FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

1470 WILLIAMSPORT DRIVE

CITY OF MISSISSAUGA
REGION OF PEEL

PREPARED FOR:

1470 WILLIAMSPORT HOLDINGS INC. C/O COMPTEN MANAGEMENT INC.

PREPARED BY:

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

FEBRUARY 2025

CFCA FILE NO. 2719-7179

CROZIER
CONSULTING ENGINEERS

Submission Number	Date	Comments
Sub. 1	February 14, 2025	Issued for ZBA

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by 1470 Williamsport Holdings Inc. (Client) to prepare a Functional Servicing & Preliminary Stormwater Management Report to support the Zoning By-Law Amendment application for the proposed infill development located at 1470 Williamsport Drive in the City of Mississauga, Regional Municipality of Peel (Region of Peel) (hereby known as Site).

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

2.0 Site Description

The site is bound by Williamsport Drive to the north, residential apartment buildings to the east and south, and a commercial shopping mall to the west. **Figure 1 – Site Location** illustrates the subject site within the context of its surroundings. Existing underground servicing infrastructure is available on Williamsport Drive. The **0.59 ha** site currently consists of a 6-storey residential building with associated driveway, surface parking lot and landscaped areas. The existing building has one (1) level of underground. For the existing conditions, refer to the topographical survey of the site included in **Appendix A.**

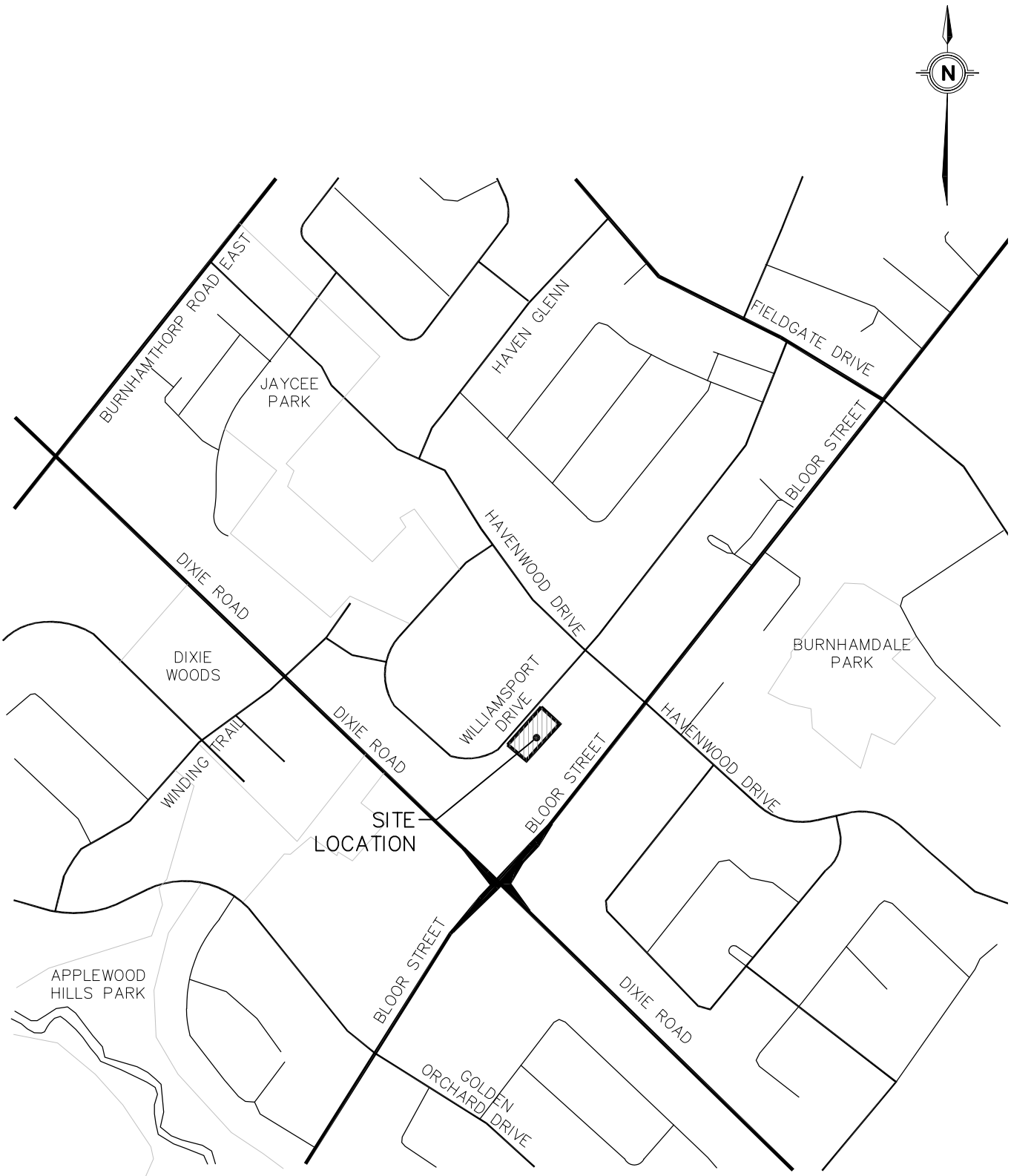
The proposed development includes the construction of two 12-storey residential towers conjoined with a 1-storey podium at the ground level, with a total of 283 residential units. Site access will be provided via Williamsport Drive on the west side of the development. The drive aisle on the west side of the development will potentially connect to Bloor Street to the south in the future. A layby will be provided on Williamsport Drive. The building will be equipped with two (2) levels of underground parking.

The expected population for the Site was calculated using the equivalent population density factors from both the Region of Peel Public Works Linear Wastewater Standards (2023) and residential unit information obtained from the Site Plan and Statistics provided by BDP Quadrangle. **Table 1** below summarizes the proposed population for the subject property.

