

Urbantech Consulting, A Division of Leighton-Zec Ltd.
2030 Bristol Circle, Suite 201 Oakville, Ontario L6H OH2
TEL: 905.946.2472 FAX: 905.829.4804
www.urbantech.com

APPENDIX D
Water Servicing

WATER DEMAND CALCULATIONS

Project Name: 3085 Hurontario Street
Municipality: City of Mississauga
Project No.: 20-653

Prepared by: M. B.
Checked by: J.P.O
Last Revised: 18-Sep-24

Fire Flow Calculations

Based on the *Water Supply for Public Fire Protection, 2020* by Fire Underwriters Survey

1 Estimate of Fire Flow

F = 220 C (A)1/2

F = Fire Flow (L/min)
C = Construction Type Coefficient
= 0.6 ,for fire-resistive construction (fully protected frame, floors, roof)

A = Total flow area (m^2)
= If vertical openings and exterior vertical communications are properly protected (one hour rating), Largest Floor + 25% of two immediately adjoining floors

Building 1

Floor	Area (m^2)	%
Level 1	1,740	100%
Level 2	1,534	25%
Level 3	1,534	25%

= 2507 m^2

F = 6609 L/min
= 7000 L/min, rounded to the nearest 1000 L/min

URBANTECH®

WATER DEMAND CALCULATIONS

Project Name: 3085 Hurontario Street
Municipality: City of Mississauga
Project No.: 20-653

Prepared by: M. B.
Checked by: J.P.O
Last Revised: 18-Sep-24

2 Occupancy Reduction

15% for low hazard occupancies (apartments)

F = 5950 L/min

3 Sprinkler Reduction

30% for adequately designed sprinkler protection conforming to NFPA 13 and other NFPA sprinkler standards

F = 4165 L/min

4 Separation Charge

Direction	Separation (m)	Charge
North	31.0	5%
West	17.5	15%
South		
East	31.0	5%

Total Charge = 25%

F = 1488 L/min

Required Fire Flow

F = 5653 L/min

= 6000 L/min, rounded to the nearest 1000 L/min

Fire Flow Demand =	100.0	L/s
=	1585	USGPM

WATER DEMAND CALCULATIONS

Project Name: 3085 Hurontario Street
Municipality: City of Mississauga
Project No.: 20-653

Prepared by: M. B.
Checked by: J.P.O
Last Revised: 18-Sep-24

Domestic Flow Calculations

Residential Population =	3529	persons, from Sanitary Calculations	
Average Day Demand =	280	L/person/day, from Region of Peel design criteria	
=	11.44	L/s	
ICI Population =	6	persons, from Sanitary Calculations	
Average Day Demand =	300	L/person/day, from Region of Peel design criteria	
=	0.02	L/s	

Use Peaking Factor the Greater of

Residential Max Daily Demand PF =	2	, from Region of Peel design criteria
Max Daily Demand =	22.87	L/s
ICI Max Daily Demand PF =	1.4	, from Region of Peel design criteria
Max Daily Demand =	0.029	L/s

or

Residential Max Peak Hour PF =	3	, from Region of Peel design criteria
Max Peak Hour Demand =	34.31	L/s
ICI Max Peak Hour PF =	3	, from Region of Peel design criteria
Max Peak Hour Demand =	0.06	L/s

Fire Flow Testing Report

FLOWMETRIX
INDU-TECH
PROCESS
WESTCAN

Residual Hydrant # **HY2020343**
NFPA Colour Code **BLUE**

RESIDUAL HYDRANT INFO.

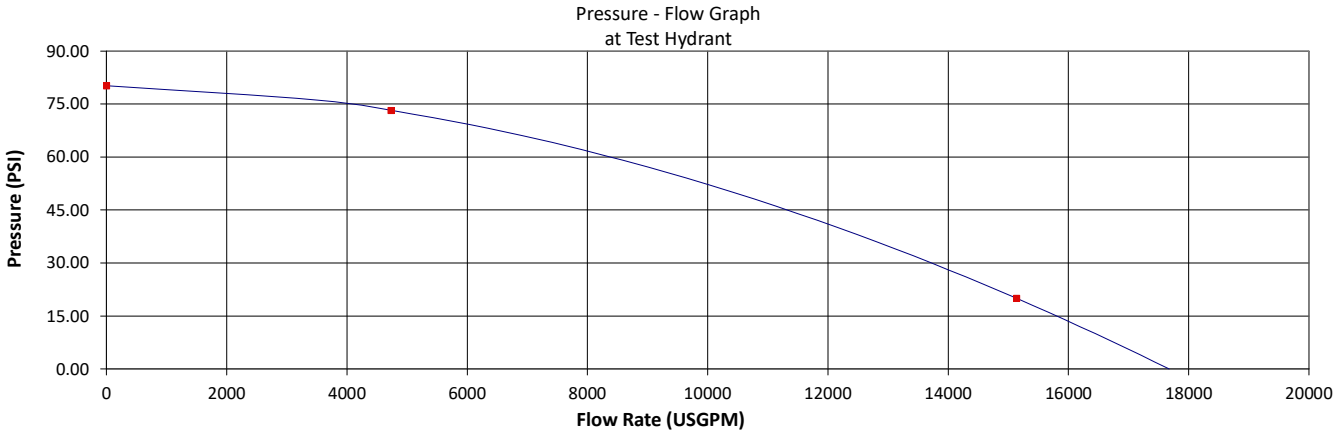
			DATE	22-Apr-21
			TIME	9:50 AM
HYDRANT #	HY2020343			
N.F.P.A. COLOUR CODE	BLUE		**ADDRESS**	3085 Hurontario St
				Mississauga, ON
STATIC PRESSURE	80.2	psi		L5A 2G9
RESIDUAL PRESSURE	73.2	psi		
PRESSURE DROP	6.99	psi	**SIZE-inches/mm**	16 400
% PRESSURE DROP	8.7	% psi		CPP
				Urbantech Consulting
				Rob Merwin, P.Eng.
				P : 905-829-6901
				E : rmerwin@urbantech.com

Flow on Water Main At Test Hydrant - 20 psi 15139 USGPM

FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
HY2020342	2	2.5	Round	Swivel	1.00	49.8	2367	0
		2.5	Round	Swivel	1.00	49.8	2367	0
								0
								0
								0
								0
				Total Flow (USGPM)			4735	0
				Total Flow (USGPM)			4735	

FIRE FLOW CHART



COMMENTS

OPERATOR	FMX	Jordan Whitlock
OPERATOR	FMX	Denis Kriventsev
OPERATOR		Peel Region
PRESSURE ZONE		n/a
TOWER LEVEL	ft	n/a
PUMPS (ON/OFF)		n/a
OTHER-1		n/a
OTHER-2		n/a

Fire Flow Testing Report

FLOWMETRIX
INDU-TECH
PROCESS
WESTCAN

Residual Hydrant # **HY6525644**
NFPA Colour Code **BLUE**

RESIDUAL HYDRANT INFO.

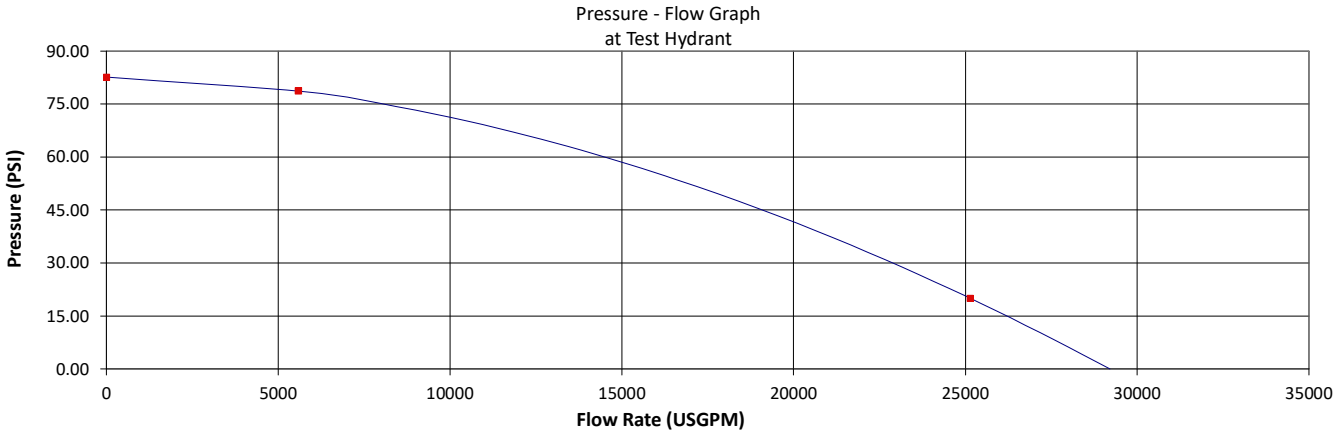
HYDRANT #	HY6525644		**DATE**	22-Apr-21
N.F.P.A. COLOUR CODE	BLUE		**TIME**	10:10 AM
			ADDRESS	3094 Jaguar Valley Drive
				Mississauga, ON
STATIC PRESSURE	82.6	psi		L5A 2J4
RESIDUAL PRESSURE	78.7	psi		
PRESSURE DROP	3.86	psi	**SIZE-inches/mm**	12 300
% PRESSURE DROP	4.7	% psi		PVC
				Urbantech Consulting
				Rob Merwin, P.Eng.
				P : 905-829-6901
				E : rmerwin@urbantech.com

Flow on Water Main At Test Hydrant - 20 psi 25144 USGPM

FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
HY6525624	2	2.5	Round	Swivel	1.00	69.3	2793	0
		2.5	Round	Swivel	1.00	69.3	2793	0
								0
								0
								0
								0
				Total Flow (USGPM)			5586	0
				Total Flow (USGPM)			5586	

FIRE FLOW CHART



COMMENTS

OPERATOR	FMX	Jordan Whitlock
OPERATOR	FMX	Denis Kriventsev
OPERATOR		Peel Region
PRESSURE ZONE		n/a
TOWER LEVEL	ft	n/a
PUMPS (ON/OFF)		n/a
OTHER-1		n/a
OTHER-2		n/a

APPENDIX E
Geohydrology Study

MCR ENGINEERS LTD.
GEO-ENVIRONMENTAL CONSULTANTS

111 ZENWAY BLVD., UNIT 4, VAUGHAN, ONTARIO, L4H 3H9
TEL: 416.675.0160 FAX: 905.851.1722
office@mccrak.com

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denison@mccrak.com

WWW.MCCRAK.COM

G5822 **SEPTEMBER 2024**

GEOHYDROLOGY ASSESSMENT
3085 – 3105 HURONTARIO STREET
MISSISSAUGA, ONTARIO

DISTRIBUTION:

1 COPY (electronic)	MATTAMY HOMES CANADA
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PREPARED FOR:

MATTAMY HOMES CANADA
3300 BLOOR ST. WEST, SUITE 1800,
TORONTO, ONTARIO
M8X 2X2

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FIGURES

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APPENDICES

1.0 INTRODUCTION

Mattamy Homes Canada intends to redevelop the property located at 3085 – 3105 Hurontario Street, Mississauga, Ontario (hereafter referred to as 'the Site). MCR Engineers Ltd. (MCR) was retained to conduct a Geohydrology Assessment for the Site to evaluate the requirement for temporary dewatering and permanent drainage in relation to the proposed redevelopment.

1.1 SCOPE OF WORK

The objectives of the Geohydrology Assessment are to determine the following:

- Determine Hydrogeological conditions of the Site, including the groundwater and phreatic surface, subsurface elevations and flow patterns and the interaction with the design and construction of the proposed development.
- Review the available background information for the Site obtained from MCR's files, Municipality of Peel, and architectural drawings.
- Estimate the potential temporary dewatering flow rates during construction and assessment of potential impacts on the surrounding environment.
- Estimate the long term flow rates from the Private Water Drainage System (PWDS) of the proposed building.
- Assess the permitting requirements for both dewatering and discharge with the Ministry of Environment, Conservation and Parks (MECP) and the Municipality of Peel, respectively.
- Summarize the findings in a Geohydrology Assessment Report.

1.2 SITE DESCRIPTION

The site is located on the east side of Hurontario Street, between Kirwin Avenue and Dundas Street East, in the City of Mississauga.

The Site is presently occupied by two [2] storey commercial building in the southwestern portion and a two [2] storey above grade parking structure on the eastern portion of the Site. The Site is bounded by Kirwin Avenue to the north, residential building to the east, commercial buildings to the south and Hurontario

Street to the west.

According to a Survey Plan by R-PE Surveying Ltd. presented in Appendix A, the Site is legally described as: Lot 15, Concession 1, North of Dundas Street, Part of Blocks A and B, Registered Plan 645 and Part of Village Lot 9, Savigney's Plan of Cooksville (Plan TOR-12), City of Mississauga, Regional Municipality of Peel.

1.3 PROPOSED DEVELOPMENT

The Site is proposed for a residential and commercial development consisting of a thirty-six [36] storey building with four to seven [4 to 7] storey podium (Tower 1), a thirty-nine [39] storey building with four to twelve [4 to 12] storey podium (Tower 2), a thirty-three [33] storey building with four to twelve [4 to 12] storey podium (Tower 3) and a thirty-one [31] storey building with four to twelve [4 to 12] storey podium (Tower 4) over three [3] levels of combined underground parking (Appendix A).

It is understood that the ground floor finished elevation (FFE) ranges from 117.85 to 116.10 m and P3 FFE will be at 105.70 m.

Presently, it is assumed that the proposed building structure can be supported on conventional spread/strip footings. The size of the shoring plan layout was assumed to cover approximately 115 m by 130 m.

A sub-floor Private Water Drainage System (PWDS) with perimeter weeping tile will be required. A soldier pile and lagging shoring system is expected for temporary dewatering/excavation except where adjacent structures exist, or heritage structures are to remain, in which case a caisson shoring system would be necessary.

1.4 PROPERTY OWNERSHIP

The Site is intended for redevelopment by Mattamy Homes Canada. The Client is represented by Mr. Piyush Sharma with the following contact information:

Mattamy Homes Canada
3300 Bloor St. West, Suite 1800
Toronto, Ontario
M8X 2X2
Mr. Piyush Sharma
Senior Development Manager
Email: Piyush.Sharma@mattamycorp.com

1.5 REVIEW OF PREVIOUS REPORTS

The following geo-environmental reports were provided for review prior to initiating the investigation:

- MCR report titled, *Geotechnical Report, Proposed Development, 3085 – 3105 Hurontario Street, Mississauga, Ontario,* prepared for Mattamy Homes Canada., dated August 2024.

2.0 HYDROGEOLOGICAL CONDITIONS

2.1 PHYSICAL SETTING

The Site is located in the southern portion of the City of Mississauga and is situated in a mixed-use residential and commercial area. The nearest major intersection is Hurontario Street and Dundas Street East, approximately 300 m south of the Site. There are no areas of natural significance within 250 m. There are no water bodies or areas of natural significance within 30 m of the Site boundaries. The nearest surface water bodies are Cooksville Creek, at approximately 0.3 km east of the Site and Mary Fix Creek, at approximately 1.3 km west of the Site

The Site is located at an elevation of approximately 115 m above sea level (asl) (377 ft) and the topography across the Site is generally flat. The surrounding area slopes gently down to the southwest.

The Site is bounded by the following properties/features:

North	Residential buildings and asphalt parking area
South	Hurontario Street
East	Residential buildings and asphalt parking area
West	Hurontario Street and Kirwin Ave

2.2 TOPOGRAPHY

According to the topographic map, Map 30 M/11, 9th Edition published by Government of Canada; Natural Resources Canada; Earth Sciences Sector; Canada Centre for Mapping and Earth Observation, on July 19, 2013, the ground surface at the Site is relatively flat with the surrounding area sloping gently to the southwest towards Credit River.

2.3 REGIONAL GEOLOGY AND HYDROGEOLOGY

According to the geological map entitled "Quaternary Geology of Ontario, Southern Sheet" Map 2556, published by the Ontario Ministry of Development and Mines, dated 1991, the overburden in the study area consists of predominantly undifferentiated carbonate and clastic sedimentary rock, exposed at surface or

covered by a discontinuous, thin layer of drift. The groundwater typically tends to flow southwest, towards Lake Ontario.

According to Ontario Ministry of Development and Mines, Map No. 2544, “Bedrock Geology of Ontario, Southern Sheet, 1991”, the bedrock typically consists of Upper Ordovician shale, limestone, dolostone and siltstone. Groundwater tends to flow south-west, towards the Credit River.

2.4 LOCAL GEOLOGY AND HYDROGEOLOGY

On a local scale, geological conditions and hydrogeology are similar to the ones at a regional scale. Locally, near surface groundwater flow may be influenced by underground structures (e.g., service trenches, catch basins, and building foundations or surface watercourses). No surface water features are present onsite and there are no Provincially Significant Wetlands in the vicinity of the Site.

3.0 SCOPE OF INVESTIGATION

3.1 OVERVIEW OF SITE INVESTIGATION

- Three [3] boreholes, BH 1, BH 2 and BH 101, were drilled at the subject site by Soil-Mat on April 8, 2019, and March 12, 2020, to depths of 7.90, 4.65 and 13.85 m.
- Two [2] boreholes, BH 19-3 and BH 19-4, were drilled at the subject site by WSP on July 3, 2019, to depths of 4.40 m.
- Two [2] supplementary boreholes, BH 101 and BH 102, were drilled at the subject site by MCR on March 15 and 16, 2023, to depths of 5.05 and 5.35 m.
- All boreholes, except borehole 1, were equipped with wells for long-term groundwater monitoring and sampling.
- The borehole locations are shown in Drawing No. 1 and the records are presented in Appendices C&D.
- Groundwater levels were recorded from the available monitoring well over various dates and the data is presented in Table 1.
- Groundwater samples were collected from BH 102 in April 2023 for chemical analysis of the Peel Region/City of Mississauga Sewers By-Law criteria.

3.2 MONITORING WELL INSTALLATION

All MCR monitoring wells were installed with a 50 mm diameter schedule 40 PVC pipe and a 3.05m long slotted well screen. Well screens were surrounded by a silica sand pack to at least 0.6 m above the top of screen with a bentonite seal extending from above the sand pack to within 0.5 m of the ground surface. All monitoring wells were completed with a flush mounted cover at ground surface. Monitoring well installation was done in accordance with the *Ontario Water Resources Act*, Sections 35 to 50.

3.3 ELEVATION SURVEYING

Elevations referred to in this report are geodetic and metric and were interpolated from the topographic survey by R-PE Surveying Ltd. The borehole logs are presented in Appendices C&D.

3.4 GROUNDWATER SAMPLING

All groundwater sampling activities were conducted in accordance with Ontario Regulation (O.Reg.)153/04, as amended to O.Reg.511/09, July 2011. All monitoring wells were developed prior to sampling activities using a Waterra Hydrolift II (HL-1217) inertial lift pump by purging at least three well volumes or until the monitoring well was purged dry. Groundwater samples were obtained at least 24 hours' post-development under static conditions. No samples were field filtered prior to laboratory analysis, in accordance with the standard.

3.5 GROUNDWATER ANALYSIS

All groundwater samples were submitted to ALS Laboratory Group (ALS) of Richmond Hill, Ontario, certified by the Canadian Association for Laboratory Accreditation (CALA), for chemical analysis. The Certificates of Analysis received are included in Appendix E. The contact information for the laboratory used is included below.

ALS Laboratory Group
95 West Beaver Creek Road
Richmond Hill, ON L4B 1H2

The groundwater sample will be submitted for bulk chemical analysis for the criteria provided in *The Regional Municipality of Peel, Sewers By-Law No. 53-2010 and Mississauga Sewers By-Law (0046-2022).* The results of chemical analysis will be compared to the criteria provided in the *Guideline Limits for Sanitary & Combined Sewers Discharge and Guideline Limits for Storm Sewer Discharge*. These guidelines establish the maximum allowable concentrations of specific analytical parameters for water discharged into either the municipal sanitary and/or storm sewer system, respectively.