Table 1: Equivalent Population Estimate
(2023 Region of Peel Linear Wastewater Standards)

Type	Unit Type	Number of Units	Population Density	Population
Existing	Residential – 1 bedroom or <	19 units	1.7 persons/unit	33
	Residential > 1 bedroom	34 units	3.1 persons/unit	106
			Total	**139**
Proposed	Residential – 1 bedroom or <	107units	1.7 persons/unit	182
	Residential > 1 bedroom	176 units	3.1 persons/unit	546
			Total	**728**

The total proposed population for the Site is 728 persons.



Legend

= SUBJECT LANDS

Project

1470 WILLIAMSPORT DRIVE
MISSISSAUGA, ONTARIO

Drawing

SITE LOCATION

CROZIER CONSULTING ENGINEERS

Drawn By	Design By	Project
E.C.M		2719-7179
Scale	Date	Check By	Drawing
N.T.S.	FEBRUARY 2025		FIG. 1

3.0 Water Servicing

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

3.1 Existing Water Servicing

The Region of Peel plan and profile drawings indicate that there is an existing 300 mm diameter watermain on the north side of Williamsport Drive fronting the Site (Town of Mississauga drawing 39812-D dated August 2009). A 100 mm diameter water service extends to the Site in the existing conditions. Refer to **Appendix A** for the plan and profile drawings and the utility locates completed by 4Sight Utility Engineers.

Any existing water service connections will be removed and capped as part of the redevelopment.

3.2 Proposed Water Servicing

The proposed development will have a single connection to the existing 300 mm diameter PVC watermain on the north side of Williamsport Drive. The connection will be a standard 'h' connection as per Region of Peel Standard for Fire line and Domestic connection. A 200 mm diameter fire line and 150 mm domestic connection will be provided. The services will extend to within 1.5m of the underground parking level.

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

3.3 Design Water Demand

The Region of Peel Development Changes Background Study (2020) identifies a marginally lower population per unit (page 3-7) therefore the population densities noted in Linear Wastewater Standards (March 2023) were used to be conservative. The Region of Peel Development Changes Background Study (2020) was used to determine the maximum domestic water demand generated by the proposed development based on the equivalent population estimate and an average daily residential water demand of 270 L/cap/day along with the associated peaking factors for max day (1.8) and peak hour (3.0) demands. **Table 2** summarizes the estimated design water demand. Refer to **Appendix B** for detailed water demand calculations.

Table 2: Existing and Proposed Domestic Water Demand

Site	Average Daily Demand (L/min)	Maximum Daily Demand (L/min)	Peak Hourly Demand (L/min)
Existing Site	26.1	46.9	78.2
Proposed Site	136.5	245.70	409.50

As shown in **Table 2**, it is proposed that following development, the peak hourly water demand will be 409.50 L/min, an increase of 331.3 L/min

3.4 Fire Flow Demand

The Fire Underwriters Survey (2020) method was used to estimate the fire flow demand for the proposed building within the development area. It is assumed that the development will be fire-resistive construction and therefore, a construction coefficient of 0.60 was applied to the fire flow calculations. The area of the largest floor plus 25% of each of the two immediately adjoining floors was used, which was calculated to be 3,710 m^2. As the proposed building use is residential, a "Limited-Combustible" occupancy hazard has been applied. The proposed building shall have a fire line connection to the same municipal watermain system as the fire department connection and will be supported by an automatic and fully supervised fire suppression system in conformance with NFPA 13 sprinkler standards. We have also assumed the proposed residential building will be equipped with automatic sprinkler systems from a standard water supply which reduces the initial fire flow demand by 50%.

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

Table 3: Estimated Fire Flow Demand

Method	Demand Flow (L/min)	Duration (h)
Water Supply for Public Fire Protection by Fire Underwriters Survey (2020)	5,000	1.75

As shown in **Table 3**, the proposed fire line is required to accommodate a fire flow demand of **5,000 L/min** for a duration of 1.75 hours. Detailed calculations are provided in **Appendix B**.

Hydrant flow testing has been completed on the local hydrants by Hydrant Testing Ontario to verify that water pressures and flows are adequate to supply the maximum domestic and fire supply required for the proposed development, and to show that the minimum required fire flows can be met for this development.

Based on the results of the tests (see **Appendix B** for results) it is estimated that approximately **20,520 L/min** (342 L/s) is available at the Williamsport Drive hydrant fronting the Site, at 140 KPa (20 psi). Therefore, based on the results of the test, the existing watermains surrounding the Site can all provide sufficient flow to service the maximum domestic demand (maximum daily) plus fire flow **(5,246 L/min).**

4.0 Sanitary Servicing

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

4.1 Existing Sanitary Servicing

Region of Peel plan and profile drawings indicate that there is an existing 250 mm diameter PVC sanitary sewer within the Williamsport Drive right-of-way (City of Mississauga drawings 39812-D and C-06433 dated August 2009 and February 1964, respectively). Refer to **Appendix A** for the plan and profile drawings and the utility locates completed by 4Sight Utility Engineers.

Any existing sanitary service connections will be removed and capped as part of the redevelopment.

4.2 Proposed Sanitary Servicing

The development is proposed to be serviced by a 200 mm diameter sanitary sewer at a slope of 2%. The service lateral will extend from the underground parking structure to the existing 250 mm PVC sanitary sewer located in the center of Williamsport Drive.

The proposed sanitary servicing design is shown on the **Preliminary Servicing Plan (C102)** in **Appendix E**. The internal building plumbing will be designed by the Mechanical Engineer's details and specifications.

4.3 Design Sanitary Flow

The sanitary design flow for the proposed development was calculated using the Region of Peel Linear Wastewater Standards (March 2023) and the equivalent population estimate described in **Table 1**. A unit sewage flow of 0.013 m^3/sec is applied for domestic sewage flow for less than 1000 persons. This rate includes the Harmon Peaking Factor and an infiltration flow rate of 0.0002m^3/sec/ha was applied to obtain the total estimated design sewage flow.

Table 4 summarizes the results and **Appendix C** contains the detailed design sanitary flow demand for the Site.

Table 4: Existing and Proposed Sanitary Design Flows

	Residential Peak Flow (L/s)	**Infiltration Flow** (L/s)	**Total Peak Flow** (L/s)
Existing	1.87	0.15	2.02
Proposed	9.49	0.15	9.65

As shown in **Table 4**, the total peak sanitary flow for the proposed development is **9.65 L/s**. There is a **7.63 L/s** increase in theoretical flow from existing conditions.

5.0 Groundwater Drainage Conditions

A Hydrogeological Investigation for the subject site was completed by DS Consultants Ltd. dated October 15, 2024, which detailed the site's subsurface and groundwater conditions. The major conclusions of the report are summarized below:

- Groundwater Elevation = 129.24 – 131.27 masl (maximum) or 11.46 to 7.93 mbgs
- Groundwater Quality does not meet Region of Peel Storm Sewer Limits = TSS exceedance
- Groundwater Quality meets Region of Peel Sanitary Sewer Limits = No exceedance
- Short-Term (Construction Dewatering) = 119,000 L/day (1.38 L/s)
- Long-Term (Post-Construction Dewatering) = 37,950 L/day (0.44 L/s)

The short-term dewatering rate includes a safety factor of 2 and the long-term rate includes a safety factor of 1.5.

An Environmental Activity Sector Registration (EASR) is required to be submitted to the Ministry of the Environment, Conservation and Parks (MECP) if the taking of groundwater and stormwater for a temporary construction project is between 50,000 L/day and 400,000 L/day. The EASR application is

an online registry and should be submitted to the MECP before any construction dewatering. A PTTW is only required to be submitted to the MECP if the taking of groundwater and stormwater for a temporary construction project is more than 400,000 L/day, which is not expected for this proposed development.

Since the expected design dewatering rate for the unsealed excavation is between the MECP's daily water-taking limit of 50,000 and 400,000 L/day, an EASR application will be required to be submitted to the MECP for short-term dewatering before starting construction. Since the long-term (permanent) flow rate is expected to be lower than the MECP's minimum pumping limit of 50,000 L/day, a permit to take water (PTTW) application is not required to be submitted to the MECP permanently.

Short-Term Discharge (Construction Dewatering)

As determined by DS Consultants, short-term dewatering is required for the Site. Short-term dewatering is to be designed by the dewatering contractor. The maximum short-term construction dewatering rate is **119,000 L/day (1.4 L/s).** The short-term discharge will outlet to the existing 600 mm diameter storm sewer found in Williamsport Drive.

Groundwater quality should be confirmed by the dewatering contractor to assess the required level of pre-treatment necessary, if any. Current quality results indicate that the short-term discharge will require treatment prior to discharge to the municipal storm sewer.

The Property Owner shall obtain short-term discharge approval to discharge private water to the municipal storm sewer ensuring any short-term discharge follows the City's Storm Sewer Use By-law (0046-2022)

Long-Term Discharge (Permanent Dewatering)

The report prepared by DS Consultants indicates an estimated long-term discharge rate of **37,950 L/day (0.44 L/s)**. Groundwater will be collected in the foundation drainage system and conveyed to the stormwater management tank. The mechanical consultant (Novatrend) has advised that groundwater will be pumped at a rate of **0.63 L/s** which has been accounted for in the stormwater management calculations. The long-term groundwater discharge will be directed to the existing 600 mm diameter storm sewer in Williamsport Drive via the proposed stormwater management tank.

The discharge will require treatment to meet the City of Mississauga Storm Sewer Use By-Law and Peel Region's Storm Sewer-Use By-Law. Details of the required treatment will be provided during detailed design. However, space has been provisionally allocated within the underground for the anticipated treatment.

6.0 Stormwater Management

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

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

Water Quantity Control

The Site is located in the Little Etobicoke Creek sub-watershed. For sites located in the Little Etobicoke Creek sub-watershed, it will be necessary to implement on-site stormwater management techniques into the design to provide post-development to pre-development quantity control for all storms (i.e. 2, 5, 10, 25, 50 & 100-year) using unit rates ($m^3/s/ha$) found in Table 6 of the City's Storm Drainage Design Requirements.

Water Quality Control

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

Water Balance & Erosion Control

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

6.1 Existing Stormwater Servicing

Region of Peel plan and profile drawings indicate that there is an existing 525 mm & 600 mm diameter concrete storm sewer within the Williamsport Drive right-of-way (City of Mississauga drawings 39812-D and C-06433 dated August 2009 and February 1964, respectively). Refer to **Appendix A** for the plan and profile drawings and the utility locates completed by 4Sight Utility Engineers.

Any existing storm service connections will be removed and capped as part of the redevelopment.