4.0 INVESTIGATION RESULTS

4.1 GEOLOGY

The ground surface elevation for the boreholes ranges from 118.26 masl (BH 19-4) to 115.51 masl (BH 19-3). Based on the investigation, the geologic formations beneath the Site are illustrated in the borehole logs (Appendices C&D), Drawing No. 2&3 and include the following (from surface to depth):

Pavement: A layer of asphalt, 100 to 200 mm in thickness, was present at the surface of BH 1, BH 2, and BH 101 (by Soil-Mat) and BH 101 (by MCR) and was followed by 150 to 250 mm of granular fill. A layer of concrete, 165 to 200 mm in thickness, was present at the surface of BH 19-3 (by WSP) and BH 102 (by MCR) and was followed by 150 to mm of granular fill in BH 102.

Possible topsoil with approximate 100 mm thickness was observed at the surface of BH 19-4 (by WSP).

For the purpose of offsite disposal, the type/quantity and extent of the existing fill layer should be explored by further test pit investigation, prior to contract award.

Sand/Silty Sand Till: Loose to very dense layer sand/silty sand till was detected below the pavement/possible topsoil in all boreholes and extended to depths of 1.75 to 3.65 m. The brown/light brown/dark brown sand/silty sand till deposit was in moist to wet condition and contained trace gravel and boulder, some silt and occasional organics in upper level.

Clayey Silt (Till): Very stiff to hard clayey stilt (till) was encountered below the sand/silty sand (till) in BH 1, BH 2 and BH 101 (by Soil-Mat), BH 19-3 and BH19-4 (by WSP) and BH 102 (by MCR) and extended to the underlying weathered shale at depths of 2.45 to 4.30 m. The grey clayey silt (till) deposit was in a moist to wet condition and contained trace of sand and gravel.

Silty Sand Till/Weathered Shale Complex: Very dense silty sand till/weathered shale complex was found below the silty sand till in BH 101 (by MCR) and

extended to the underlying weathered shale at a depth of 4.60 m. The brown silty sand till/weathered shale complex was in a wet condition and contained trace gravel.

It should be noted that the till/sand soil is unsorted sediment; therefore, boulders and cobbles are anticipated.

Shale Bedrock: Weathered shale bedrock was spotted below the clayey silt (till)/silty sand till/weathered shale complex in all boreholes at about depth of 2.45 to 4.60 m, i.e., at about Elevations of 114.00 to 111.25 m, and extended to the maximum depth of the borehole.

The surface of the shale bedrock will vary across the site; therefore, it should be confirmed by further borehole investigation and during shoring/foundation installations.

Groundwater: Upon competition of drilling, BH 101 (by Soil-Mat) remained dry. Groundwater level was not measured in BH 101 and BH 102 (by MCR) upon competition of drilling. The results are summarized on the Record of Borehole Sheets in Appendices C&D and Table 1.

4.2 GROUNDWATER LEVEL MONITORING

All current and past groundwater monitoring data is presented in Table 1. It should be noted that groundwater levels are subject to seasonal fluctuations. All groundwater levels were measured manually using an electric water level meter and with respect to the geodetic borehole elevations within the property boundary. The monitoring wells must be decommissioned, prior to construction, in accordance with Regulation 903 by a qualified contractor.

The interpreted groundwater flow direction is based on the 2019, 2020 and 2023 round of water table elevation measurements, to include all the available data. Groundwater levels were measured in all available wells (BH 101 and 102), in April 2023. The interpreted local direction of hydraulic movement across the Site is inferred to be in a south-west direction, towards the Credit River.

4.3 GROUNDWATER QUALITY

The groundwater sample collected from BH 102 in April 2023 was analyzed for the Municipality of Peel Sewers By-Law and Mississauga Sewer By-Law criteria. The results of chemical analysis (Table 2) indicate that the sample exceeds the Table 1 Limits for Sanitary & Combined Sewers Discharge for Biological Oxygen Demand (686 mg/L vs. 300 mg/L) and Carbonaceous Biochemical Oxygen Demand (587 mg/L vs. 300 mg/L). The following exceedance was recorded for the Table 2 Limits for Storm Sewer Discharge: Biological Oxygen Demand (686 mg/L vs. 15 mg/L), Carbonaceous Biochemical Oxygen Demand (587 mg/L vs. 300 mg/L), and Total Manganese (0.136 mg/L vs. 0.05 mg/L).

4.4 GROUNDWATER DISCHARGE ASSESSMENT

Presently, the groundwater onsite can be discharged to the city sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD) and Carbonaceous Biochemical Oxygen Demand (CBOD). A filtration/treatment system for BOD, CBOD, and manganese will be required prior to discharging to the storm sewer system. A dewatering contractor should be approached to explore the possibility of treatment if discharge to the storm sewer is required.

5.0 REVIEW AND EVALUATION

5.1 TEMPORARY DEWATERING ASSESSMENT

The excavation for the proposed three level underground parking structure will extend into shale bedrock. In order to protect the sides/bottom of the excavation from being disturbed by excess groundwater pressure, i.e., to prevent quicksand/dilating silt conditions, the groundwater will need to be lowered below the top of shale bedrock.

Positive dewatering, such as localized sumps/well points might be required for the proposed excavation. Onsite soil might be subject to localized piping during dewatering. Creation of piping channels may result in a substantial increase in the volume of both temporary dewatering and permanent drainage.

In addition, the (weathered) sedimentary bedrock can be fractured, fissured, or contain water-bearing bedding planes. When these bedding planes are intercepted in rock excavation, a substantial amount of water, often under a significant hydrostatic head, may be encountered. The depths and condition of shale bedrock vary across the Site; therefore, its quality should be confirmed during shoring installation and general excavation through inspections in the field.

For the proposed three underground levels, groundwater is required to be drawn down 1.2 m below the underside of the footing. The foundation elevation is assumed to be at approximately 105.20 masl. However, for the purpose of temporary/construction dewatering, given the encountered subsurface conditions, groundwater cannot be lowered with well points below the average top elevation of shale bedrock at approximately 112.85 masl. Localized trenches and sumps can be used within bedrock to lower the water level below the underside of the footings, to an approximate elevation of 104.00 masl. This result is preliminary and should be confirmed during the construction phase and final stage of detailed design.

The average groundwater elevation was estimated at approximately 113.47 masl (Table 3), representing an approximate 9.5 m of hydrostatic head requiring dewatering. The size of the shoring plan layout was assumed to cover the

equivalent of approximately 115 m by 130 m.

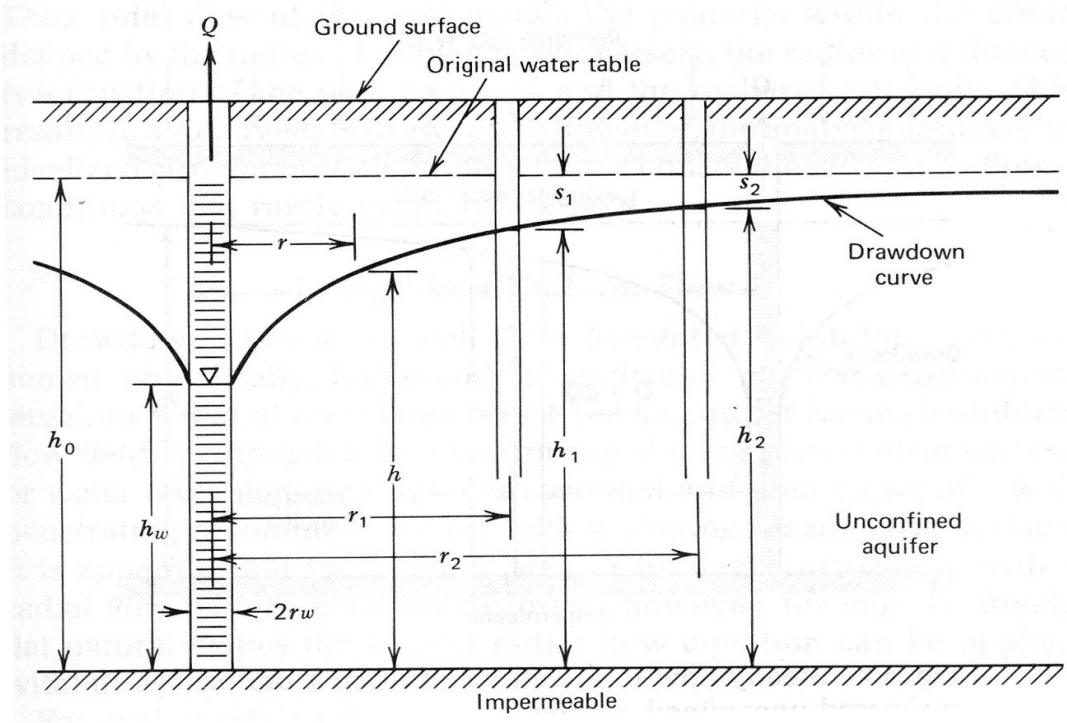
Theoretically, the discharge rate for a single pumping well in an unconfined aquifer can be described as:

$$Q = -2\pi r K h \frac{dh}{dr} \quad (1)$$

By integrating Equation (1) and separating variables h and r, we obtain

$$h^2 = -\frac{Q}{\pi K}\ln(r / r_w) + h_w{}^2 \quad (2)$$

where
h [m] is the height of the water table above an impervious base
Q [m³/day] is the rate of pumping discharge
K [m/day] is hydraulic conductivity
R [m] is the radius from the center of well location
r_w *[m]* is the radius of pumping well (see Schematic A below).



Schematic A: Radial flow to an unconfined aquifer (Todd, 1980)

5.1.1 Numerical Analysis

The abovementioned Site parameters were used to calculate the estimated steady state discharge rate for temporary construction dewatering. Groundwater monitoring data is presented in Table 3. The calculations for temporary dewatering rates are shown in Table 4.

From the observed soil types and based on soil sample descriptions (Todd, 1980; Mays, 2001; and Craig, 2004), the average hydraulic conductivity (K) of the aquifer was conservatively estimated at 0.2 m/day.

The steady state discharge rate for temporary construction dewatering was calculated at approximately 210 m^3/day (39 USG/min), with a safety factor of 1.50. The steady state discharge is 140 m^3/day (26 USG/min), with no safety factor.

It should be noted that the initial drawdown pumping rate and accumulation from rainfall will be higher, and this should be confirmed by the dewatering contractor.

5.2 PERMANENT FOUNDATION DRAIN FLOW RATES

For the proposed redevelopment, the ground finished floor elevation (FFE) ranges from 117.85 to 116.10 masl and P3 FFE will be at 105.70 masl.

A sub-floor Private Water Drainage System (PWDS) with perimeter/underfloor weeping tile is proposed below the P3 level slab. The invert of the PWDS is assumed to be approximately 0.5 m below the FFE of the P3 slab, i.e., at approximately 105.20 masl.

The proposed PWDS is shown in Drawing No. 4. The slotted pipes should slope to a minimum 1% slope. Perimeter drainage pipes, with a positive gravity outlet, should be solid PVC with a minimum 0.5% slope. In addition, silt traps must be provided at convenient/accessible locations.

5.2.1 Numerical Analysis

The abovementioned Site parameters were used to calculate the estimated steady state discharge rate for the PWDS. Groundwater monitoring data is presented in

Table 3. The calculations for permanent drainage flow rates are shown in Table 5.

From the observed soil types and based on soil sample descriptions (Todd, 1980; Mays, 2001; and Craig, 2004), the average hydraulic conductivity (K) of the aquifer was conservatively estimated at 0.2 m/day.

The estimated steady state discharge rate for the PWDS was calculated at 183 m^3/day (34 USG/min).

Please note that due to the presence of bedding planes/vertical fissures in the bedrock, the discharge volume might increase with time. Monitoring of permanent sumps is recommended for quality and quantity of discharge.

5.3 MECP PERMIT TO TAKE WATER REQUIREMENT

The Permit to Take Water (PTTW) requirements for construction site dewatering have been updated to the current O.Reg.63/16 amendment to Environmental Protection Act. In accordance with the updated regulation, construction site dewatering will require a complete PTTW application when water takings greater than 400,000 L/day are predicted. Groundwater taking between 50,000 L/day and 400,000 L/day will require a limited PTTW via an online application process through the Environmental Activity and Sector Registry (EASR). Groundwater taking from a proposed building structure by means of a PWDS will require a PTTW when water taking is greater than 50,000 L/day. The complete permit application process for PTTW takes approximately twelve weeks to review and is required prior to applying for the discharge permits.

The estimated steady state discharge rate for temporary construction dewatering was calculated at approximately 210 m^3/day (39 USG/min). Therefore, a limited PTTW application through the ESAR will be required to be applied for with the MECP.

The estimated steady state discharge rate for PWDS was calculated at approximately 183 m^3/day (34 USG/min). Therefore, a complete PTTW application for the PWDS will be required for the proposed building.

In accordance with the current Ontario Regulation 387/04 for Water Taking, every person to whom a permit has been issued under Section 34 of the Act shall collect and record data on the volume of water taken daily. The data collected shall be measured by a flow meter or calculated using a method acceptable to a Director.

5.4 MUNICIPAL WATER DISCHARGE PERMIT REQUIREMENTS

The Municipality requires that any private water to be discharged into the municipal sewer system must have a permit or agreement in place in order to discharge; this applies to all water not purchased from the municipal water supply. For temporary dewatering during the construction phase, this includes all groundwater and storm water that is collected or encountered during site excavation. For the PWDS, this includes all groundwater that is constantly pumped as a result of the PWDS elevation located below the groundwater table elevation or through storm water infiltration.

The groundwater quality sample collected in April 2023 indicates that groundwater onsite can be discharged to the municipal sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD) and Carbonaceous Biochemical Oxygen Demand (CBOD). A filtration/treatment system for BOD, CBOD, and manganese will be required prior to discharging to the storm sewer system. A dewatering contractor should be approached to explore the possibility of treatment if discharge to the storm sewer is required.

A short-term temporary discharge permit must be applied for construction dewatering with the Municipality. A long-term permanent discharge permit must be applied for the proposed PWDS since the drainage system is located below the long-term groundwater elevation. The permanent discharge permit will involve coordination with the mechanical and site servicing consultant to provide calculations and drawing specifications for the ultimate discharge location and the sampling port required by the Municipality.

5.5 ENVIRONMENTAL PROTECTION

The Site is located within the Credit River basin and the river is 3 km south-west of the Site. There are no surface water features and no areas of natural significance or provincially significant wetlands in the vicinity of the Site. The Site is located in the City of Mississauga urban environment which obtains its municipal water supply from Lake Ontario. Therefore, there are no potable groundwater users within the vicinity of the Site.

The proposed redevelopment plan will remove the overburden to a depth of approximately 12 - 13 mbgs, subject to final design. Temporary groundwater dewatering, where required, will lower the groundwater table to below the underground parking foundation levels. The extracted water can be discharged to the city sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD) and Carbonaceous Biochemical Oxygen Demand (CBOD). A filtration/treatment system for BOD, CBOD, and manganese will be required prior to discharging to the storm sewer system. Updated groundwater monitoring will be conducted by the dewatering contractor prior to and during construction activities to ensure that no additional adverse groundwater impacts are identified throughout the project's construction.

6.0 CONCLUSIONS AND RECOMMENDATIONS

MCR Engineers Ltd. (MCR). was retained to conduct a Geohydrology Assessment for the Site in relation to the proposed redevelopment. The Site is presently occupied by two [2] storey commercial building in the southwestern portion and a two [2] storey above grade parking structure on the eastern portion.

The Site is proposed for a residential and commercial development consisting of a thirty-six [36] storey building with four to seven [4 to 7] storey podium (Tower 1), a thirty-nine [39] storey building with four to twelve [4 to 12] storey podium (Tower 2), a thirty-three [33] storey building with four to twelve [4 to 12] storey podium (Tower 3) and a thirty-one [31] storey building with four to twelve [4 to 12] storey podium (Tower 4) over three [3] levels of combined underground parking (Appendix A).

It is understood that the ground floor finished elevation (FFE) ranges from 117.85 to 116.10 m and P3 FFE will be at 105.70 m.

The average groundwater elevation was estimated at approximately 113.47 masl (Table 3), representing an approximate 9.5 m of hydrostatic head requiring dewatering. The size of the shoring plan layout was assumed to cover the equivalent of approximately 115 m by 130 m.

A sub-floor Private Water Drainage System (PWDS) with perimeter weeping tile will be required. A soldier pile and lagging shoring system is expected for temporary dewatering/excavation except where adjacent structures exist, or heritage structures are to remain, in which case a caisson shoring system would be necessary.

The excavation for the proposed three level underground parking structure will extend into shale bedrock. In order to protect the sides/bottom of the overburden excavation from being disturbed by excess groundwater pressure, i.e., to prevent quicksand/dilating silt conditions, the groundwater will need to be lowered below the top of shale bedrock.

Positive dewatering, such as localized sumps/well points might be required for the proposed excavation. Onsite soil might be subject to localized piping during dewatering. Creation of piping channels may result in a substantial increase in the

volume of both temporary dewatering and permanent drainage.

In addition, the (weathered) sedimentary bedrock can be fractured, fissured, or contain water-bearing bedding planes. When these bedding planes are intercepted in rock excavation, a substantial amount of water, often under a significant hydrostatic head, may be encountered. The depths and condition of shale bedrock vary across the Site; therefore, its quality should be confirmed during shoring installation and general excavation through inspections in the field.

For the proposed three underground levels, groundwater is required to be drawn down 1.2 m below the underside of the footing. The foundation elevation is assumed to be at approximately 105.20 masl. However, for the purpose of temporary/construction dewatering, given the encountered subsurface conditions, groundwater cannot be lowered with well points below the average top elevation of shale bedrock at approximately 112.85 masl. Localized trenches and sumps can be used within bedrock to lower the water level below the underside of the footings, to an approximate elevation of 104.00 masl. This result is preliminary and should be confirmed during the construction phase and final stage of detailed design.

The average groundwater elevation was estimated at approximately 113.47 masl (Table 3), representing an approximate 9.5 m of hydrostatic head requiring dewatering. The size of the shoring plan layout was assumed to cover the equivalent of approximately 115 m by 130 m.

The estimated steady state discharge rate for temporary construction dewatering was calculated at approximately 210 m^3/day (39 USG/min). Therefore, a limited PTTW application through the ESAR will be required to be applied for with the MECP, and a temporary discharge permit will be required from the Municipality. It should be noted that the initial drawdown pumping rate and accumulation from rainfall will be higher and this should be confirmed by the dewatering contractor.

The selected dewatering contract must be performance driven and the contractor must provide a performance bond. In addition, upon completion of system's installation, the contractor must produce a written statement that "The system installed is robust enough to lower and maintain groundwater at least 1.2 m below the lowest footing elevation, without impacting the integrity of shoring or foundation soils."

The estimated steady state discharge rate for PWDS was calculated at approximately 183 m^3/day (34 USG/min). Therefore, a complete PTTW application for the PWDS will be required for the proposed building from the MECP. A long-term permanent discharge permit will be required from the Municipality since the drainage will be installed below the long-term groundwater elevation.

Presently, the groundwater onsite can be discharged to the city sanitary or combined sewer system with filtration/treatment for Biological Oxygen Demand (BOD) and Carbonaceous Biochemical Oxygen Demand (CBOD). A filtration/treatment system for BOD, CBOD, and manganese will be required prior to discharging to the storm sewer system. Updated groundwater monitoring will be conducted by the dewatering contractor prior to and during construction activities to ensure that no additional adverse groundwater impacts are identified throughout the project's construction.