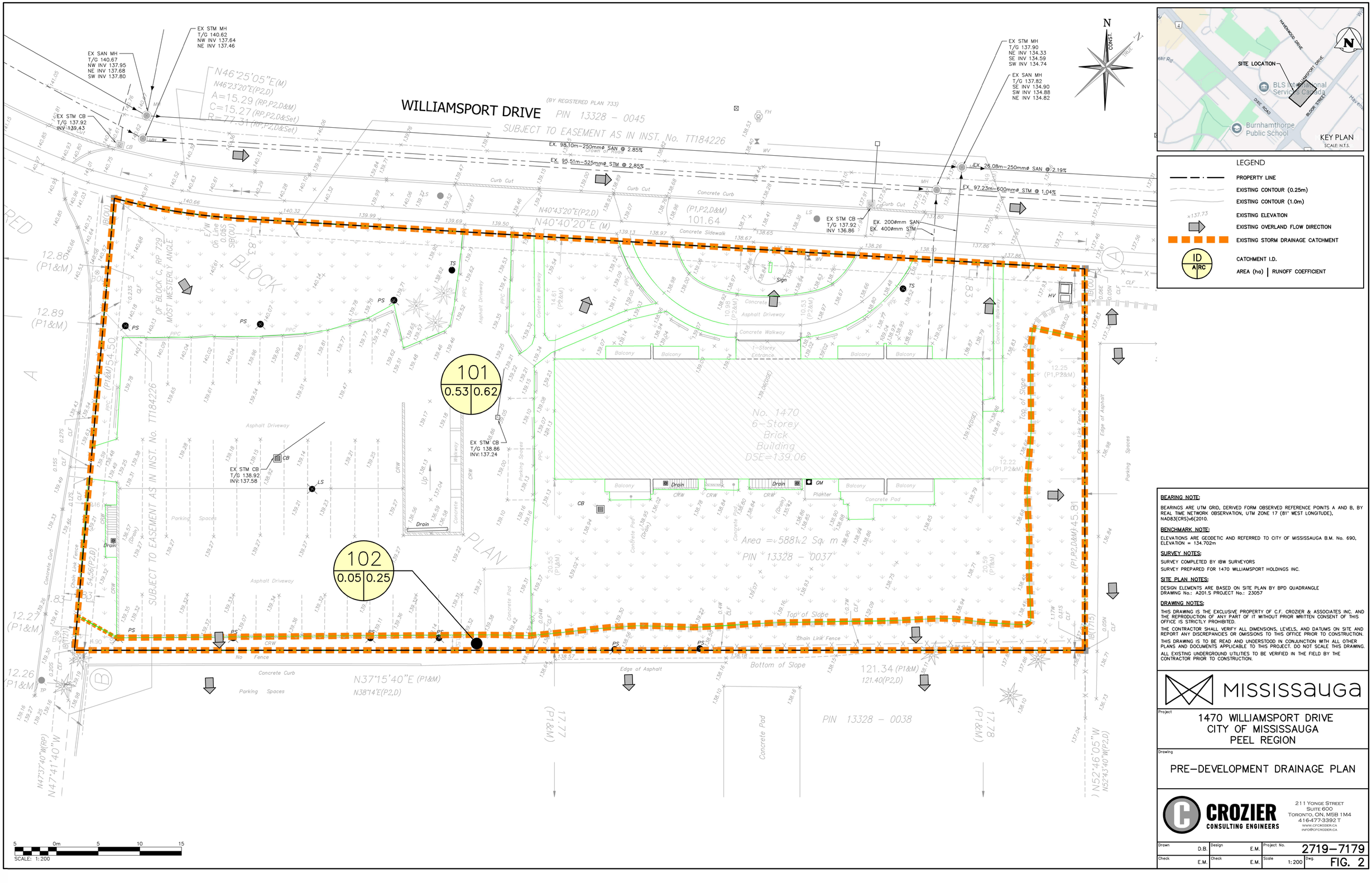
6.2 Existing Drainage Conditions

The existing Site contains a six-storey apartment building, landscaped areas, and a paved parking lot. A review of the survey completed by IBW Surveyors shows that the majority of the Site is captured by catchbasins or flows overland to the Williamsport Drive right-of-way where it is conveyed to the 525mm & 600 mm diameter municipal storm sewers. There is also a minor area along the south and east property lines that flows overland south of the Site and ultimately ends up at Bloor Street.

Table 5 provides a breakdown of the pre-development site areas and associated runoff coefficients with the existing drainage conditions shown on **Figure 2 - Pre-Development Drainage Plan.**

Table 5: Pre-Development Land Areas and Runoff Coefficients

Catchment No.	**Outlet Location**	**Area** (m^2)	**Weighted Runoff Coefficient** (RC)
101	Storm Sewers on Williamsport Drive	5,345	0.62
102	Overland to the South (Bloor Street)	536	0.25
	Total	**5,881**	-



BEARING NOTE:

BEARINGS ARE UTM GRID, DERIVED FORM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK OBSERVATION, UTM ZONE 17 (81° WEST LONGITUDE), NAD83(CRS)v6(2010.

BENCHMARK NOTE:

ELEVATIONS ARE GEODETIC AND REFERRED TO CITY OF MISSISSAUGA B.M. No. 690, ELEVATION = 134.702m

SURVEY NOTES:

SURVEY COMPLETED BY IBW SURVEYORS

SURVEY PREPARED FOR 1470 WILLIAMSPORT HOLDINGS INC.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY BPD QUADRANGLE
DRAWING No.: A201.S PROJECT No.: 23057

DRAWING NOTES:

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

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

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

MISSISSAUGA

Project

1470 WILLIAMSPORT DRIVE
CITY OF MISSISSAUGA
PEEL REGION

Drawing

PRE–DEVELOPMENT DRAINAGE PLAN

CROZIER
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INFO@CFCROZIER.CA

Drawn	D.B.	Design	E.M.	Project No.	2719–7179
Check	E.M.	Check	E.M.	Scale 1:200	Dwg. FIG. 2

6.3 Allowable Release Rate

The Site is located in the Little Etobicoke Creek sub-watershed. For sites located in the Little Etobicoke Creek sub-watershed, it will be necessary to implement on-site stormwater management techniques into the design to provide post-development to pre-development quantity control for all storms (i.e. 2, 5, 10, 25, 50 & 100-year) using unit rates ($m^3/s/ha$) found in Table 6 of the City's Storm Drainage Design Requirements.

Based on Table 6 of the City's Storm Drainage Design Requirements the allowable release rates for each storm event for the proposed development area are summarized in **Table 6** below.

Table 6: Allowable Release Rates (Little Etobicoke Creek sub-watershed)

Allowable Release Rates (L/s)					
2-year	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**
21.02	27.91	32.61	38.57	43.02	47.49

6.4 Proposed Stormwater Servicing & Drainage Conditions

The proposed storm connection will be a 300 mm diameter storm connection at a 2.0% slope to the existing 600 mm diameter municipal storm sewer located on Williamsport Drive. The proposed storm servicing design is shown on the **Preliminary Servicing Plan (C102)** in **Appendix E**.

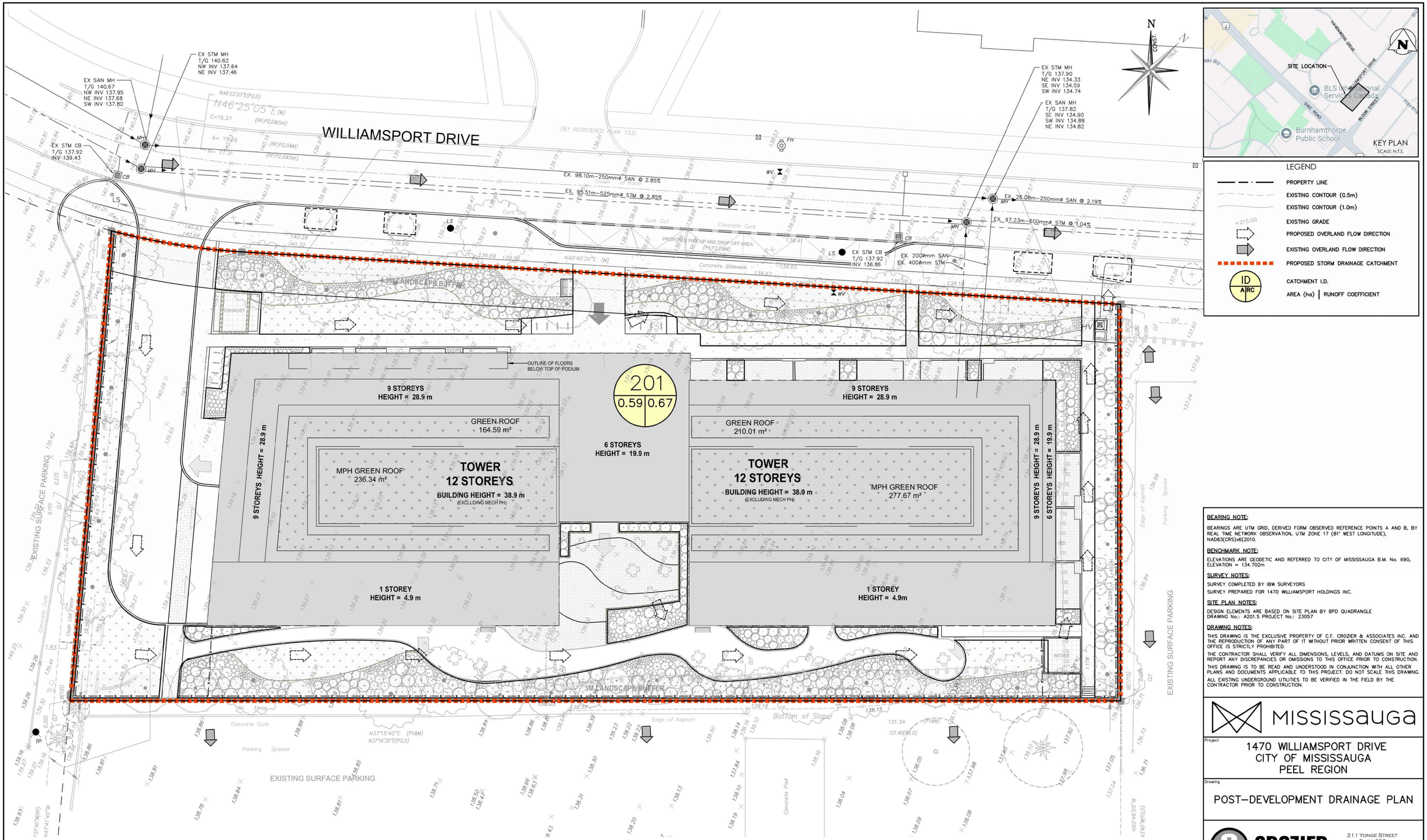
The Site will be graded to promote positive drainage away from the building and to convey stormwater from the Site to area drains and catch basins proposed within the driveway, and surrounding areas (hardscaped and landscape areas). The roof drains, area drains and catchbasins will be connected to the proposed underground stormwater management tank via the internal system designed by the mechanical engineer at detailed design stage.

Table 7 provides a breakdown of the post-development site areas and associated runoff coefficient with the proposed drainage conditions shown on the **Figure 3 - Post-Development Drainage Plan.**

Table 7: Post-Development Land Areas and Runoff Coefficients

Catchment No.	Outlet Location	Pervious[1] (m^2)	Impervious (m^2)	Weighted Runoff Coefficient (RC)
201	Controlled to Storm Sewer on Williamsport Drive	2,451	3,430	0.67
	Total	**5,881**		**-**

1. Includes proposed green roof areas.



LEGEND

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

BEARING NOTE:

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MISSISSAUGA

Project

1470 WILLIAMSPORT DRIVE
CITY OF MISSISSAUGA
PEEL REGION

Drawing

POST–DEVELOPMENT DRAINAGE PLAN

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Drawn	D.B.	Design	E.M.	Project No.	2719–7179
Check	E.M.	Check	E.M.	Scale	1:200
				Dwg.	FIG_3

6.5 Stormwater Quantity Control

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

In accordance with the Storm Drainage Design Requirements, the post-development runoff rates must be controlled to the allowable rates as noted in **Table 6** in Section 6.3.

Runoff from Catchment 201 will be conveyed to the stormwater management storage tank location is the northeast corner of the underground.

Quantity control will be provided on site by a storage tank located at the P1 level in combination with an outlet control device (**100 mm diameter Orifice Tube**) to ensure that the post development peak flows are attenuated to allowable release rates for the required storm events. A constant flow rate of **0.63 L/s** from the foundation drainage system was included in the stormwater management calculations. There is no roof top storage proposed. A maximum storage volume of approximately **189.9 m³** will be required to control the 100-year post development flows to the allowable release rate. Note that the required water reuse volume will be available below the outlet invert and is discussed in further detail later in this report in **Section 6.7**.