The application process, where a PTTW is required, can take at least three months for a review by the MECP and is required to be approved prior to applying for discharge permits. It is recommended that applications to Municipality for discharge permits be applied for at least four months prior to the required start dates. Applications are to be supported by drawings and calculations provided by the mechanical and the site servicing consultant and coordination is required amongst all disciplines.

7.0 REFERENCES

1. Ontario Ministry of the Environment. *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.* April15, 2011.
2. Ontario Ministry of Northern Development and Mines. *Quaternary Geology of Ontario - Southern Sheet,* Map 2556, 1991.
3. Ontario Ministry of Northern Development and Mines. *Bedrock Geology of Ontario - Southern Sheet,* Map 2544, 1991.
4. D.K. Todd, *Groundwater Hydrology,* 2nd Edition, John Wiley & Sons, New York, 1980.
5. L.W. Mays, *Water Resources Engineering*, 1st Edition, John Wiley & Sons, New York, 2001.
6. R.F. Craig, *Soil Mechanics*, 7th Edition, Spon Press, London, 2004.
7. MCR report titled, Geotechnical Report, Proposed Development, 3085 – 3105 Hurontario Street, Mississauga, Ontario, prepared for Mattamy Homes Canada., dated August 2024.

8.0 STATEMENT OF LIMITATIONS

MCR Engineers Ltd. (MCR) conducted the work associated with this report in accordance with the scope of services, time and budget limitations imposed for this work. The work has been conducted according to reasonable and generally accepted local standards for an environmental consultant at the time of the work. No other warranty or representation, expressed or implied, is included or intended in this report.

The work was designed to provide an overall assessment of the environmental conditions at the Site. The conclusions presented in this report are based on the information obtained during the investigation. The work is intended to reduce the client's risk with respect to environmental impairment. No work can completely eliminate the possibility of further environmental impairment on the Site.

It should be noted that subsurface conditions might vary at locations and depths other than those locations where borings, surveys or explorations were made by MCR. Other contaminants, not tested for in this work, may also potentially be present on the Site. Even with exhaustive investigation, it is not possible to warranty the Site will be free of contaminants. Should conditions, not observed during the work, become apparent, MCR should be immediately notified to assess the situation and conduct additional work, where required. The findings of this report are based on conditions as they were observed at the time of the work.

No assurance is made regarding changes in conditions subsequent to the time of the work. Remediation cost estimates is based on the available information. The estimated costs for remediation only represent the costs for the clean-up of known contaminants that have been identified during the work. Additional costs may be incurred as a result of other contaminants or areas of contamination identified by subsequent work.

Regulatory statutes are subject to interpretation. These statutes and their interpretation may change over time, thus these issues should be reviewed with appropriate legal counsel.

MCR relied on information provided by others in this report. MCR cannot guarantee the accuracy, completeness and reliability of the information provided by others, although MCR staff attempted to seek clarification on information provided and verifies authenticity, where practical.

The report and its attachments were prepared for and made available for the sole use of the client. MCR will not be responsible for any use or interpretation of the information contained in this report by any other party without the prior expressed written consent of MCR.

9.0 CLOSURE

In accordance with your request and authorization, MCR Engineers Ltd. completed this Geohydrology Assessment Report. This report presented the methodology, findings and conclusions of the investigation. The Statement of Limitations for all work performed as part of this investigation is included.

We trust that the information provided in this report is sufficient for your present requirements. Should you have any further questions, please do not hesitate to contact our office. Thank you for retaining MCR Engineers Ltd. for this project.

Respectfully,
MCR ENGINEERS LTD.

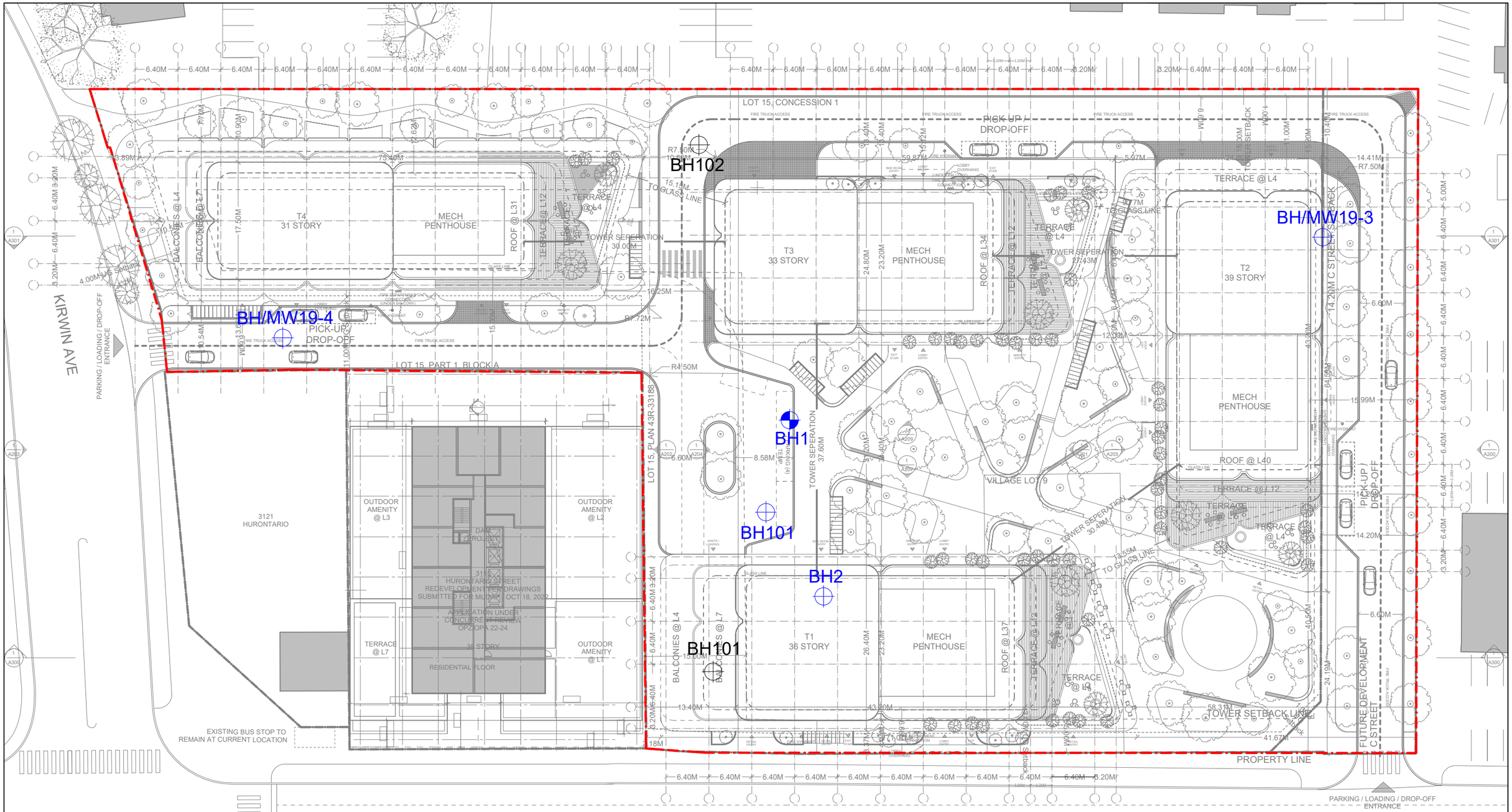
Prepared By:
Salman Tavassoli, M.Sc., P.Eng.

Reviewed By:
Richard Sukhu, P.Eng., B.Eng.

Reviewed By:
Lad Rak, P.Eng.

Date of Issue: September 3, 2024

APPENDIX D



LEGEND:

- PROPERTY BOUNDARY
- MONITORING WELL INSTALLED BY MCR, 2023
- BOREHOLE/MONITORING WELL BY OTHERS, 2019

PROJECT NORTH

TRUE NORTH

0 5 10 20

SCALE (m)

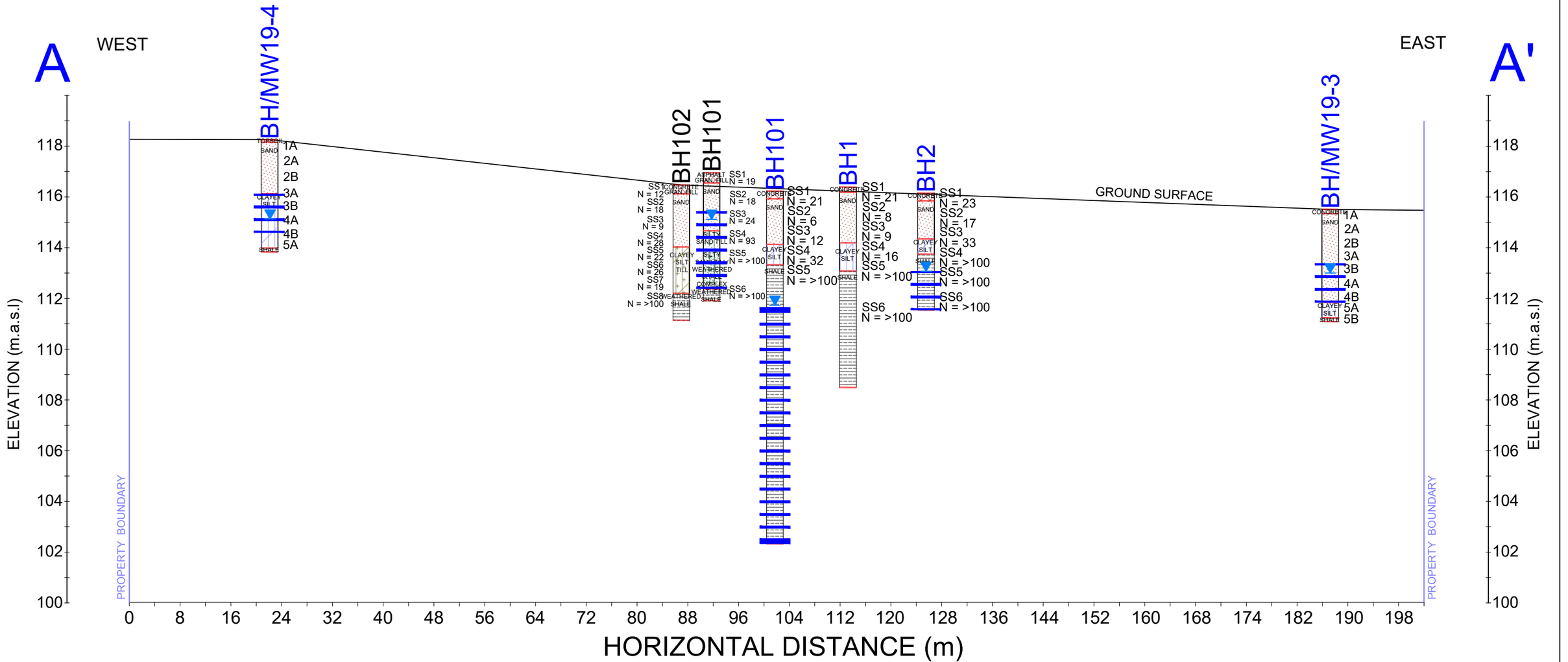
Drawing Notes: Image drafted from property survey, Toronto Maps, Google Maps, and site inspections. Not for construction purposes.

MCR ENGINEERS LTD.
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

BOREHOLE
LOCATION PLAN

Project No.	Date	Drawn by:	Checked by:	Drawing No.
GE5822	JULY 2024	CM	ST	1



LEGEND:

- SCREENED INTERVALS
- ELEVATION MARK (masl)
- APPROXIMATE WATER LEVEL
- FILL
- SAND
- SILTY SAND
- SHALE
- SILT
- CLAYEY SILT
- SANDY SILT

MCR ENGINEERS LTD
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

CROSS-SECTION A-A'

Project No.	Date	Drawn by:	Checked by:	Drawing No.
GE5822	AUGUST 2023	CM	ST	2

B

NORTH

SOUTH

B'

GROUND SURFACE

BH102

SS1 N = 12
SS2 N = 18
SS3 N = 9
SS4 N = 28
SS5 N = 22
SS6 N = 26
SS7 N = 19
SS8 N = >100

CONCRETE
GRANULAR FILL
SAND
CLAYEY SILT TILL
WEATHERED SHALE

BH/MW19-3

CONCRETE
SAND
1A
2A
2B
3A
3B
4A
4B
5A
CLAYEY SILT
SHALE
5B

BH/MW19-4

TOPSOIL
SAND
1A
2A
2B
CLAYEY SILT
3A
3B
4A
4B
SHALE
5A

BH1

CONCRETE
SAND
SS1 N = 21
SS2 N = 8
SS3 N = 9
SS4 N = 16
SS5 N = >100
CLAYEY SILT
SHALE
SS6 N = >100

BH101

CONCRETE
SAND
SS1 N = 21
SS2 N = 6
SS3 N = 12
SS4 N = 32
SS5 N = >100
CLAYEY SILT
SHALE

BH2

CONCRETE
SAND
SS1 N = 23
SS2 N = 17
SS3 N = 33
SS4 N = >100
SS5 N = >100
SS6 N = >100
CLAYEY SILT
SHALE

BH101

ASPHALT
GRANULAR FILL
SAND
SS1 N = 19
SS2 N = 18
SS3 N = 24
SILTY SAND TILL
SS4 N = 93
SILTY SAND WEATHERED COMPLEX
SS5 N = >100
WEATHERED SHALE
SS6 N = >100

PROPERTY BOUNDARY

PROPERTY BOUNDARY

ELEVATION (m.a.s.l)

118
116
114
112
110
108
106
104
102
100

0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100

HORIZONTAL DISTANCE (m)

LEGEND:

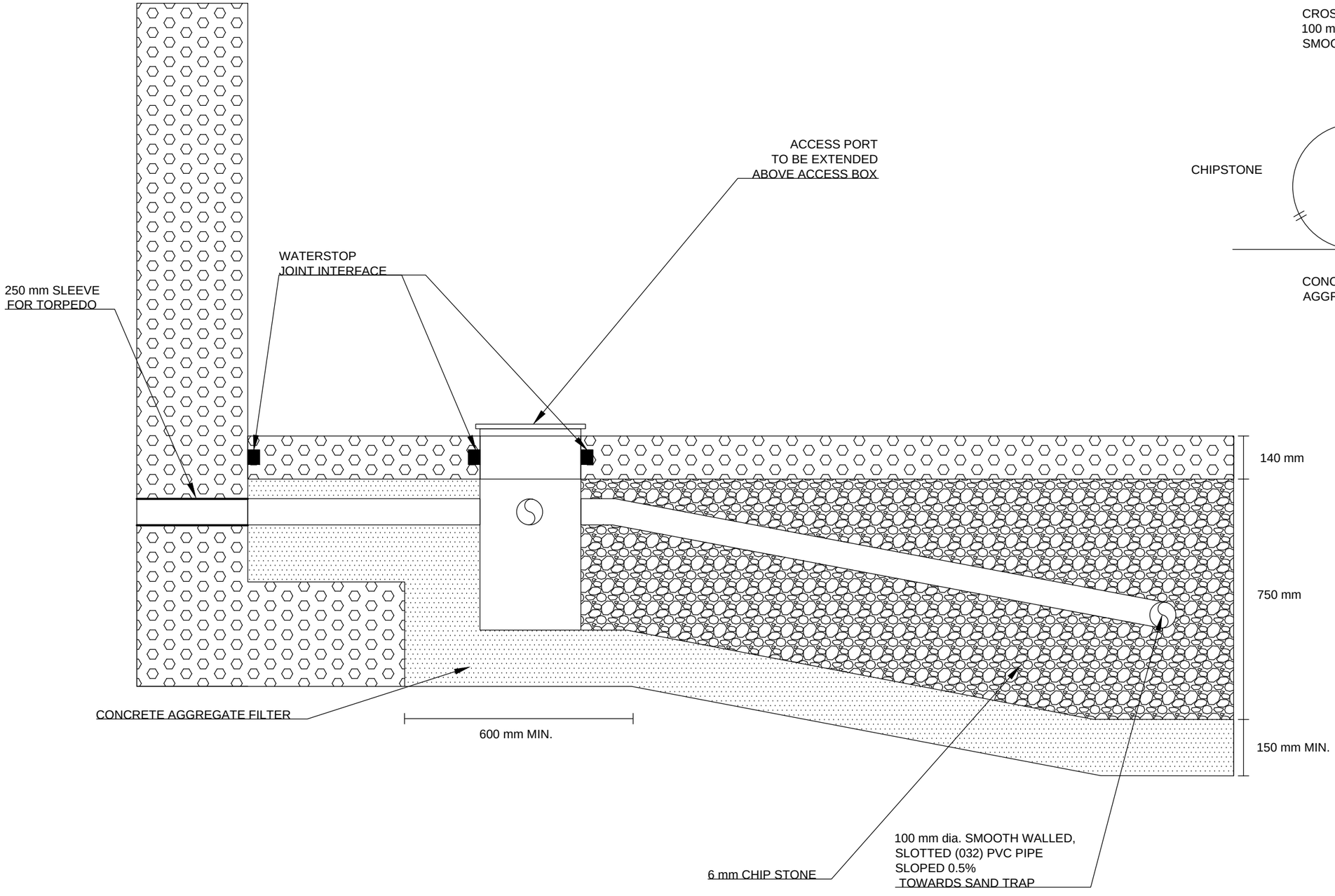
- SCREENED INTERVALS
- ELEVATION MARK (masl)
- APPROXIMATE WATER LEVEL
- FILL
- SAND
- SILTY SAND
- SHALE
- SILT
- CLAYEY SILT
- SANDY SILT

MCR ENGINEERS LTD
GEO-ENVIRONMENTAL CONSULTANTS

3085-3105 HURONTARIO STREET, MISSISSAUGA, ONTARIO

CROSS-SECTION B-B'

Project No.	Date	Drawn by:	Checked by:	Drawing No.
GE5822	AUGUST 2023	CM	ST	3



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GEO-ENVIRONMENTAL CONSULTANTS

PRIVATE WATER DRAINAGE SYSTEM

Scale:	Drawing No.
NTS	3

TABLES

MCR ENGINEERS LTD.
GEO-ENVIRONMENTAL CONSULTANTS

TABLE 1
CONSTRUCTION DETAILS AND ELEVATION OF MONITORING WELLS

MONITORING WELL ID	GROUND SURFACE ELEVATION (masl)	WATER LEVEL (mbgs)	GROUNDWATER ELEVATION (masl)	DATE OF MEASUREMENT (mm/dd/yyyy)	DEPTH OF WELL (mbgs)	DEPTH OF BENTONITE (mbgs)	LENGTH OF SCREEN (m)	INSIDE DIAMETER OF PIPE (mm)	TOP OF MONITORING WELL
Boreholes by Soil-Mat									
BH 2	116.15	3.10	113.05	04/24/2019	4.40	2.80	1.52	50	FLUSH MOUNT
		3.00	113.15	05/07/2019					
		3.10	113.05	04/17/202					
BH 101	116.23	4.60	111.63	03/27/2020	13.63	4.30	9.20	50	FLUSH MOUNT
		4.50	111.73	04/17/2020					
Boreholes by WSP									
BH 19-3	115.51	2.51	113.00	8/9/2019	3.55	1.85	3.05	50	FLUSH MOUNT
BH 19-4	118.26	3.13	115.13	8/9/2019	3.55	1.85	3.05	50	FLUSH MOUNT
Boreholes by MCR									
BH 101	116.95	1.83	115.12	04/11/2023	4.57	0.91	3.05	50	FLUSH MOUNT
BH 102	116.47	3.71	112.76	04/11/2023	5.33	1.68	3.05	50	FLUSH MOUNT
Min	115.51	1.83	111.63	-	3.55	-	-	-	-
Max	118.26	4.60	115.13	-	13.63	-	-	-	-
Average	116.60	3.28	113.18	-	5.84	-	-	-	-