A summary of the peak storm flows and required storage volume have been provided in **Table 8**.

Table 8: Summary of 100-year Peak Stormwater Flow Rates and Storage

Storm Event (yr)	**Peak Flow Rate**		**Required Storage** (m^3)
	Allowable Release Rate (L/s)	**Post-Development** (L/s) **Controlled**	
2	21.02	20.09	50.9
5	27.91	24.10	73.2
10	32.61	27.35	94.4
25	38.57	31.51	125.2
50	43.02	35.52	159.1
100	47.49	38.80	189.9

As shown above in **Table 8,** the proposed site release rates of during the 2, 5, 10, 25, 50 and 100 year storm events is less than the allowable release rate.

Refer to **Appendix D** for the detailed calculations. Refer to **Preliminary Servicing Plan (C102)** in **Appendix E** for the proposed size and location of the underground storage tank.

6.6 Stormwater Quality Control

Stormwater quality controls for the site must incorporate measures to provide an Enhanced Protection Level according to Section 3.3 of the MECP Guidelines (March 2003). Enhanced water quality protection involves the removal of at least 80% of TSS from 90% of the annual runoff volume.

A 1200 mm Up-Flo Filter is proposed to provide the requisite water quality control for the entire site. The filtration unit is proposed to be installed downstream of the proposed tank and will treat the stormwater runoff from the site prior to being discharged to the municipal storm sewer.

Refer to **Appendix D** for the treatment unit sizing, specifications and Operation and Maintenance Manual. Refer to **Preliminary Servicing Plan (C102)** in **Appendix E** for the proposed location of treatment unit.

6.7 Water Balance & Erosion Control

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

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

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

Table 9 below depicts the volume required to be retained to satisfy the water balance and erosion control criteria.

Table 9: Water Balance and Erosion Control Storage Requirement

Standard	Criteria	Impervious Area (m^2)	Volume Required (m^3)
City of Mississauga Development Requirements Manual (September 2016) to achieve water balance	Retention of first 5 mm[1]	3,430	17.2

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

As noted above, the water balance requirement is **17.2 m^3**, which has been accounted for in the preliminary tank design. Water balance will be achieved using water re-use methods such as irrigation. Note due to the infill nature of this project and the limits of the proposed underground foundation, infiltration is not feasible. The water re-use method will be confirmed at detailed design stage.

7.0 Erosion and Sediment Control During Construction

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

Silt Fencing

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

Rock Mud Mat

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

Sediment Control Devices

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

8.0 Conclusions and Recommendations

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

1. Water servicing is proposed to be provided by the existing 300 mm diameter watermain on Williamsport Drive through a 200 mm diameter water service connection.

2. Sanitary servicing for the new development is proposed through a 200 mm diameter sanitary service with a connection to the existing 250 mm diameter sanitary sewer on Williamsport Drive.

3. Storm servicing for the new development is proposed through a 300 mm diameter storm service with a connection to the existing 600 mm diameter storm sewer on Williamsport Drive.

4. The Site will be graded to promote positive drainage away from the building and to convey stormwater towards the proposed area drains located throughout the property. Stormwater management is proposed to be provided through a stormwater tank located on the P1 level.

5. The water quality requirement of 80% TSS removal from the Site is achieved through the use of a 1200mm Up-Flo Filter system.

6. Site water balance objective will be achieved through water re-use methods such as irrigation. The water re-use method will be confirmed at detailed design stage.

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

Respectfully submitted,

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Emily McNamee, P.Eng.
Senior Project Engineer

\\Crozier-Files\Projects\2700\2719 - 1470 Williamsport Hldgs Inc. co Compten Mgmt Inc\7179 - 1470 Williamsport Drive - Residential\Reports\Civil\7179_FSRSWM.docx

APPENDIX A

Plan and Profile Drawings & Background Materials

SURVEYOR'S REAL PROPERTY REPORT–PART 1

PLAN OF PART OF BLOCK C REGISTERED PLAN 729

CITY OF MISSISSAUGA

REGIONAL MUNICIPALITY OF PEEL

SCALE 1:400

5 0 5 10 20 30m

PART 2: REPORT

SUBJECT TO EASEMENT AS IN INST. No. TT184226
FENCES AS SHOWN
SURVEY PREPARED FOR 1470 WILLIAMSPORT HOLDINGS INC.

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT SET
SIB	DENOTES	STANDARD IRON BAR
IB	DENOTES	IRON BAR
RP	DENOTES	REGISTERED PLAN 729
P1	DENOTES	SURVEY BY ERTL SURVEYORS, O.L.S. DATED OCTOBER 09, 2009
P2	DENOTES	SURVEY BY CARTER & HORWOOD, O.L.S. DATED MAY 09, 1968
D	DENOTES	DEED INSTRUMENT No. VS108942
OU	DENOTES	ORIGIN UNKNOWN
1121	DENOTES	PAUL JAYSON, O.L.S.
1715	DENOTES	ROWAN–STANCIU LTD., O.L.S.
N,S,E,W	DENOTES	NORTH, SOUTH, EAST, WEST
M	DENOTES	MEASURED
DSE	DENOTES	DOOR SILL ELEVATION
CLF	DENOTES	CHAIN LINK FENCE
CRW	DENOTES	CONCRETE RETAINING WALL
PPC	DENOTES	PRECAST PARKING CURB
WV	DENOTES	WATER VALVE/KEY
FH	DENOTES	FIRE HYDRANT
CB	DENOTES	CATCH BASIN
GM	DENOTES	GAS METER
HV	DENOTES	HYDRO VAULT
BOL	DENOTES	BOLLARD
TS	DENOTES	TRAFFIC SIGN POST
PS	DENOTES	PARKING SIGN POST
LS	DENOTES	LIGHT STANDARD
MH	DENOTES	MAINTENANCE HOLE
	DENOTES	CONIFEROUS TREE
	DENOTES	DECIDUOUS TREE

BENCHMARK

ELEVATIONS ARE GEODETIC AND REFERRED TO CITY OF MISSISSAUGA B.M. No. 690, ELEVATION = 134.702m

TREE NOTE

ALL TREES FRONTING THE PROPERTY, WITHIN THE BOULEVARD, ARE SHOWN. TREES ON THE PROPERTY AND ITS PROXIMITY ARE SHOWN, IF THEY HAVE A TRUNK DIAMETER LARGER THAN 0.15m.