NOTE:

mbgs - meters below ground surface

masl - meters above sea level

N/A - Not Applicable

NF - Not Found

MCR ENGINEERS LTD.
GEO-ENVIRONMENTAL CONSULTANTS

TABLE 2
GROUNDWATER ANALYTICAL RESULTS - PEEL REGION/MISSISSAUGA SEWERS BY-LAW DISCHARGE CRITERIA
MCR JOB#: G5822
SITE ADDRESS: 3085 - 3105 Hurontario Street, Mississauga, ON

PARAMETER	UNITS	LIMITS FOR STORM SEWER DISCHARGE	LIMITS FOR SANITARY & COMBINED SEWERS DISCHARGE	BH 102
				13-Apr-23
pH	pH Units	6.0 - 9.0	5.5 - 10.0	8.05
Total Suspended Solids	mg/L	15	350	7
Fluoride (F-)	mg/L	-	10	0.199
Total Kjeldahl Nitrogen (TKN)	mg/L	1	100	0.398
Total Phosphorus (P)	mg/L	0.4	10	0.093
Sulfate (SO4)	mg/L	-	1500	35.5
Total Cyanide (CN)	mg/L	0.02	2	<0.0020
Escherichia Coli	CFU/100mL	200	-	<1
Total Aluminum (Al)	mg/L	-	50	0.357
Total Antimony (Sb)	mg/L	-	5	<0.00100
Total Arsenic (As)	mg/L	0.02	1	<0.00100
Total Cadmium (Cd)	mg/L	0.008	0.7	<0.0000500
Total Chromium (Cr)	mg/L	0.08	5	<0.00500
Total Cobalt (Co)	mg/L	-	5	0.00102
Total Copper (Cu)	mg/L	0.05	3	<0.00500
Total Lead (Pb)	mg/L	0.12	3	0.00119
Total Manganese (Mn)	mg/L	0.05	5	**0.136**
Total Mercury (Hg)	mg/L	0.0004	0.01	<0.0000050
Total Molybdenum (Mo)	mg/L	-	5	0.0278
Total Nickel (Ni)	mg/L	0.08	3	<0.00500
Total Selenium (Se)	mg/L	0.02	1	0.000566
Total Silver (Ag)	mg/L	0.12	5	<0.000100
Total Tin (Sn)	mg/L	-	5	<0.00100
Total Titanium (Ti)	mg/L	-	5	0.00844
Total Zinc (Zn)	mg/L	0.04	3	<0.0300
Biological Oxygen Demand	mg/L	15	300	**686**
Carbonaceous Biochemical Oxygen Demand	mg/L	-	300	**587**
Total Oil & Grease (Animal/Vegetable)	mg/L	-	150	<5.0
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	<5.0
Phenols-4AAP	mg/L	0.008	1	0.0013
Benzene	µg/L	2	10	<0.50
Chloroform	µg/L	2	40	<0.50
1,2-Dichlorobenzene	µg/L	5.6	50	<0.50
1,4-Dichlorobenzene	µg/L	6.8	80	<0.50
cis-1,2-Dichloroethylene	µg/L	5.6	4000	<0.50
Dichloromethane (Methylene Chloride)	µg/L	5.2	2000	<1.0
trans-1,3-Dichloropropene	µg/L	5.6	140	<0.30
Ethylbenzene	µg/L	2	160	<0.50
Methyl Ethyl Ketone	µg/L	-	8000	<20
Styrene	µg/L	-	200	<0.50
1,1,2,2-Tetrachloroethane	µg/L	17	1400	<0.50
Tetrachloroethylene	µg/L	4.4	1000	<0.50
Toluene	µg/L	2	270	<0.50
Trichloroethylene	µg/L	8	400	<0.50
Xylene (Total)	µg/L	4.4	1400	<0.50
Bis(2-ethylhexyl)phthalate	µg/L	8.8	12	<2.0
Di-n-butylphthalate	µg/L	15	80	<1.0
Total PCBs	µg/L	0.4	1	<0.060
Nonylphenol	µg/L	-	20	<1.0
Total Nonylphenol Ethoxylates	µg/L	-	200	<2.0

Note:

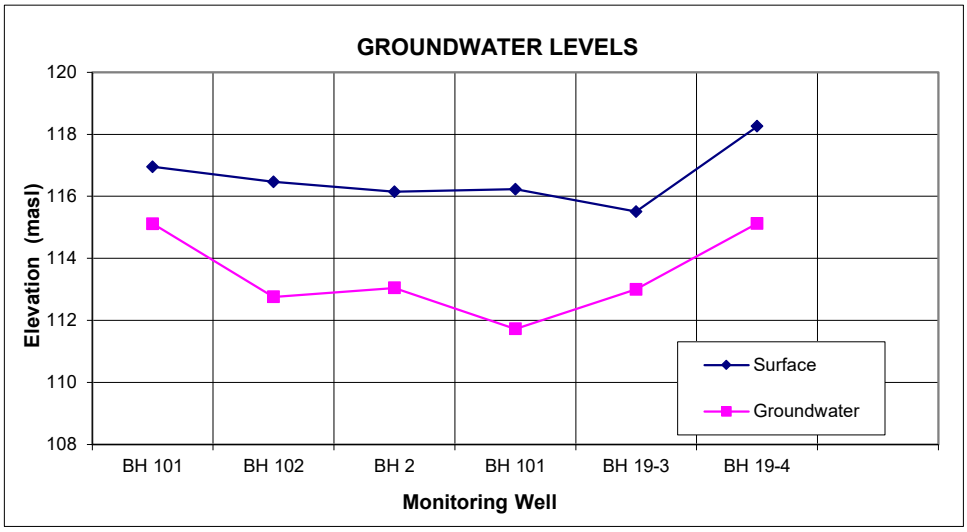
BOLD	Exceeds Criteria - Peel Region Sanitary By-Law
BOLD	Non-Detect Exceeds Criteria - Peel Region Sanitary By-Law
BOLD	Exceeds Criteria - Peel Region Storm By-Law
BOLD	Non-Detect Exceeds Criteria - Peel Region Storm By-Law

MCR	MCR ENGINEERS LTD.	GROUNDWATER
	GEO-ENVIRONMENTAL CONSULTANTS	

Project: Proposed Residential Development
Location: 3085 - 3105 Hurontario Street, Mississauga, ON
Date: September-24
Project #: G5822

TABLE 3
GROUNDWATER MONITORING DATA

Borehole Number	Surface Elevation	Water Level Depth	Water Level Elevation	Monitoring Date	NOTES
	(masl)	(mbgs)	(masl)	(mm/dd/yyy)	
BH 101	116.95	1.83	115.12	4/1/2023	
BH 102	116.47	3.71	112.76	4/1/2023	
BH 2	116.15	3.10	113.05	4/17/2020	by Soil-Mat
BH 101	116.23	4.50	111.73	4/17/2020	by Soil-Mat
BH 19-3	115.51	2.51	113.00	8/9/2019	by WSP
BH 19-4	118.26	3.13	115.13	8/9/2019	by WSP
Average	116.60	3.13	113.47		
Max			115.13		



Project: Proposed Residential Development
Location: 3085 - 3105 Hurontario Street, Mississauga, ON
Date: September-24
Project #: G5822

TABLE 4
DISCHARGE ESTIMATION OF CONSTRUCTION DEWATERING

Site Parameters		Units
Initial Water Level before Dewatering	113.47	(m)
Lowest Water Level during Construction Dewatering	104.00	(m)
Length of Site X	115.00	(m)
Width of Site W	130.00	(m)
Equivalent Radius r_e	68.98	(m)
Hydraulic Conductivity of Aquifer (k)	0.20	(m/day)
Aquifer Bottom Elevation	103.00	(m)
Applied Radius of Influence (Ro)	43.20	(m)
Height btw Initial Water Level and Aquifer Bottom (H)	10.47	(m)
Height btw Lowest Water Level and Aquifer Bottom (h_w)	1.00	(m)
Radius of Influence (R)	112.19	(m)
Factor of Safety (FS)	1.50	

$$Q = \frac{\pi k (H^2 - h_w^2)}{Ln(R/r)}$$

Estimated steady-state discharge of dewatering	210	(m^3/day)
	39	(USG/min)

Project:	**Proposed Residential Development**
Location:	**3085 - 3105 Hurontario Street, Mississauga, ON**
Date:	**September-24**
Project #:	**G5822**

TABLE 5
DISCHARGE ESTIMATION OF PERMANENT DRAINAGE SYSTEM

Site Parameters		Units
Initial Water Level before Dewatering	113.47	(m)
Lowest Water Level under PDS conditions	105.20	(m)
Length of Site X	115.00	(m)
Width of Site W	130.00	(m)
Equivalent Radius r_e	68.98	(m)
Hydraulic Conductivity of Aquifer (k)	0.20	(m/day)
Aquifer Bottom Elevation	104.20	(m)
Applied Radius of Influence (Ro)	37.72	(m)
Height btw Initial Water Level and Aquifer Bottom (H)	9.27	(m)
Height btw Lowest Water Level and Aquifer Bottom (h_w)	1.00	(m)
Radius of Influence (R)	106.71	(m)
Factor of Safety (FS)	1.50	

$$Q = \frac{\pi k (H^2 - h_w^2)}{Ln(R/r)}$$

Estimated steady-state discharge of dewatering	**183**	(m^3/day)
	34	(USG/min)

APPENDIX A

PLAN OF SURVEY OF LOT 15, CONCESSION 1 NORTH OF DUNDAS STREET, PART OF BLOCKS A AND B, REGISTERED PLAN 645 AND PART OF VILLAGE LOT 9, SAVIGNEY'S PLAN OF COOKSVILLE (PLAN TOR–12) CITY OF MISSISSAUGA REGIONAL MUNICIPALITY OF PEEL

SCALE 1:300

10m 5m 0 10m 20m 30 metres

R–PE SURVEYING LTD., O.L.S.

METRIC

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

NOTES

□	DENOTES MONUMENT SET
■	DENOTES MONUMENT FOUND
SSIB	DENOTES SHORT STANDARD IRON BAR
SIB	DENOTES STANDARD IRON BAR
IB	DENOTES IRON BAR
RSIB	DENOTES ROUND STANDARD IRON BAR
CC	DENOTES CUT CROSS
PL1	DENOTES PLAN 43R–17198
PL2	DENOTES PLAN 43R–33188
PL3	DENOTES EXPROPRIATION PLAN PR3525321
PL6	DENOTES UNREGISTERED PEEL STANDARD CONDOMINIUM PLAN BY CHAMBERS & ASSOCIATES SURVEYING LTD., O.L.S. DATED AUGUST 23, 2018 (FILE No. 10–12)
(1225)	DENOTES DAVID B. SEARLES SURVEYING LTD., O.L.S.
(1654)	DENOTES CHAMBERS & ASSOCIATES SURVEYING LTD., O.L.S.
(NI)	DENOTES NOT IDENTIFIED
(WIT)	DENOTES WITNESS
P.I.N.	DENOTES PROPERTY IDENTIFIER NUMBER
RW	DENOTES RETAINING WALL
SCP	DENOTES SPECIFIED CONTROL POINT
CLF	DENOTES CHAIN LINK FENCE

INTEGRATION NOTE

BEARINGS ARE UTM GRID, DERIVED FROM SPECIFIED CONTROL POINTS 2016079 AND 2016080, UTM ZONE 17, NAD–1983:CSRS:CBNV6–2010.0.

COORDINATES ARE UTM ZONE 17, NAD–1983:CSRS:CBNV6–2010.0, TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

POINT ID	NORTHING	EASTING
SCP 2016079	4826446.77	611405.54
SCP 2016080	4826342.28	611561.12

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999739.

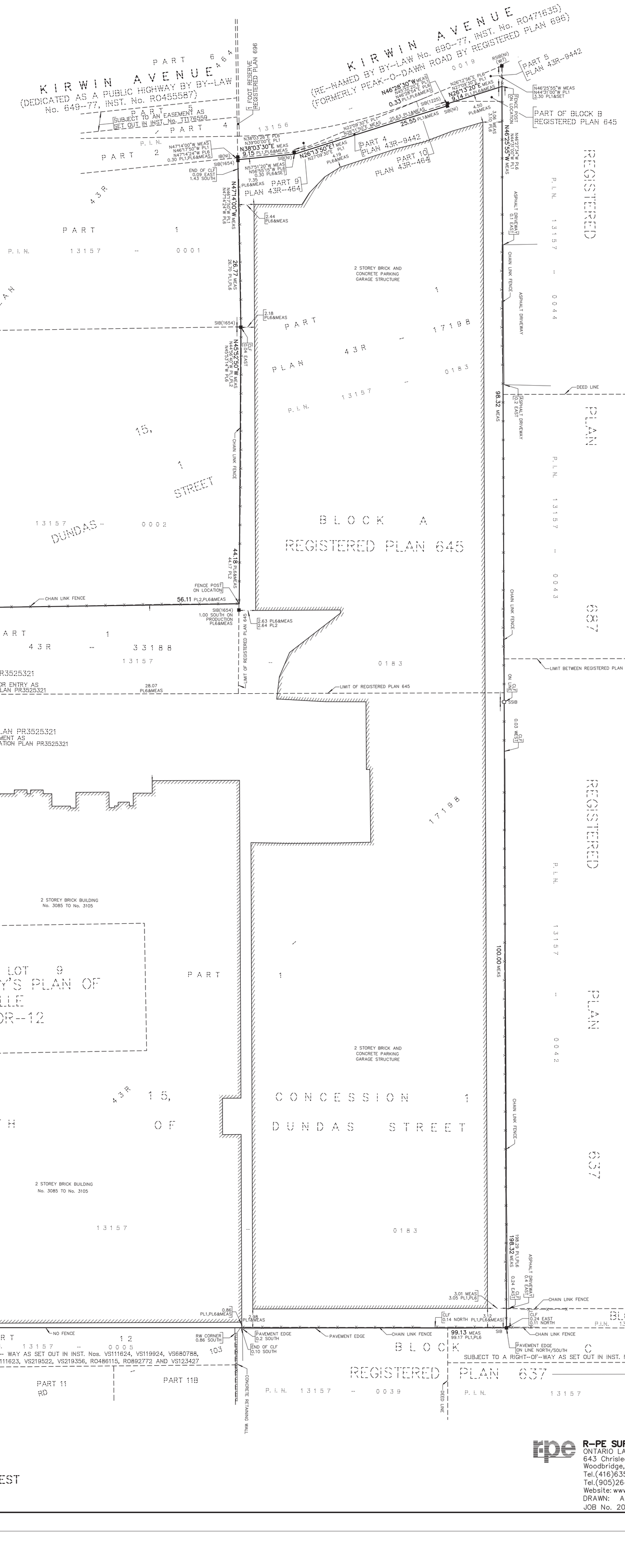
SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 08th DAY OF FEBRUARY ,2021.

DATE FEBRUARY 24th ,2021

S. GOONEWARDENA
ONTARIO LAND SURVEYOR



ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2153932
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3).

R–PE SURVEYING LTD.
ONTARIO LAND SURVEYORS
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Woodbridge, Ontario L4L 8A3
Tel.(416)635–5000 Fax (416)635–5001
Tel.(905)264–0881 Fax (905)264–2099
Website: www.r–pe.ca

DRAWN: A.Q. CHECKED: S.G.
JOB No. 20–257 CAD FILE No.20257PS01

APPENDIX C

3085 HURONTARIO ST

3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

ARCHITECTURAL DRAWINGS					
SHEET	DRAWING TITLE	SCALE	ISSUANCE		
			Backgrounds	OPA & ZBA	100% SD
GENERAL					
A-001	COVER SHEET & DRAWING LIST	N/A	•	•	•
A-010	SURVEY & SITE CONTEXT & PHASING PLAN	SEE DWG	•	•	•
A-011	CONTEXT PLAN	1:800	•	•	•
A-012	SITE PLAN	1:300	•	•	•
A-013	SIMPLIFIED SITE PLAN	1:300	•	•	•
A-020	PERSPECTIVE VIEWS	N/A	•	•	•
A-021	PERSPECTIVE VIEWS	N/A	•	•	•
PLANS					
A-100	LEVEL P3 PLAN	1:300	•	•	•
A-101	LEVEL P2 PLAN	1:300	•	•	•
A-102	LEVEL P1 PLAN	1:300	•	•	•
A-103	LEVEL P1 MEZZANINE PLAN	1:300	•	•	•
A-104	GROUND LEVEL PLAN	1:300	•	•	•
A-105	GROUND LEVEL MEZZANINE PLAN	1:300	•	•	•
A-106	LEVEL 2 PLAN	1:300	•	•	•
A-107	LEVEL 3 PLAN	1:300	•	•	•
A-108	LEVEL 4 PLAN	1:300	•	•	•
A-109	LEVEL 5 PLAN	1:300	•	•	•
A-110	LEVEL 6 PLAN	1:300	•	•	•
A-111	LEVEL 7 PLAN	1:300	•	•	•
A-112	LEVEL 8-11 PLAN	1:300	•	•	•
A-113	LEVEL 12 PLAN	1:300	•	•	•
A-114	TYPICAL TOWER PLAN	1:300	•	•	•
A-115	MECHANICAL PENTHOUSE PLAN	1:300		•	•
A-116	ROOF LEVEL PLAN	1:300	•	•	•
EXTERIOR ELEVATIONS					
A-200	SOUTH ELEVATION 1	1:300	•	•	•
A-201	SOUTH ELEVATION 2	1:300	•	•	•
A-202	SOUTH ELEVATION 3	1:300	•	•	•
A-203	NORTH ELEVATION 1	1:300	•	•	•
A-204	NORTH ELEVATION 2	1:300	•	•	•
A-205	NORTH ELEVATION 3	1:300	•	•	•
A-206	EAST ELEVATION 1	1:300	•	•	•
A-207	EAST ELEVATION 2	1:300	•	•	•
A-208	WEST ELEVATION 1	1:300	•	•	•
A-209	WEST ELEVATION 2	1:300	•	•	•
EXTERIOR SECTIONS					
A-300	SECTION 1	1:300	•	•	•
A-301	SECTION 2	1:300	•	•	•
A-302	SECTION 3	1:300	•	•	•
A-303	SECTION 4	1:300	•	•	•
A-304	SECTION 5	1:300	•	•	•

PRELIMINARY
NOT FOR CONSTRUCTION

ISSU. NO.	DESCRIPTION	DATE
3	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 2	2024.07.25
2	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 1	2024.07.22
1	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION)	2024.07.12

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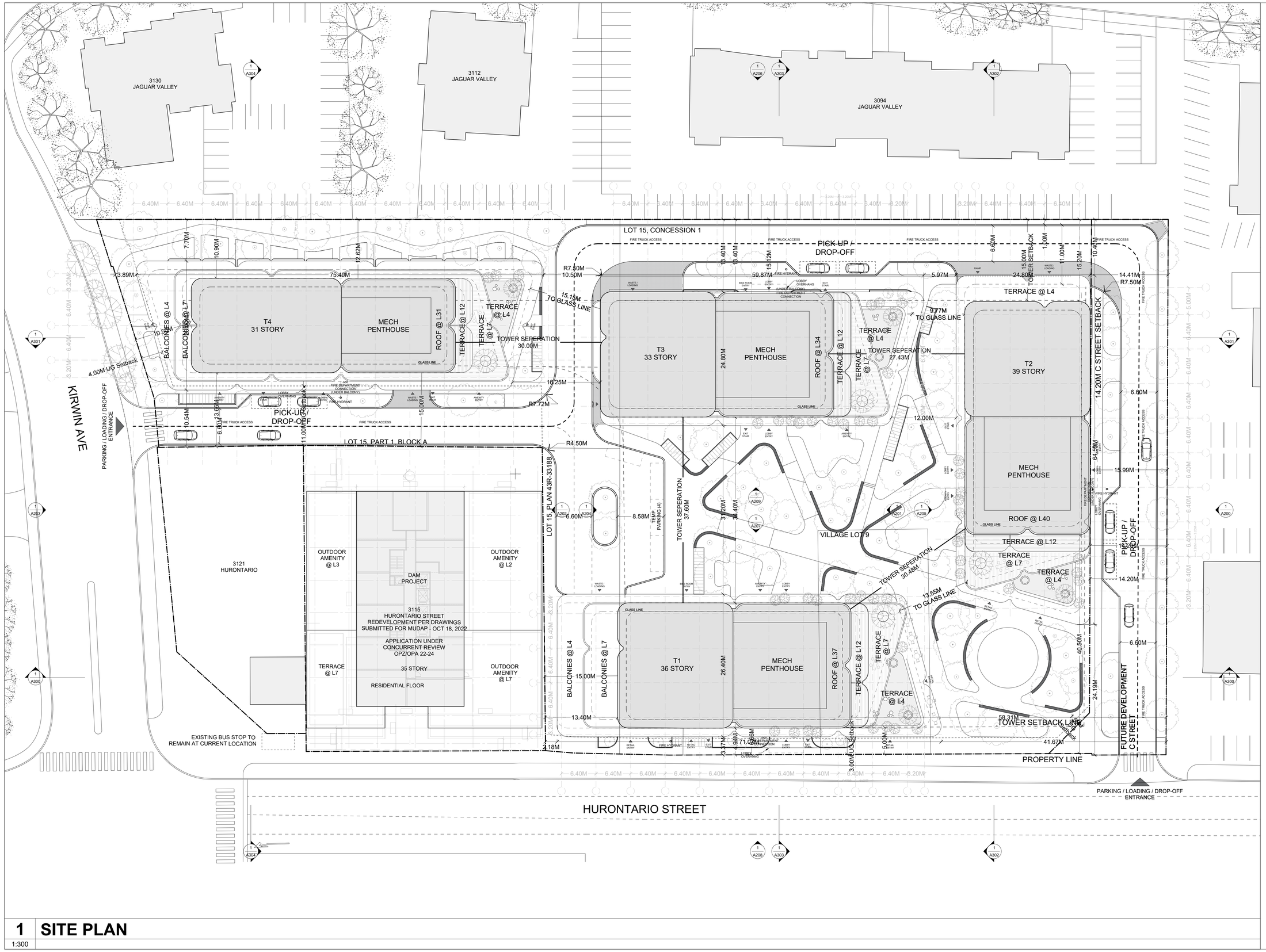
3085 Hurontario St

3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

DRAWING TITLE

TITLE SHEET & DRAWING LIST

PROJECT NUMBER	850010
SCALE	NO SCALE
SHEET SIZE	ARCH D
DRAWING NO.	**A001**
DATE	2024.07.25
REVIEWED BY	DKI



1 SITE PLAN

1:300

PRELIMINARY
NOT FOR CONSTRUCTION

ISSU. NO.	DESCRIPTION	DATE
3	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 2	2024.07.25
2	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 1	2024.07.22
1	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION)	2024.07.12

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3085 Hurontario St

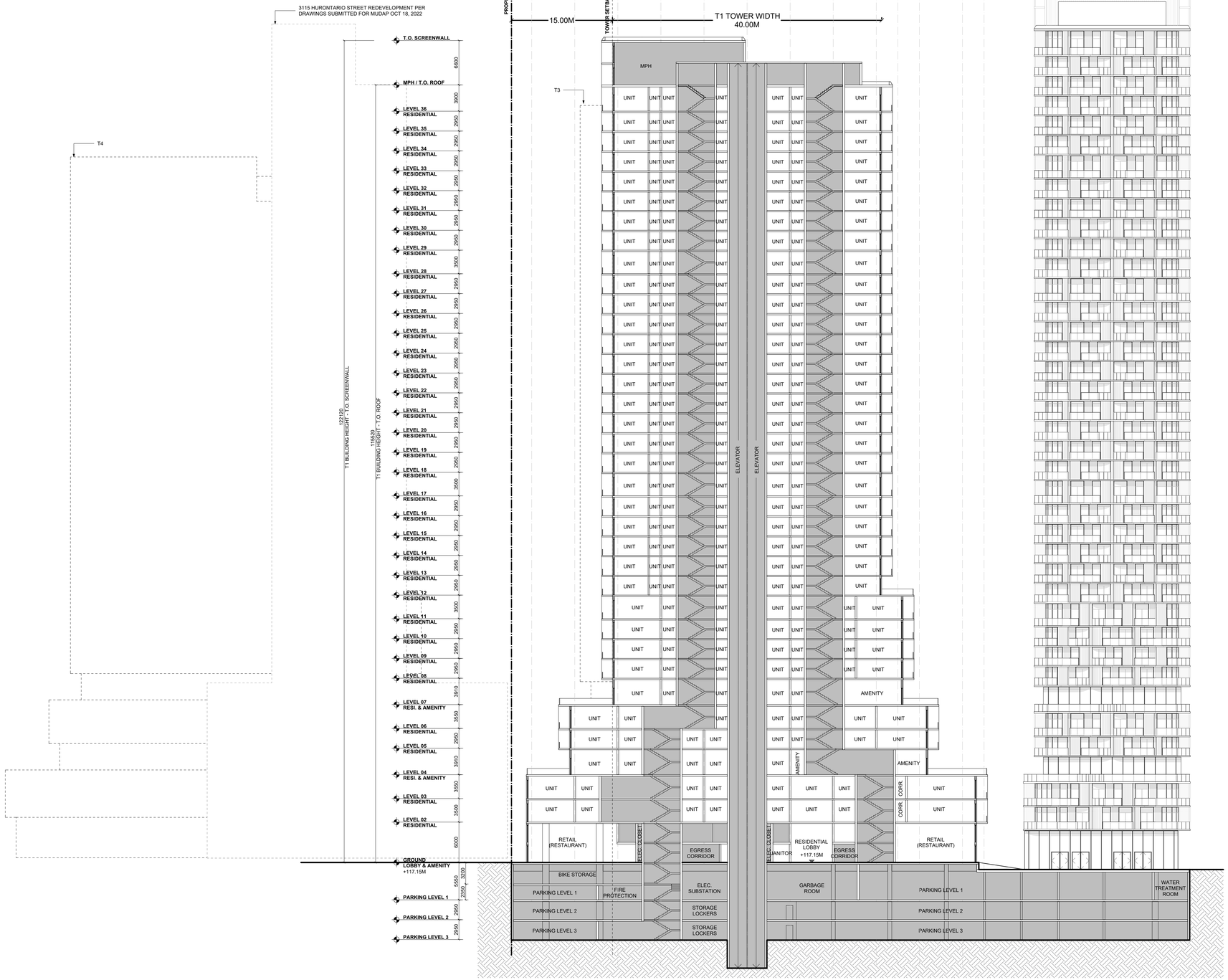
3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

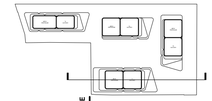
DRAWING TITLE

SITE PLAN

.

PROJECT NUMBER	850010
SCALE	1:300
SHEET SIZE	ARCH D
DRAWING NO.	**A012**
DATE	2024.07.25
REVIEWED BY	DKI





KEY PLAN

PRELIMINARY NOT FOR CONSTRUCTION	
3	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 2 — 2024.07.25
2	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 1 — 2024.07.22
1	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) — 2024.07.12
ISSU. NO.	DESCRIPTION — DATE

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MISSISSAUGA, ON L5N 1P7
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3085 Hurontario St

3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

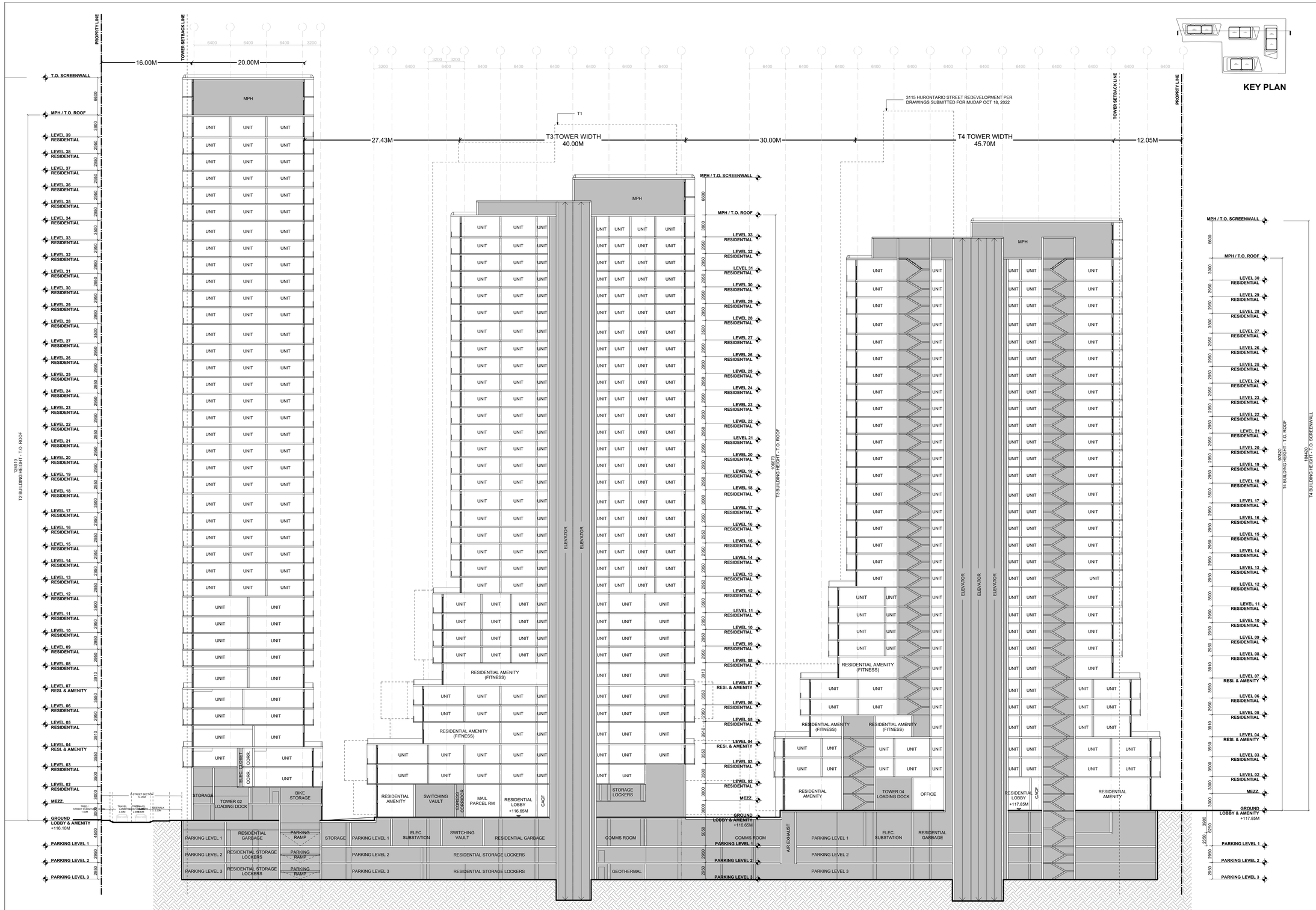
DRAWING TITLE

SECTION 1

.

PROJECT NUMBER	850010
SCALE	1:300
SHEET SIZE	ARCH D
DRAWING NO.	**A300**
DATE	2024.07.25
REVIEWED BY	DKI

1 SECTION 1
1:300



1 SECTION 2

1:300

KEY PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

ISSU. NO.	DESCRIPTION	DATE
3	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 2	2024.07.25
2	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 1	2024.07.22
1	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION)	2024.07.12

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T 416 340 6703
JABLONSKY AST AND PARTNERS
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TORONTO, ON M3C 3N7
T 416 447 7405
SMITH + ANDERSEN
1100 – 100 SHEPPARD AVE. EAST
TORONTO, ON M2N 6N5
T 416 487 8151
SOBERMAN ENGINEERING
60 ST. CLAIR AVENUE EAST, SUITE 806
TORONTO, ON M4T 1N5
T 416 323 2133
SPANIER GROUP
786 ST CLAIR AVE W SUITE B
TORONTO, ON M6C 1B6
T 416 543 2221
URBANTECH
2030 BRISTOL CIRCLE, SUITE 105
OAKVILLE, ON L6H 0H2
T 905 829 8818
WALMSLEY ENVIRONMENTAL
103-30 OLD MILL ROAD
ETOBICOKE, ON M8X 0A5
T 647 271 3716
FOOTPRINT
100 SHEPPARD AVE E, SUITE 1100
TORONTO, ON M2N 6N5
T 416 218 7025
BA CONSULTING GROUP
95 ST. CLAIR AVE. W, SUITE 1000
TORONTO, ON M4V 1N6
T 416 961 7110
GRADIENT WIND ENGINEERING
127 WALGREEN ROAD
OTTAWA, ON K0A 1L0
T 613 836 0934
GLEN SCHNARR & ASSOCIATES
10 KINGSBRIDGE GARDEN CIRCLE, SUITE 700
MISSISSAUGA, ON L5R 3K6
T 905 568 8888
PRIMARY ENGINEERING
EAST TOWER, 77 CITY CENTRE DR, SUITE 501
MISSISSAUGA, ON L5B 1M5
T 647 361 4808
HGC ENGINEERING
2000 ARGENTIA ROAD, PLAZA 1, SUITE 203
MISSISSAUGA, ON L5N 1P7
T 905 826 4044

3085 Hurontario St

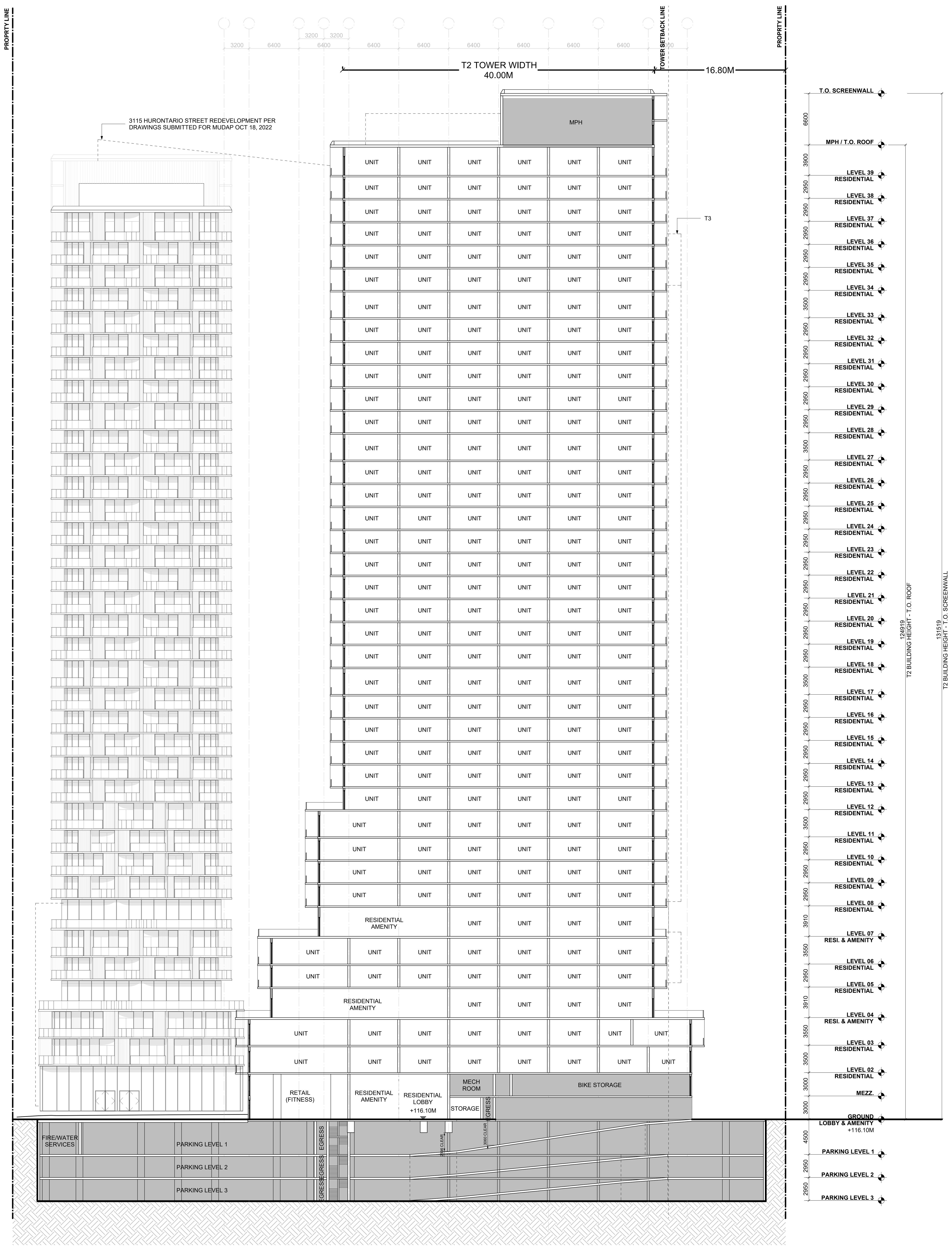
3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

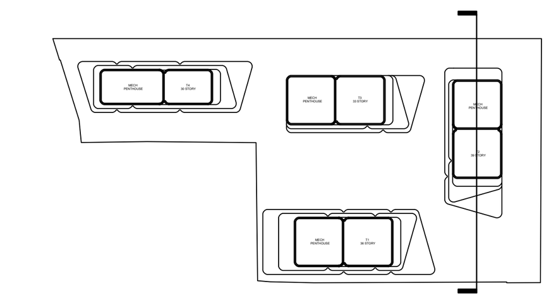
DRAWING TITLE

SECTION 2

.