BEARING NOTES

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK OBSERVATIONS, UTM ZONE 17 (81° WEST LONGITUDE), NAD83(CSRS)v6(2010).

FOR BEARING COMPARISONS, THE FOLLOWING ROTATIONS WERE APPLIED:

RP,P1,P2,D – 0°57'40" COUNTER–CLOCKWISE

DISTANCE NOTES – METRIC

DISTANCES AND COORDINATES ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999740.

CAUTION

THE WORK AND DRAWINGS HEREIN WERE COMPLETED FOR THE EXCLUSIVE USE OF OUR CLIENT AND NO LIABILITY IS ASSUMED TO ANY THIRD PARTIES OR SUBSEQUENT OWNERS.

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2184066

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR. In accordance with Regulation 1026, Section 29(3).

REVISION NOTE

PLAN GEOREFERENCED ON SEPTEMBER 11, 2024

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 16TH DAY OF DECEMBER, 2021

Date

Lawrence O. Ertl
Ontario Land Surveyor

INTEGRATION DATA

OBSERVED REFERENCE POINTS DERIVED FROM GPS OBSERVATIONS USING A REAL TIME NETWORK AND ARE REFERRED TO UTM ZONE 17 (81° WEST LONGITUDE) NAD83(CSRS)v6(2010).

URBAN ACCURACY PER SEC. 14(2), O.REG. 216/10.

POINT ID	NORTHING	EASTING
A	4830546.94	613477.56
B	4830422.68	613440.58

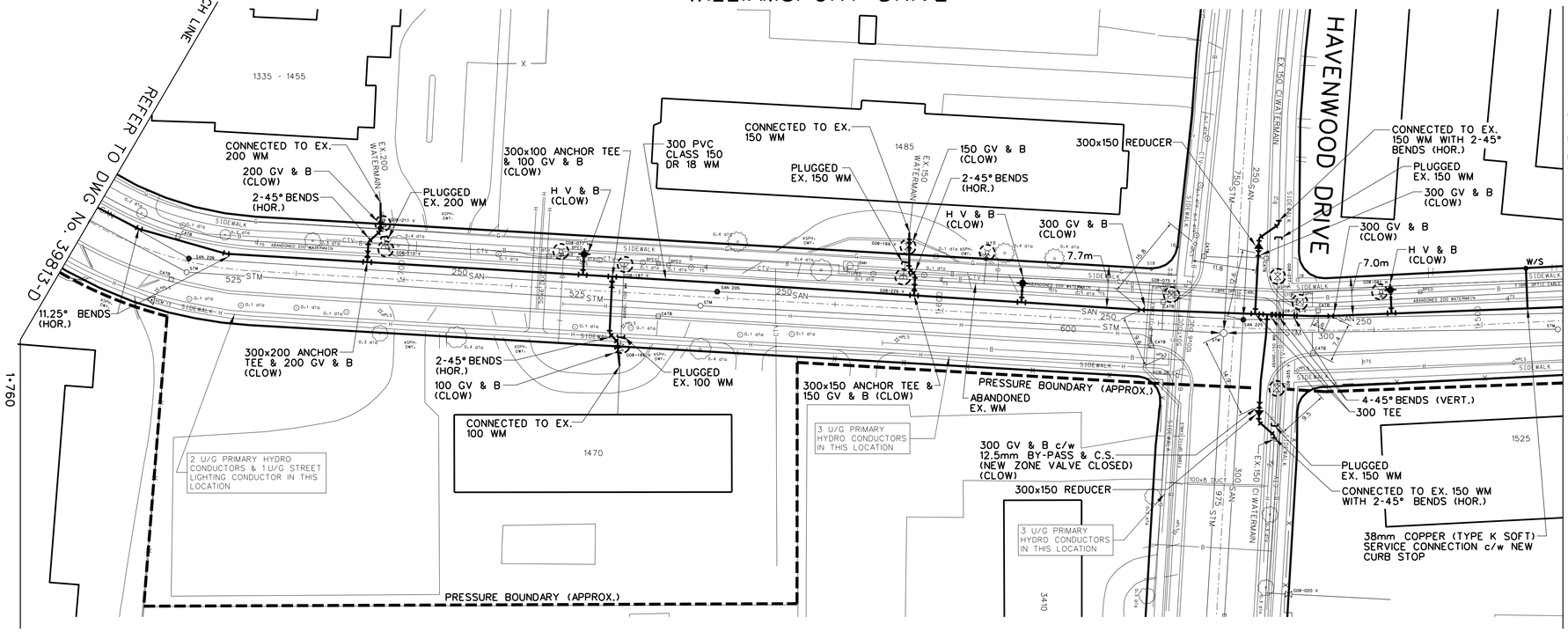
CAUTION: COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN

IBW SURVEYORS

IBWSURVEYORS.COM | 1.800.667.0696
copies available at ProtectYourBoundaries.ca

PARTY CHIEF: JA	DRAWN: DH/DV	CHECKED: *	PLOT DATE: SEPT. 19, 2024
FILE: A–049825–21648–TB_V			A-049825

WILLIAMSPORT DRIVE

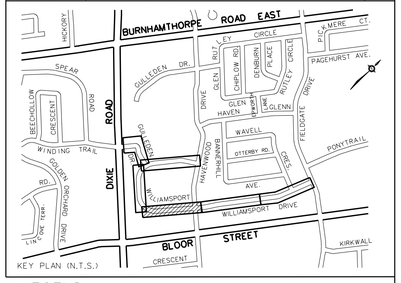


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.
SEPT. 11/09	ISSUED FOR PUCC	N.M.S.
DEC. 2/09	ISSUED FOR TENDER	N.M.S.
FEB. 16/10	ISSUED FOR CONSTRUCTION	N.M.S.
JULY 2011	REVISED AS RECORD DRAWING	R.M.