PROJECT NUMBER	850010
SCALE	1:300
SHEET SIZE	ARCH D
DRAWING NO.	**A301**
DATE	2024.07.25
REVIEWED BY	DKI





KEY PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

ISSU. NO.	DESCRIPTION	DATE
3	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 2	2024.07.25
2	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 1	2024.07.22
1	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION)	2024.07.12

OWNER
EQUITY THREE HOLDINGS INC.
3300 BLOOR STREET WEST, SUITE 1800
TORONTO, ON M8X 2X2
T 905 907 8888
MATTAMY HOMES CANADA

DESIGN ARCHITECT
3XN USA LLC
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ARCHITECT OF RECORD
KIRKOR
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TORONTO ON M3J 0H1
T 416 665 6060

CONSULTANTS

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T 416 340 6703

JABLONSKY AST AND PARTNERS
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TORONTO, ON M3C 3N7
T 416 447 7405

SMITH + ANDERSEN
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TORONTO, ON M2N 6N5
T 416 487 8151

SOBERMAN ENGINEERING
60 ST. CLAIR AVENUE EAST, SUITE 806
TORONTO, ON M4T 1N5
T 416 323 2133

SPANIER GROUP
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TORONTO, ON M6C 1B6
T 416 543 2221

URBANTECH
2030 BRISTOL CIRCLE, SUITE 105
OAKVILLE, ON L6H 0H2
T 905 829 8818

WALMSLEY ENVIRONMENTAL
103-30 OLD MILL ROAD
ETOBICOKE, ON M8X 0A5
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FOOTPRINT
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BA CONSULTING GROUP
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PRIMARY ENGINEERING
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MISSISSAUGA, ON L5B 1M5
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HGC ENGINEERING
2000 ARGENTIA ROAD, PLAZA 1, SUITE 203
MISSISSAUGA, ON L5N 1P7
T 905 826 4044

3085 Hurontario St

3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

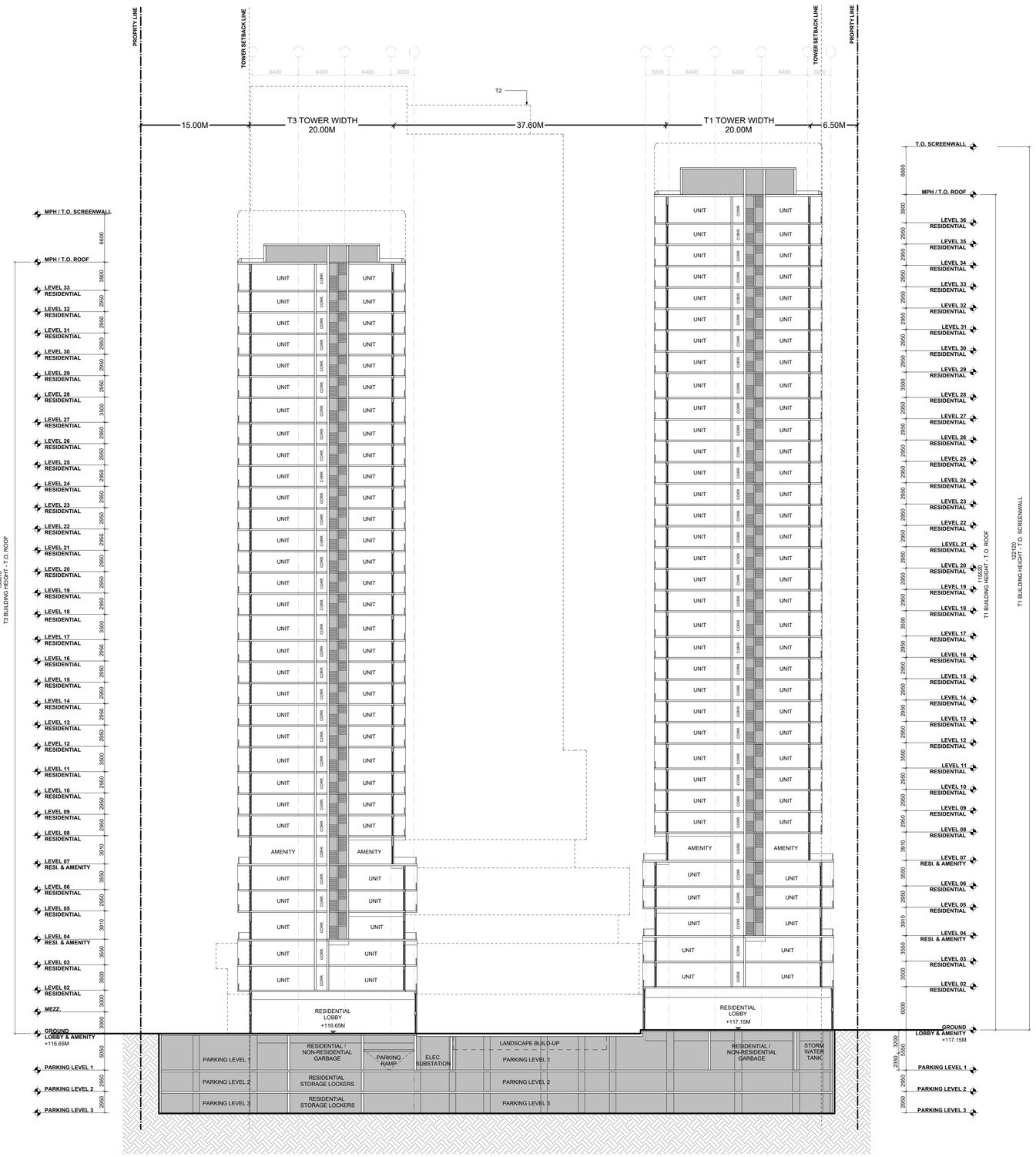
DRAWING TITLE

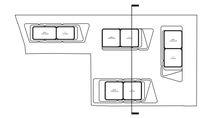
SECTION 3

.

PROJECT NUMBER	850010
SCALE	1:300
SHEET SIZE	ARCH D
DRAWING NO.	A302
DATE	2024.07.25
REVIEWED BY	DKI

1 SECTION 3
1:300





KEY PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

ISSU. NO.	DESCRIPTION	DATE
3	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 2	2024.07.25
2	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 1	2024.07.22
1	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION)	2024.07.12

OWNER
EQUITY THREE HOLDINGS INC.
3300 BLOOR STREET WEST, SUITE 1800
TORONTO, ON M8X 2X2
T 905 907 8888
MATTAMY HOMES CANADA

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TORONTO, ON M2N 6N5
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T 416 543 2221
URBANTECH
2030 BRISTOL CIRCLE, SUITE 105
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T 905 829 8818
WALMSLEY ENVIRONMENTAL
103-30 OLD MILL ROAD
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FOOTPRINT
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3085 Hurontario St

3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

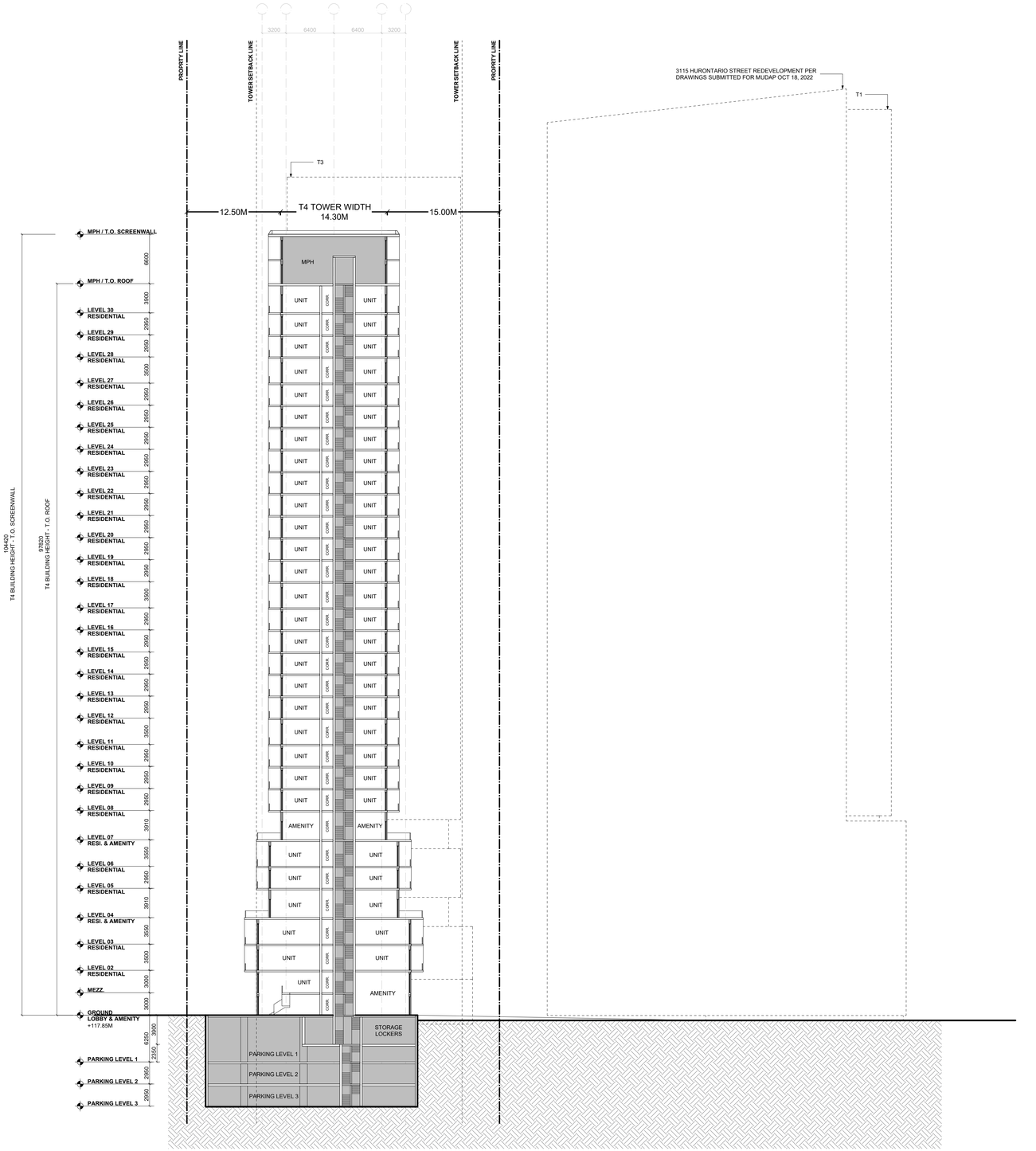
DRAWING TITLE

SECTION 4

.

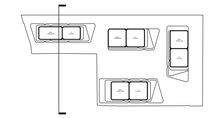
PROJECT NUMBER	850010
SCALE	1:300
SHEET SIZE	ARCH D
DRAWING NO.	**A303**
DATE	2024.07.25
REVIEWED BY	DKI

1 SECTION 4
1:300



1 SECTION 5

1:300



KEY PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

ISSU. NO.	DESCRIPTION	DATE
3	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 2	2024.07.25
2	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION) REVISION 1	2024.07.22
1	60% SD SUBMISSION (ARCH BACKGROUNDS FOR COORDINATION)	2024.07.12

OWNER
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MATTAMY HOMES CANADA

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SPANIER GROUP
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2030 BRISTOL CIRCLE, SUITE 105
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103-30 OLD MILL ROAD
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3085 Hurontario St

3085 HURONTARIO ST. MISSISSAUGA
ON L5A 2G9

DRAWING TITLE

SECTION 5

.

PROJECT NUMBER	850010
SCALE	1:300
SHEET SIZE	ARCH D
DRAWING NO.	**A304**
DATE	2024.07.25
REVIEWED BY	DKI

APPENDIX B

RECORD OF BOREHOLE 101

PROJECT : GE5822
LOCATION : 3085-3105 Hurontario Street, Mississauga, Ontario
STARTED : March 16, 2023
COMPLETED : March 16, 2023

MC CLYMONT & RAK ENGINEERS, INC.

SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ORGANIC VAPOUR READINGS (ppm) ⊗ 100 200 300 400 / % LEL - (hexane) □ 20 40 60 80	SHEAR STRENGTH: Cu, KPa nat V - ✚ rem V - ● Q - ✖ U - ▲ 20 40 60 80 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		116.95							
	POWER BORING / HOLLOW STEM AUGER	150mm ASPHALT		116.80							Flush Mount Cover
		250mm GRANULAR FILL		0.15	1	SS	19				
		SAND: fine, brown, moist, compact.		116.55 0.40	2	SS	18				Bentonite
					3	SS	24				116.04
2											1.52 m Long 50 mm ID PVC Riser
		SILTY SAND TILL: trace of shale fragments and gravel, brown, wet, very dense.		114.66 2.29	4	SS	93				
		SILTY SAND TILL/WEATHERED SHALE COMPLEX: trace of gravel, brown, wet, very dense.		113.90 3.05	5	SS	>100				Silica Sand
4											3.05 m Long 50 mm ID Well Screen
		WEATHERED SHALE: grey, moist.		112.38 4.57	6	SS	>100				112.38
		End of Borehole		111.92 5.03							
6		Note: 1) Water level was not measured on completion of drilling. 2) Water level was measured at 1.83 mbgs on Apr. 11, 2023.									

GROUNDWATER ELEVATIONS

▽ SHALLOW/SINGLE INSTALLATION
WATER LEVEL: 1.83 m bgs

▼ DEEP/DUAL INSTALLATION
WATER LEVEL:

LOGGED : RS
CHECKED : CM

MCR LOG ENVIRONMENTAL 5822.GPJ 4-13-23

RECORD OF BOREHOLE 102

PROJECT : GE5822
LOCATION : 3085-3105 Hurontario Street, Mississauga, Ontario
STARTED : March 15, 2023
COMPLETED : March 16, 2023

MC CLYMONT & RAK ENGINEERS, INC.

SHEET 1 OF 1
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ORGANIC VAPOUR READINGS (ppm) ⊗ 100 200 300 400 / % LEL - (hexane) □ 20 40 60 80	SHEAR STRENGTH: Cu, KPa nat V - ✚ rem V - ● Q - ✖ U - ▲ 20 40 60 80 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		116.47							
	POWER BORING / HOLLOW STEM AUGER	200mm CONCRETE		116.27							Flush Mount Cover
		150mm GRANULAR FILL		0.20 116.12	1	SS	12				
		SAND: fine, dark brown to brown, moist to wet, compact to dense. - trace of gravel until 0.61 m.		0.35	2	SS	18				Bentonite
					3	SS	9				114.79
2					4	SS	28				2.29 m Long 50 mm ID PVC Riser
		CLAYEY SILT TILL: trace of sand and gravel, brown to grey, moist, very stiff.		114.03 2.44	5	SS	22				
					6	SS	26				Silica Sand
4					7	SS	19				▽
		WEATHERED SHALE		112.20 4.27	8	SS	>100				3.05 m Long 50 mm ID Well Screen
					9	SS					
		End of Borehole Note: 1) Water level was not measured on completion of drilling. 2) Water level was measured at 3.71 mbgs on Apr. 11, 2023.		111.14 5.33							111.14
6											

GROUNDWATER ELEVATIONS

▽ SHALLOW/SINGLE INSTALLATION
WATER LEVEL: 3.71 m bgs

▼ DEEP/DUAL INSTALLATION
WATER LEVEL:

LOGGED : RS
CHECKED : CM

MCR LOG ENVIRONMENTAL 5822.GPJ 4-13-23

APPENDIX C

Log of Borehole No. 1

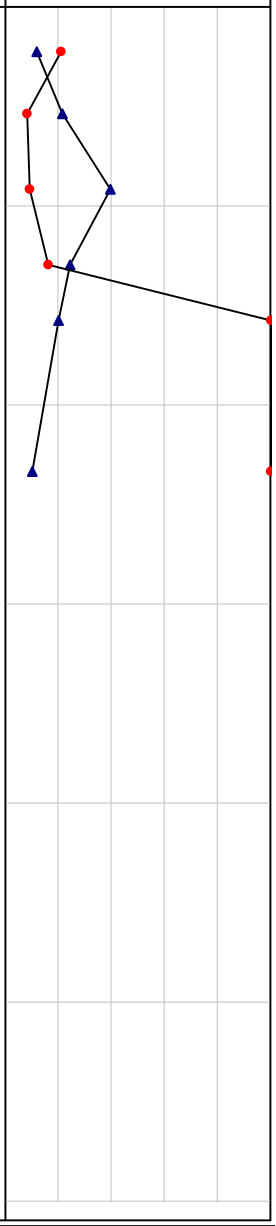
Project No: SM 190138-G
Project: Proposed Condominium Building
Location: 3085 Hurontario Street, Mississauga
Client: Oakhill Environmental Inc.

Project Manager: Kyle Richardson
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4826460
E: 611511

Soil-Mat

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	116.39	Ground Surface								
0 / 0	116.09	**Pavement Structure** Approximately 100 millimetres of asphaltic concrete over 200 millimetres of compact granular base.								
1 /		**Sand** Brown, medium in gradation, trace gravel, occasional organics in upper level, loose.		SS	1	9,10,11,7	21			
2 / 1				SS	2	3,4,4,9	8			
6 /	114.20			SS	3	5,5,4,6	9			
9 / 2		**Clayey Silt** Grey, trace gravel, very stiff.		SS	4	4,7,9,12	16		>4.5	
10 / 3	113.10			SS	5	14,50/5"	100			
13 / 4		**Dundas Shale** Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.			6	50/4"	100			
19 / 6				NQ	7	RQD 29.4%				
23 / 7				NQ	8	RQD 35.7%				
25 /	108.50									
26 / 8		End of Borehole NOTES: 1. Borehole was advanced using hollow stem auger equipment on April 8, 2019 to auger refusal at a depth of 5.2 metres, then the bedrock cored to a depth of approximately 7.9 metres using Nq diamond barrel equipment. 2. Borehole was backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.								
29 / 9										
33 / 10										
36 / 11										
39										

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: Hollow Stem Augers
Drill Date: April 8, 2019
Hole Size: 200 millimetres
Drilling Contractor: Geo-Environmental

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Benchmark
Field Logged by: ZRV
Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 2

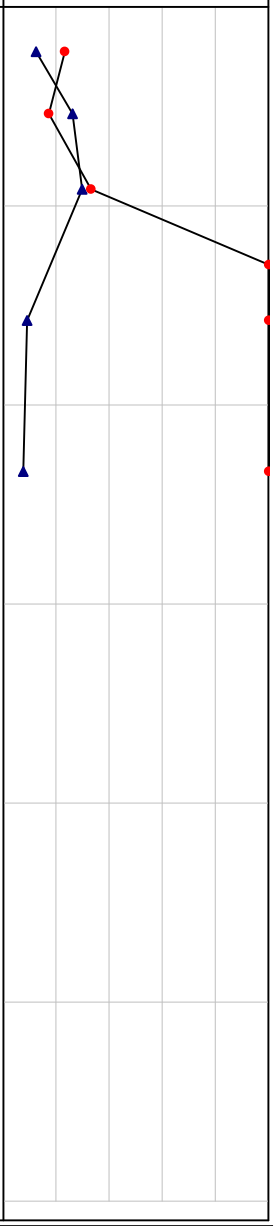
Project No: SM 190138-G
Project: Proposed Condominium Building
Location: 3085 Hurontario Street, Mississauga
Client: Oakhill Environmental Inc.

Project Manager: Kyle Richardson
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4826436
E: 611503

Soil-Mat

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	116.15	Ground Surface								
0 / 0	115.85	**Pavement Structure** Approximately 150 millimetres of asphaltic concrete over 150 millimetres of compact granular base.								
4 / 1	114.40	**Sand** Brown, medium in gradation, trace gravel, occasional organics in upper level, compact.		SS	1	12,12,11,9	23			
7 / 2	113.70	**Clayey Silt** Grey, trace gravel, hard.		SS	2	3,5,12,19	17			
10 / 3	111.50	**Dundas Shale** Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	3	12,22,11,13	33			
				SS	4	11,50/4"	100			
				SS	5	50/5"	100			
15 / 5		End of Borehole			6	50/3"	100			

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on April 8, 2019 to auger refusal on assumed bedrock at a depth of approximately 4.6 metres.

2. Borehole was backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

April 24, 2019 - 3.1 metres

May 7, 2019 - 3.0 metres

April 17, 2020 - 3.1 metres

Drill Method: Hollow Stem Augers
Drill Date: April 8, 2019
Hole Size: 200 millimetres
Drilling Contractor: Geo-Environmental

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Temporary Benchmark
Field Logged by: ZRV
Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 101

Project No: SM 190138-G
Project: Proposed Condominium Building
Location: 3085 Hurontario Street, Mississauga
Client: Oakhill Environmental Inc.

Project Manager: Kyle Richardson
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4826448
E: 611500

Soil-Mat

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
	116.23	Ground Surface									
0 / 0	115.93	**Pavement Structure** Approximately 100 millimetres of asphaltic concrete over 200 millimetres of compact granular base.									
1 /		**Sand** Brown, medium in gradation, trace gravel, loose to compact.		SS	1	12,11,10,9	21				
2 / 1				SS	2	5,4,2,2	6				
3 /				SS	3	4,5,7,9	12				
4 /	114.10	**Clayey Silt** Grey, trace gravel, very stiff.		SS	4	6,10,22,50/3"	32		>4.5		
5 / 2	113.40	**Dundas Shale** Grey with occasional harder limestone layers, highly weathered in upper levels, becoming more sound with depth, hard.		SS	5	50/3"	100				
6 /				NQ	7	RQD 0%					
7 / 3				NQ	8	RQD 64.2%					
8 /				NQ	9	RQD 78.8%					
9 / 4				NQ	10	RQD 62.9%					13.8 MPa 13.5 MPa
10 /				NQ	11	RQD 44.2%					11.8 MPa 14.2 MPa
11 / 5				NQ	12	RQD 23.6%					69.3 MPa
12 /											
13 / 6											
14 /											
15 / 7											
16 /											
17 / 8											
18 /											
19 / 9											
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21 / 10											
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33 / 15											
34 /											
35 /											
36 / 16											
37 /											
38 / 17											
39 /											

Drill Method: Hollow Stem Augers
Drill Date: March 12, 2020
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Temporary Benchmark
Field Logged by: SW
Checked by: KR
Sheet: 1 of 2

Log of Borehole No. 101

Project No: SM 190138-G
Project: Proposed Condominium Building
Location: 3085 Hurontario Street, Mississauga
Client: Oakhill Environmental Inc.

Project Manager: Kyle Richardson
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4826448
E: 611500

Soil-Mat

Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79	13 14 15 16 17 18 19 20 21 22 23				NQ	13	RQD 56.7%					56.3 MPa 12.4 MPa
	102.40		End of Borehole									

NOTES:

1. Borehole was advanced using hollow stem auger equipment on March 12, 2020 to auger refusal at a depth of 3.0 metres, then the bedrock cored to a depth of approximately 13.8 metres using Nq diamond barrel equipment.

2. Borehole was backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free ground water level readings have been measured:

March 27, 2020 - 4.6 metres below the existing ground surface

April 17, 2020 - 4.5 metres below the existing ground surface

Drill Method: Hollow Stem Augers
Drill Date: March 12, 2020
Hole Size: 200 millimetres
Drilling Contractor: Davis Drilling

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Temporary Benchmark
Field Logged by: SW
Checked by: KR
Sheet: 2 of 2

MONITORING WELL DRILLING RECORD : **BH19-3**

Project Number: **191-02120-01**

3085 Hurontario Street, Mississuaga, Ontario
Phase Two Environmental Site Assessment
Equity Builders

DRILLING DETAILS

Date (Start):	7/3/2019
Date (End):	7/3/2019
Drilling Company:	Strata Drilling Group
Drilling Equipment:	CME 420M
Drilling Method:	Solid Stem Auger
Borehole Diameter:	38.1 mm
Drilling Fluid:	N/A

SURVEY DETAILS

Easting:	m
Northing:	m
Surface Elevation:	115.51 masl
Top of Well Elevation:	115.44 masl

ODOUR
L - Light
M - Medium
S - Strong

VISUAL
D - Dispersed with Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
DT - Dual Tube
MC - Macro Core
NR - No Recovery

CHEMICAL ANALYSIS

Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Inorg.	Inorganic Compounds
PHC	Petroleum Hydrocarbons (F1-F4)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
VOC	Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
D/F	Dioxins & Furans
Phenol	Phenolic Compounds
GSA	Grain-size Analysis

(m) DEPTH / *ELEVATION* (masl)	LITHOLOGY / GEOLOGY: STRATIGRAPHY	LITHOLOGY / GEOLOGY: DESCRIPTION	OBSERVATIONS: PID *CGD* (ppm)	OBSERVATIONS: ODOUR (L M S)	OBSERVATIONS: VISUAL (D S)	SAMPLES: SAMPLE TYPE & No.	SAMPLES: % RECOVERY	SAMPLES: N (Blow/15cm)	SAMPLES: CHEMICAL ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
0.05 / *115.81*		**CONCRETE** : approximately 165.1 mm										— CONCRETE (FLUSH MOUNT)	
115.46		**SAND** : trace gravel, light brown, moist	0			DT1A	50%						
0.5		*some silt*											0.5
			0			DT2A	67%		pH				
1.0												BENTONITE	1.0
1.5			0			DT2B	67%						1.5
			0.1			DT3A	58%						
2.0			0			DT3B	58%						2.0
2.5		*light brown, wet*	0.2			DT4A	100%						2.5
3.0		*some silt, trace boulder, light brown, wet @ 3.05m*	0			DT4B	100%					SAND SCREEN Length: 1.52 m Diam.: 38.1 mm Slot: #10	3.0
3.5													3.5
3.66 / *111.85*		**CLAYEY SILT** : grey, very moist, dense	0.2			DT5A	100%		GSA Gr % Sa % Si % Cl % Hydrometer				
4.0													4.0
4.27 / *111.24*		**SHALE** : moist, grey	0			DT5B	83%						
4.42		***END OF BOREHOLE*** *Bedrock refusal @ 4.48m; MW Installed at 3.57 m.*										WATER MARKER Depth : 2.51 m Elev. : 113 m Date : 8/9/2019	
4.5													4.5

Project : DATABASE_MASTER.GPJ Report : WSP_EN_WELL-ENVIRONMENTAL 8/13/2019

Prepared by: Sheema Everett
Reviewed by: Lindsy Levesque

MONITORING WELL DRILLING RECORD : **BH19-4**

Project Number: **191-02120-01**

3085 Hurontario Street, Mississuaga, Ontario
Phase Two Environmental Site Assessment
Equity Builders

DRILLING DETAILS		SURVEY DETAILS		ODOUR	SAMPLE TYPE	CHEMICAL ANALYSIS	
Date (Start):	7/3/2019	Easting:	611464.98 m	L - Light	DC - Diamond Corer	Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Date (End):	7/3/2019	Northing:	4826526.176 m	M - Medium	SS - Split Spoon	Inorg.	Inorganic Compounds
Drilling Company:	Strata Drilling Group	Surface Elevation:	118.26 masl	S - Strong	MA - Manual Auger	PHC	Petroleum Hydrocarbons (F1-F4)
Drilling Equipment:	CME 420M	Top of Well Elevation:	118.18 masl	VISUAL	TR - Trowel	BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Drilling Method:	Solid Stem Auger			D - Dispersed with Product	ST - Shelby Tube	VOC	Volatile Organic Compounds
Borehole Diameter:	38.1 mm			S - Saturated with Product	DT - Dual Tube	PAH	Polycyclic Aromatic Hydrocarbons
Drilling Fluid:	N/A				MC - Macro Core	PCB	Polychlorinated Biphenyl
					NR - No Recovery	D/F	Dioxins & Furans
						Phenol	Phenolic Compounds
						GSA	Grain-size Analysis

(m) DEPTH / *ELEVATION* (masl)	LITHOLOGY / GEOLOGY: STRATIGRAPHY	LITHOLOGY / GEOLOGY: DESCRIPTION	OBSERVATIONS: PID / *CGD* (ppm)	OBSERVATIONS: ODOUR (L M S)	OBSERVATIONS: VISUAL (D S)	SAMPLES: SAMPLE TYPE & No.	SAMPLES: % RECOVERY	SAMPLES: N (Blow/15cm)	SAMPLES: CHEMICAL ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
118.26 / 0.10		**TOPSOIL** : approximately 101.6 mm										CONCRETE (FLUSH MOUNT)	
118.16		**SAND** : light brown, moist, loose	125.4			DT1A	83%						
0.5													0.5
			2.1			DT2A	75%						
1.0												BENTONITE	1.0
		some silt, light brown, moist											
1.5			0.3			DT2B	75%						1.5
		very moist											
2.0			0.3			DT3A	63%		pH GSA Gr % Sa % Si % Cl %				2.0
2.13 / 116.13		**CLAYEY SILT** : grey, very moist to wet,											
2.5			0.1			DT3B	42%						2.5
3.0		*trace boulders, coarse sand seam @ 3.05m, wet*	15.7			DT4A	100%		PHC VOC			SAND SCREEN Length: 1.52 m Diam.: 38.1 mm Slot: #10	3.0
3.5			0.1			DT4B	100%						3.5
4.0			0.1			DT5A	44%						4.0
4.27 / 113.99		**SHALE** : moist, grey											
4.42		*Bedrock refusal at 4.48 m. MW Install at 3.57m.*											
4.5												WATER MARKER Depth : 3.13 m Elev. : 115.13 m Date : 8/9/2019	4.5

Project : DATABASE_MASTER.GPJ Report : WSP_EN_WELL-ENVIRONMENTAL 8/13/2019

Prepared by: Sheema Everett
Reviewed by: Lindsy Levesque

APPENDIX D

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2309350**	Page	: 1 of 7
Client	: **McClymont & Rak Engineers Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Richard Sukhu	Account Manager	: Emily Smith
Address	: 111 Zenway Blvd. Unit 4 Vaughan ON Canada L4H 3H9	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 675 0160	Telephone	: +1 519 886 6910
Project	: 5822	Date Samples Received	: 13-Apr-2023 17:30
PO	: ----	Date Analysis Commenced	: 14-Apr-2023
C-O-C number	: 17-620765	Issue Date	: 25-Apr-2023 18:00
Sampler	: BR		
Site	: ----		
Quote number	: 2022 Price List		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit .

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
PEHR	*Parameter exceeded recommended holding time on receipt: Proceeded with analysis as requested.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	Method	LOR	Unit	Client sample ID: BH 102 Sampling date/time: 13-Apr-2023 09:00 WT2309350-001		MISSUB STM	RMPSUB SAN	RMPSUB STM			
Physical Tests											
pH	E108	0.10	pH units	8.05		**6 - 9 pH units**	**5.5 - 10 pH units**	**6 - 9 pH units**	--	--	--
Solids, total suspended [TSS]	E160	3.0	mg/L	7.0		**15 mg/L**	**350 mg/L**	**15 mg/L**	--	--	--
Anions and Nutrients											
Fluoride	E235.F	0.020	mg/L	0.199	DLDS	--	10 mg/L	--	--	--	--
Kjeldahl nitrogen, total [TKN]	E318	0.050	mg/L	0.398		**1 mg/L**	**100 mg/L**	**1 mg/L**	--	--	--
Phosphorus, total	E372-U	0.0020	mg/L	0.0930		**0.4 mg/L**	**10 mg/L**	**0.4 mg/L**	--	--	--
Sulfate (as SO4)	E235.SO4	0.30	mg/L	35.5	DLDS	--	1500 mg/L	--	--	--	--
Cyanides											
Cyanide, strong acid dissociable (Total)	E333	0.0020	mg/L	<0.0020		**0.02 mg/L**	**2 mg/L**	**0.02 mg/L**	--	--	--
Inorganics											
Chlorine, total	E326	0.050	mg/L	<0.050	PEHR	1 mg/L	--	--	--	--	--
Microbiological Tests											
Coliforms, Escherichia coli [E. coli]	E012A.EC	1	CFU/100mL	Not Detected		**200 CFU/100mL**	**--**	**200 CFU/100mL**	--	--	--
Total Metals											
Aluminum, total	E420	0.0030	mg/L	0.357	DLHC	1 mg/L	50 mg/L	--	--	--	--
Antimony, total	E420	0.00010	mg/L	<0.00100	DLHC	--	5 mg/L	--	--	--	--
Arsenic, total	E420	0.00010	mg/L	<0.00100	DLHC	**0.02 mg/L**	**1 mg/L**	**0.02 mg/L**	--	--	--
Cadmium, total	E420	0.0000050	mg/L	<0.0000500	DLHC	**0.008 mg/L**	**0.7 mg/L**	**0.008 mg/L**	--	--	--
Chromium, total	E420	0.00050	mg/L	<0.00500	DLHC	**0.08 mg/L**	**5 mg/L**	**0.08 mg/L**	--	--	--
Cobalt, total	E420	0.00010	mg/L	0.00102	DLHC	--	5 mg/L	--	--	--	--
Copper, total	E420	0.00050	mg/L	<0.00500	DLHC	**0.04 mg/L**	**3 mg/L**	**0.05 mg/L**	--	--	--
Lead, total	E420	0.000050	mg/L	0.00119	DLHC	**0.12 mg/L**	**3 mg/L**	**0.12 mg/L**	--	--	--
Manganese, total	E420	0.00010	mg/L	0.136	DLHC	**0.05 mg/L**	**5 mg/L**	**0.05 mg/L**	--	--	--
Mercury, total	E508	0.0000050	mg/L	<0.0000050		**0.0004 mg/L**	**0.01 mg/L**	**0.0004 mg/L**	--	--	--
Molybdenum, total	E420	0.000050	mg/L	0.0278	DLHC	--	5 mg/L	--	--	--	--
Nickel, total	E420	0.00050	mg/L	<0.00500	DLHC	**0.08 mg/L**	**3 mg/L**	**0.08 mg/L**	--	--	--
Selenium, total	E420	0.000050	mg/L	0.000566	DLHC	**0.02 mg/L**	**1 mg/L**	**0.02 mg/L**	--	--	--
Silver, total	E420	0.000010	mg/L	<0.000100	DLHC	**0.12 mg/L**	**5 mg/L**	**0.12 mg/L**	--	--	--
Tin, total	E420	0.00010	mg/L	<0.00100	DLHC	--	5 mg/L	--	--	--	--

Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
Total Metals - Continued										
Titanium, total	E420	0.00030	mg/L	0.00844 DLHC	--	5 mg/L	--	--	--	--
Zinc, total	E420	0.0030	mg/L	<0.0300 DLHC	**0.04 mg/L**	**3 mg/L**	**0.04 mg/L**	--	--	--
Speciated Metals										
Chromium, hexavalent [Cr VI], total	E532	0.00050	mg/L	<0.00050	--	--	--	--	--	--
Aggregate Organics										
Biochemical oxygen demand [BOD]	E550	2.0	mg/L	686 HTD	15 mg/L	300 mg/L	--	--	--	--
Carbonaceous biochemical oxygen demand [CBOD]	E555	2.0	mg/L	587 HTD	--	**300 mg/L**	**15 mg/L**	--	--	--
Oil & grease (gravimetric)	E567	5.0	mg/L	<5.0	--	--	--	--	--	--
Oil & grease, animal/vegetable (gravimetric)	EC567A.SG	5.0	mg/L	<5.0	--	150 mg/L	--	--	--	--
Oil & grease, mineral (gravimetric)	E567SG	5.0	mg/L	<5.0	--	15 mg/L	--	--	--	--
Phenols, total (4AAP)	E562	0.0010	mg/L	0.0013	**0.008 mg/L**	**1 mg/L**	**0.008 mg/L**	--	--	--
Volatile Organic Compounds										
Benzene	E611D	0.50	µg/L	<0.50	**2 µg/L**	**10 µg/L**	**2 µg/L**	--	--	--
Chloroform	E611D	0.50	µg/L	<0.50	--	**40 µg/L**	**2 µg/L**	--	--	--
Dichlorobenzene, 1,2-	E611D	0.50	µg/L	<0.50	--	**50 µg/L**	**5.6 µg/L**	--	--	--
Dichlorobenzene, 1,4-	E611D	0.50	µg/L	<0.50	--	**80 µg/L**	**6.8 µg/L**	--	--	--
Dichloroethylene, cis-1,2-	E611D	0.50	µg/L	<0.50	--	**4000 µg/L**	**5.6 µg/L**	--	--	--
Dichloromethane	E611D	1.0	µg/L	<1.0	--	**2000 µg/L**	**5.2 µg/L**	--	--	--
Dichloropropylene, trans-1,3-	E611D	0.30	µg/L	<0.30	--	**140 µg/L**	**5.6 µg/L**	--	--	--
Ethylbenzene	E611D	0.50	µg/L	<0.50	**2 µg/L**	**160 µg/L**	**2 µg/L**	--	--	--
Methyl ethyl ketone [MEK]	E611D	20	µg/L	<20	--	8000 µg/L	--	--	--	--
Styrene	E611D	0.50	µg/L	<0.50	--	200 µg/L	--	--	--	--
Tetrachloroethane, 1,1,2,2-	E611D	0.50	µg/L	<0.50	--	**1400 µg/L**	**17 µg/L**	--	--	--
Tetrachloroethylene	E611D	0.50	µg/L	<0.50	--	**1000 µg/L**	**4.4 µg/L**	--	--	--
Toluene	E611D	0.50	µg/L	<0.50	**2 µg/L**	**270 µg/L**	**2 µg/L**	--	--	--
Trichloroethylene	E611D	0.50	µg/L	<0.50	--	**400 µg/L**	**8 µg/L**	--	--	--
Xylene, m+p-	E611D	0.40	µg/L	<0.40	--	--	--	--	--	--
Xylene, o-	E611D	0.30	µg/L	<0.30	--	--	--	--	--	--
Xylenes, total	E611D	0.50	µg/L	<0.50	**4.4 µg/L**	**1400 µg/L**	**4.4 µg/L**	--	--	--
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	E611D	1.0	%	105	--	--	--	--	--	--
Difluorobenzene, 1,4-	E611D	1.0	%	99.5	--	--	--	--	--	--

Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Acenaphthylene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Anthracene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benz(a)anthracene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(a)pyrene	E641A	0.0050	µg/L	<0.0050	--	--	--	--	--	--
Benzo(b+j)fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(g,h,i)perylene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Benzo(k)fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Chrysene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Dibenz(a,h)anthracene	E641A	0.0050	µg/L	<0.0050	--	--	--	--	--	--
Fluoranthene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Fluorene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Methylnaphthalene, 1-	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Methylnaphthalene, 2-	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
Naphthalene	E641A	0.050	µg/L	<0.050	--	--	--	--	--	--
Phenanthrene	E641A	0.020	µg/L	<0.020	--	--	--	--	--	--
Pyrene	E641A	0.010	µg/L	<0.010	--	--	--	--	--	--
PAHs, total (CCME sewer 18)	E641A	0.070	µg/L	<0.070	2 µg/L	--	--	--	--	--
Chrysene-d12	E641A	0.1	%	82.4	--	--	--	--	--	--
Naphthalene-d8	E641A	0.1	%	97.4	--	--	--	--	--	--
Phenanthrene-d10	E641A	0.1	%	99.7	--	--	--	--	--	--
Phthalate Esters										
bis(2-Ethylhexyl) phthalate [DEHP]	E655F	2.0	µg/L	<2.0	--	**12 µg/L**	**8.8 µg/L**	--	--	--
Di-n-butyl phthalate	E655F	1.0	µg/L	<1.0	--	**80 µg/L**	**15 µg/L**	--	--	--
Semi-Volatile Organics Surrogates										
Fluorobiphenyl, 2-	E655F	1.0	%	85.1	--	--	--	--	--	--
Terphenyl-d14, p-	E655F	1.0	%	92.8	--	--	--	--	--	--
Phenolics Surrogates										
Tribromophenol, 2,4,6-	E655F	0.20	%	106	--	--	--	--	--	--
Nonylphenols										
Nonylphenol diethoxylates [NP2EO]	E749B	0.10	µg/L	<0.10	--	--	--	--	--	--
Nonylphenol ethoxylates, total	E749B	2.0	µg/L	<2.0	--	200 µg/L	--	--	--	--

Analyte	Method	LOR	Unit	WT2309350-001 (Continued)	MISSUB STM	RMPSUB SAN	RMPSUB STM			
Nonylphenols - Continued										
Nonylphenol monoethoxylates [NP1EO]	E749B	2.0	µg/L	<2.0	--	--	--	--	--	--
Nonylphenols [NP]	E749A	1.0	µg/L	<1.0	--	20 µg/L	--	--	--	--
Polychlorinated Biphenyls										
Aroclor 1016	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1221	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1232	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1242	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1248	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1254	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1260	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1262	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1268	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Polychlorinated biphenyls [PCBs], total	E687	0.060	µg/L	<0.060	--	**1 µg/L**	**0.4 µg/L**	--	--	--
Decachlorobiphenyl	E687	0.1	%	116	--	--	--	--	--	--
Tetrachloro-m-xylene	E687	0.1	%	98.2	--	--	--	--	--	--

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH 102	Water	Manganese, total		MISSUB	STM	0.136 mg/L	0.05 mg/L
	Water	Biochemical oxygen demand [BOD]		MISSUB	STM	686 mg/L	15 mg/L
	Water	Biochemical oxygen demand [BOD]		RMPSUB	SAN	686 mg/L	300 mg/L
	Water	Carbonaceous biochemical oxygen demand [CBOD]		RMPSUB	SAN	587 mg/L	300 mg/L
	Water	Manganese, total		RMPSUB	STM	0.136 mg/L	0.05 mg/L
	Water	Carbonaceous biochemical oxygen demand [CBOD]		RMPSUB	STM	587 mg/L	15 mg/L

Key:

MISSUB	Ontario Mississauga Storm Sewer Use By-Law (0046-2022) (March 2022)
STM	Mississauga Storm Sewer (0046-2022)
RMPSUB	Ontario Reg.Mun. of Peel Sewer Bylaw #53-2010 (APR, 2019)
SAN	Peel Sanitary Sewer (53-2010)
STM	Peel Storm Sewer (53-2010)

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2309350**	Page	: 1 of 13
Client	: **McClymont & Rak Engineers Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Richard Sukhu	Account Manager	: Emily Smith
Address	: 111 Zenway Blvd. Unit 4 Vaughan ON Canada L4H 3H9	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 675 0160	Telephone	: +1 519 886 6910
Project	: 5822	Date Samples Received	: 13-Apr-2023 17:30
PO	: ----	Issue Date	: 25-Apr-2023 18:00
C-O-C number	: 17-620765		
Sampler	: BR		
Site	: ----		
Quote number	: 2022 Price List		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Volatile Organic Compounds	QC-MRG2-9017180 02	----	Methyl ethyl ketone [MEK]	78-93-3	E611D	148 % LCS-H	70.0-130%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
LCS-H	*Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d]										
BH 102	E550	13-Apr-2023	----	----	----		20-Apr-2023	4 days	7 days	× EHT
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT-4d]										
BH 102	E555	13-Apr-2023	----	----	----		20-Apr-2023	4 days	7 days	× EHT
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH 102	E567SG	13-Apr-2023	21-Apr-2023	28 days	8 days	✓	21-Apr-2023	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH 102	E567	13-Apr-2023	21-Apr-2023	28 days	8 days	✓	21-Apr-2023	40 days	0 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP]										
BH 102	E562	13-Apr-2023	22-Apr-2023	----	----		22-Apr-2023	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
BH 102	E235.F	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
BH 102	E235.SO4	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	28 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) [ON MECP]										
BH 102	E318	13-Apr-2023	19-Apr-2023	----	----		19-Apr-2023	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP]										
BH 102	E372-U	13-Apr-2023	19-Apr-2023	----	----		20-Apr-2023	28 days	7 days	✓
Cyanides : Total Cyanide										
HDPE - total (sodium hydroxide)										
BH 102	E333	13-Apr-2023	19-Apr-2023	----	----		19-Apr-2023	14 days	6 days	✓
Inorganics : Total Chlorine (Residual) by DPD Colourimetry										
HDPE [ON MECP]										
BH 102	E326	13-Apr-2023	----	----	----		18-Apr-2023	0.25 hrs	120 hrs	× EHTR-FM
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
BH 102	E012A.EC	13-Apr-2023	----	----	----		14-Apr-2023	48 hrs	28 hrs	✓
Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode										
Amber glass/Teflon lined cap - LCMS										
BH 102	E749B	13-Apr-2023	14-Apr-2023	7 days	1 days	✓	14-Apr-2023	7 days	0 days	✓
Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode										
Amber glass/Teflon lined cap - LCMS										
BH 102	E749A	13-Apr-2023	14-Apr-2023	7 days	1 days	✓	14-Apr-2023	7 days	0 days	✓
Phthalate Esters : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH 102	E655F	13-Apr-2023	18-Apr-2023	14 days	5 days	✓	19-Apr-2023	40 days	1 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH 102	E108	13-Apr-2023	18-Apr-2023	----	----		19-Apr-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
BH 102	E160	13-Apr-2023	----	----	----		18-Apr-2023	7 days	5 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH 102	E687	13-Apr-2023	18-Apr-2023	14 days	5 days	✓	19-Apr-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) [ON MECP]										
BH 102	E641A	13-Apr-2023	18-Apr-2023	7 days	5 days	✓	18-Apr-2023	40 days	1 days	✓
Speciated Metals : Total Hexavalent Chromium (Cr VI) by IC										
HDPE - total (sodium hydroxide)										
BH 102	E532	13-Apr-2023	----	----	----		14-Apr-2023	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
BH 102	E508	13-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	28 days	1 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH 102	E420	13-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	180 days	2 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH 102	E611D	13-Apr-2023	18-Apr-2023	----	----		18-Apr-2023	14 days	5 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	897728	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
pH by Meter	E108	901441	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	900969	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	905683	1	16	6.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	905682	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900959	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	900975	1	19	5.2	4.7	✓
pH by Meter	E108	901441	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
Method Blanks (MB)							
Biochemical Oxygen Demand - 5 day	E550	897340	1	20	5.0	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	897569	1	14	7.1	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	900969	1	2	50.0	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	897728	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	905683	1	16	6.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Oil & Grease by Gravimetry	E567	905682	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900959	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	900975	1	19	5.2	4.7	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	897519	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	901162	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Fluoride in Water by IC	E235.F	901447	1	11	9.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	897633	1	8	12.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	897632	1	8	12.5	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	906864	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	901448	1	11	9.0	5.0	✓
Total Chlorine (Residual) by DPD Colourimetry	E326	901104	1	2	50.0	5.0	✓
Total Cyanide	E333	903588	1	20	5.0	5.0	✓
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Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	901841	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	897737	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Total metals in Water by CRC ICPMS	E420	898147	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	901840	1	20	5.0	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	901718	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MF-mFC-BCIG)	E012A.EC Waterloo - Environmental	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
pH by Meter	E108 Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Fluoride in Water by IC	E235.F Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Waterloo - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Chlorine (Residual) by DPD Colourimetry	E326 Waterloo - Environmental	Water	APHA 4500-Cl G (mod)	Chlorine (residual), as free or total, is analyzed using the DPD colourimetric method. The recommended hold time for this test is 15 minutes and field testing is recommended when determining Chlorine concentrations at the time of sampling. Chlorine if present in a sample container after sampling can be rapidly consumed by any inorganic or organic matter in the sample and dissipates rapidly into headspace. Laboratory results may be requested when chlorine concentrations that may be present at the time of laboratory analysis are required for the interpretation of other laboratory analysis where the presence of Chlorine may affect results. e.g. laboratory toxicity testing

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Cyanide	E333 Waterloo - Environmental	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total metals in Water by CRC ICPMS	E420 Waterloo - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Total Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Water	APHA 3500-Cr C (Ion Chromatography)	Hexavalent Chromium is measured by Ion chromatography-Post column reaction and UV detection. Results are based on an un-filtered, field-preserved sample.
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Phenols (4AAP) in Water by Colorimetry	E562 Waterloo - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K3Fe(CN)6) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Mineral Oil & Grease by Gravimetry	E567SG Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Waterloo - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F Waterloo - Environmental	Water	EPA 8270E (mod)	BNA are analyzed by GC-MS.
PCB Aroclors by GC-MS	E687 Waterloo - Environmental	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	Water samples are filtered and analyzed on LCMS/MS by direct injection.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG Waterloo - Environmental	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Waterloo - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Oil & Grease Extraction for Gravimetry	EP567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581 Waterloo - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Waterloo - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
BNA Extraction	EP655 Waterloo - Environmental	Water	EPA 3510C (mod)	SVOCs are extracted from aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749 Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.

QUALITY CONTROL REPORT

Work Order	: **WT2309350**	Page	: 1 of 15
Client	: McClymont & Rak Engineers Inc.	Laboratory	: Waterloo - Environmental
Contact	: Richard Sukhu	Account Manager	: Emily Smith
Address	: 111 Zenway Blvd. Unit 4 Vaughan ON Canada L4H 3H9	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: 5822	Date Samples Received	: 13-Apr-2023 17:30
PO	: ----	Date Analysis Commenced	: 14-Apr-2023
C-O-C number	: 17-620765	Issue Date	: 25-Apr-2023 18:00
Sampler	: BR 416 675 0160		
Site	: ----		
Quote number	: 2022 Price List		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	Waterloo LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 901162)											
WT2309547-001	Anonymous	Solids, total suspended [TSS]	----	E160	30.0	mg/L	2330	2390	2.37%	20%	----
Physical Tests (QC Lot: 901441)											
WT2309388-001	Anonymous	pH	----	E108	0.10	pH units	7.64	7.75	1.43%	4%	----
Anions and Nutrients (QC Lot: 901447)											
WT2309367-001	Anonymous	Fluoride	16984-48-8	E235.F	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 901448)											
WT2309367-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	70.7	70.2	0.644%	20%	----
Anions and Nutrients (QC Lot: 901840)											
WT2309288-014	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0067	0.0055	0.0012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 901841)											
HA2300138-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.137	0.144	0.007	Diff <2x LOR	----
Cyanides (QC Lot: 903588)											
EO2302909-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0050	mg/L	0.0074	0.0074	0.00002	Diff <2x LOR	----
Inorganics (QC Lot: 901104)											
WT2309350-001	BH 102	Chlorine, total	7782-50-5	E326	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 897728)											
WT2309350-001	BH 102	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 897737)											
BF2300013-008	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 898147)											
WT2309350-001	BH 102	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.357	0.392	9.20%	20%	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	0.00102	0.00108	0.00006	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00119	0.00121	0.000020	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.136	0.141	2.96%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 898147) - continued											
WT2309350-001	BH 102	Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.0278	0.0292	5.08%	20%	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	0.000566	0.000556	0.000011	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	0.00844	0.00832	0.00012	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 897519)											
WT2309024-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 897340)											
WT2309319-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 897569)											
WT2309340-002	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 906864)											
WP2304935-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0026	0.0024	0.0002	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 901718)											
WT2309668-001	Anonymous	Benzene	71-43-2	E611D	0.50	µg/L	0.75	0.76	0.01	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	3.32	3.42	2.97%	30%	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	5.9	6.0	0.04	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	119	120	1.58%	30%	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	103	113	10	Diff <2x LOR	----
		Styrene	100-42-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	0.51	0.58	0.07	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	1.22	1.27	0.05	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	231	236	2.06%	30%	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	4.31	4.37	1.38%	30%	----
Nonylphenols (QC Lot: 897632)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Nonylphenols (QC Lot: 897632) - continued											
WT2309182-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 897633)											
WT2309182-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	10.0	µg/L	<10.0	<10.0	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 901162)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 901447)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 901448)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 901840)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 901841)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Cyanides (QCLot: 903588)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Inorganics (QCLot: 901104)						
Chlorine, total	7782-50-5	E326	0.05	mg/L	<0.050	----
Microbiological Tests (QCLot: 897728)						
Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	----
Total Metals (QCLot: 897737)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 898147)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 898147) - continued						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Speciated Metals (QCLot: 897519)						
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	<0.00050	----
Aggregate Organics (QCLot: 897340)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 897569)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 905682)						
Oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 905683)						
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 906864)						
Phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 901718)						
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	----
Styrene	100-42-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900959)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 900959) - continued						
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Phthalate Esters (QCLot: 900969)						
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	<2.0	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	<1.0	----
Nonylphenols (QCLot: 897632)						
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	<1.0	----
Nonylphenols (QCLot: 897633)						
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	<0.10	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	<2.0	----
Polychlorinated Biphenyls (QCLot: 900975)						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 901162)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	96.0	85.0	115	----
Physical Tests (QCLot: 901441)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 901447)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 901448)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	98.0	90.0	110	----
Anions and Nutrients (QCLot: 901840)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.845 mg/L	99.2	80.0	120	----
Anions and Nutrients (QCLot: 901841)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.6	75.0	125	----
Cyanides (QCLot: 903588)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	95.6	80.0	120	----
Inorganics (QCLot: 901104)									
Chlorine, total	7782-50-5	E326	0.05	mg/L	0.28861 mg/L	100	75.0	125	----
Total Metals (QCLot: 897737)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	97.1	80.0	120	----
Total Metals (QCLot: 898147)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	94.9	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	98.0	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	102	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	103	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	98.4	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	100	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	107	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	93.5	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	99.0	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 898147) - continued									
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	101	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	98.4	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	98.4	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	95.1	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	98.8	80.0	120	----
Speciated Metals (QCLot: 897519)									
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	0.025 mg/L	98.8	80.0	120	----
Aggregate Organics (QCLot: 897340)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	99.2	85.0	115	----
Aggregate Organics (QCLot: 897569)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	104	85.0	115	----
Aggregate Organics (QCLot: 905682)									
Oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	98.4	70.0	130	----
Aggregate Organics (QCLot: 905683)									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	94.8	70.0	130	----
Aggregate Organics (QCLot: 906864)									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	95.7	85.0	115	----
Volatile Organic Compounds (QCLot: 901718)									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	98.4	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	99.8	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	94.4	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	81.0	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	100	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	108	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	93.7	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	100 µg/L	# 148	70.0	130	LCS-H
Styrene	100-42-5	E611D	0.5	µg/L	100 µg/L	102	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	115	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	89.4	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	88.5	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	98.2	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	89.0	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 901718) - continued									
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	96.4	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900959)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5263 µg/L	107	50.0	140	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5263 µg/L	96.3	50.0	140	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5263 µg/L	95.5	50.0	140	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5263 µg/L	108	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5263 µg/L	98.2	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5263 µg/L	100	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5263 µg/L	109	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5263 µg/L	102	50.0	140	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5263 µg/L	110	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5263 µg/L	104	50.0	140	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5263 µg/L	111	50.0	140	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5263 µg/L	86.3	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5263 µg/L	114	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5263 µg/L	91.8	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5263 µg/L	94.5	50.0	140	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5263 µg/L	92.9	50.0	140	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5263 µg/L	107	50.0	140	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5263 µg/L	111	50.0	140	----
Phthalate Esters (QCLot: 900969)									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	6.4 µg/L	110	50.0	140	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	6.4 µg/L	102	50.0	140	----
Nonylphenols (QCLot: 897632)									
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	10 µg/L	105	75.0	125	----
Nonylphenols (QCLot: 897633)									
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	1 µg/L	95.4	75.0	125	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	20 µg/L	112	75.0	125	----
Polychlorinated Biphenyls (QCLot: 900975)									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polychlorinated Biphenyls (QCLot: 900975) - continued									
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	114	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	97.2	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	102	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	121	60.0	140	----

Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 901447)										
WT2309367-001	Anonymous	Fluoride	16984-48-8	E235.F	9.67 mg/L	10 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 901448)										
WT2309367-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	912 mg/L	1000 mg/L	91.2	75.0	125	----
Anions and Nutrients (QCLot: 901840)										
WT2309288-014	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.102 mg/L	0.1 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 901841)										
HA2300138-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.73 mg/L	2.5 mg/L	109	70.0	130	----
Cyanides (QCLot: 903588)										
EO2302909-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.229 mg/L	0.25 mg/L	91.7	75.0	125	----
Inorganics (QCLot: 901104)										
WT2309350-001	BH 102	Chlorine, total	7782-50-5	E326	0.250 mg/L	0.28861 mg/L	86.6	70.0	130	----
Total Metals (QCLot: 897737)										
BF2300013-009	Anonymous	Mercury, total	7439-97-6	E508	0.0000975 mg/L	0.0001 mg/L	97.5	70.0	130	----
Total Metals (QCLot: 898147)										
WT2309355-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0998 mg/L	0.1 mg/L	99.8	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0519 mg/L	0.05 mg/L	104	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0534 mg/L	0.05 mg/L	107	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00510 mg/L	0.005 mg/L	102	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0129 mg/L	0.0125 mg/L	104	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Copper, total	7440-50-8	E420	0.0122 mg/L	0.0125 mg/L	97.9	70.0	130	----
		Lead, total	7439-92-1	E420	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0126 mg/L	0.0125 mg/L	101	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0248 mg/L	0.025 mg/L	99.3	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0509 mg/L	0.05 mg/L	102	70.0	130	----
		Silver, total	7440-22-4	E420	0.00474 mg/L	0.005 mg/L	94.8	70.0	130	----
		Tin, total	7440-31-5	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0132 mg/L	0.0125 mg/L	106	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 898147) - continued										
WT2309355-001	Anonymous	Zinc, total	7440-66-6	E420	0.0237 mg/L	0.025 mg/L	94.8	70.0	130	----
Speciated Metals (QCLot: 897519)										
WT2309024-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
Aggregate Organics (QCLot: 906864)										
WP2304935-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0199 mg/L	0.02 mg/L	99.5	75.0	125	----
Volatile Organic Compounds (QCLot: 901718)										
WT2309668-001	Anonymous	Benzene	71-43-2	E611D	99.9 µg/L	100 µg/L	99.9	60.0	140	----
		Chloroform	67-66-3	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	96.0 µg/L	100 µg/L	96.0	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	83.9 µg/L	100 µg/L	83.9	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Dichloromethane	75-09-2	E611D	106 µg/L	100 µg/L	106	60.0	140	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	104 µg/L	100 µg/L	104	60.0	140	----
		Ethylbenzene	100-41-4	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Styrene	100-42-5	E611D	98.2 µg/L	100 µg/L	98.2	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	116 µg/L	100 µg/L	116	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	91.9 µg/L	100 µg/L	91.9	60.0	140	----
		Toluene	108-88-3	E611D	92.8 µg/L	100 µg/L	92.8	60.0	140	----
		Trichloroethylene	79-01-6	E611D	99.2 µg/L	100 µg/L	99.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611D	ND µg/L	200 µg/L	ND	60.0	140	----
		Xylene, o-	95-47-6	E611D	101 µg/L	100 µg/L	101	60.0	140	----
Nonylphenols (QCLot: 897632)										
WT2309182-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	12.6 µg/L	10 µg/L	126	60.0	140	----
Nonylphenols (QCLot: 897633)										
WT2309182-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.92 µg/L	1 µg/L	91.5	60.0	140	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	15.2 µg/L	20 µg/L	76.0	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

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Company:	MCR
Contact:	Richard Sukhu
Phone:	
	Company address below will appear on the final report
Street:	111 Zenway Blvd
City/Province:	Vaughan
Postal Code:	
Invoice To	Same as Report To [X] YES [ ] NO
	Copy of Invoice with Report [ ] YES [X] NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	[X] PDF [ ] EXCEL [ ] EDD (DIGITAL)
Quality Control (QC) Report with Report	[X] YES [ ] NO
[X] Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	[X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax	rsukhu@mcrak.com
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Email 3	

Invoice Distribution	
Select Invoice Distribution:	[X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax	
Email 2	

Project Information	
ALS Account # / Quote #:	
Job #:	5822
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): WT2309350

ALS Contact: Sampler: BR

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] [X] Standard TAT if received by 3 PM - business days

PRIORITY (Business Days): 4 day [P4-20%] [ ] | 3 day [P3-25%] [ ] | 2 day [P2-50%] [ ]

EMERGENCY: 1 Bu | Same (Labo

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level

Ana

Indicate Filtered (F), Preserved (P) or Filte

Peel Region / Mississauga Storm & Sanitary Sewer By-Laws

Environmental Division
Waterloo
Work Order Reference
WT2309350

Telephone : +1 519 886 6910

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	SAMPLES ON HOLD	Sample is hazardous (please pr	NUMBER OF CONTAINERS
	BH 102	4/13/23	9:00Am	GW	X		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? [ ] YES [X] NO

Are samples for human consumption/ use? [ ] YES [X] NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] | SIF Observations Yes [ ] No [ ]

Ice Packs [ ] Ice Cubes [ ] | Custody seal intact Yes [ ] No [ ]

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	6.4

SHIPMENT RELEASE (client use)		
Released by: MCR	Date: 4/13/2023	Time:

INITIAL SHIPMENT RECEPTION (lab use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (lab use only)		
Received by: FK	Date: Apr 13, 23	Time: 5:30 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

HCl VOC-24 mm 824 N-695