KEY PLAN (N.T.S.)

LEGEND

EX. 20mm DIAMETER & LARGER COPPER W/S TO BE CUT AND TRANSFERED OR EXTENDED TO THE NEW WM.

REPLACE EX. W/S WITH 25mm DIAMETER COPPER

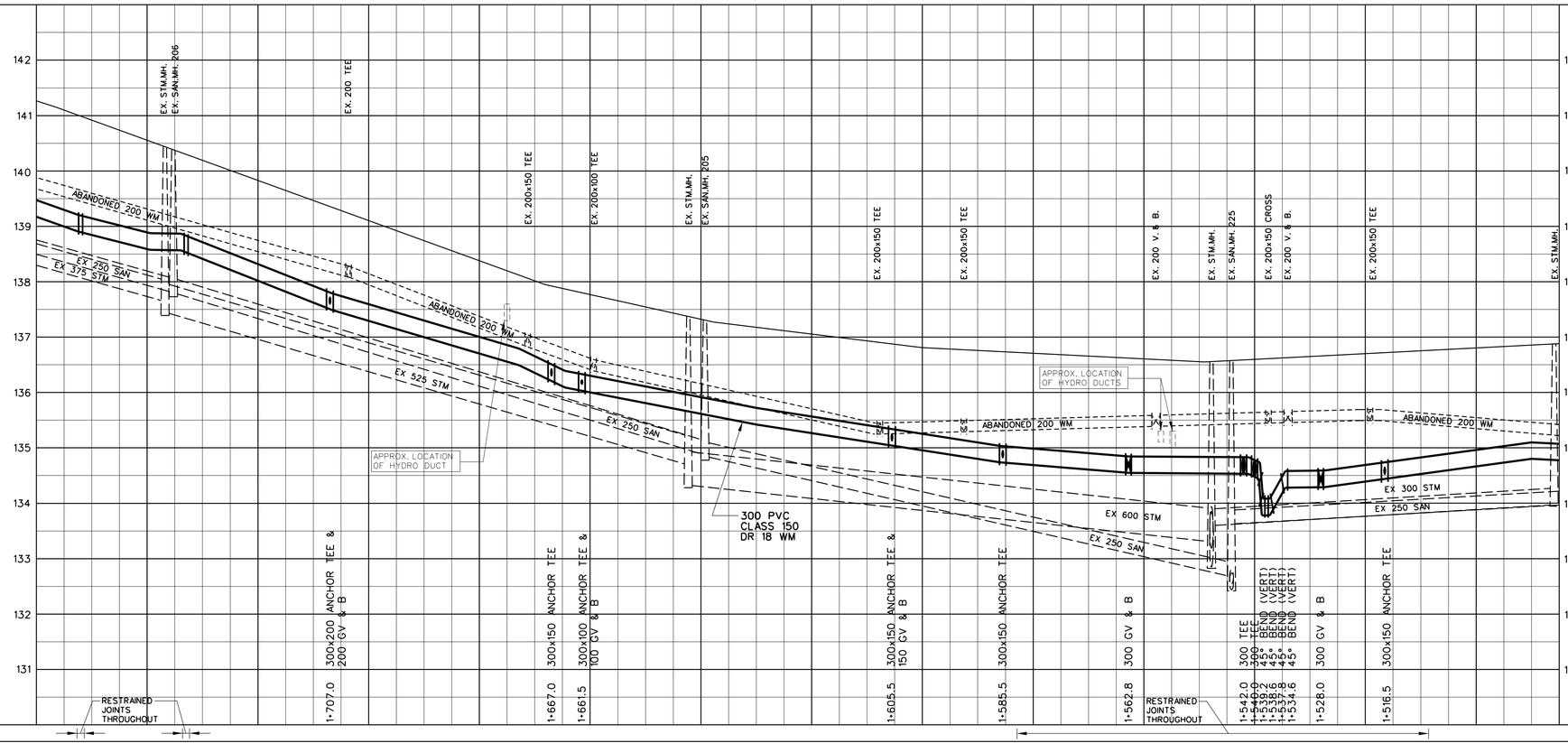
EX. HYD. V. & B. TO BE REMOVED AND HYD. TO BE RETURNED TO REGION YARD AT 3515 WOLFEDALE ROAD, MISSISSAUGA

i) ALL VALVES TO BE ABANDONED IN PLACE INCLUDING THE BOX. THE ONLY ITEMS TO BE REMOVED ARE THE ROAD LEVELLERS AND CAP. THIS APPLIES TO:
   1) TAPPING VALVES
   2) DIRECT BURIED VALVES
   3) LARGE DIAMETER W/S V & B
ii) VALVES IN CHAMBER ARE TO BE ABANDONED IN PLACE.

FOR WATERMAIN NOTES & DETAILS SEE DWG. 39833-D

THIS DRAWING TO BE USED FOR WATERMAIN CONSTRUCTION ONLY.

RECORD DRAWINGS
NOTICE TO USERS
Information contained on this drawing may have changed since the completion of construction. Further, this drawing may contain information provided by others. While Ainley & Associates Limited believes this information to be reliable and correct as of the completion of construction, no warranty is provided as to its accuracy and/or completeness. As such, Ainley & Associates Limited shall not be responsible for any errors or omissions which may result from incorporation of the information herein.



BOT.EL. OF WM.
EX. ROAD ELEV.
ROAD CHAINAGE

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

Survey Completed To City Of Mississauga Elevations
B.M. No. 688 Elev. 143.902
(Non-Geodetic Elevation)

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

Ainley CONSULTING ENGINEERS PLANNERS

Approved by

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:

BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m — HORIZONTAL SCALE
1m 0 1 2 3m — VERTICAL SCALE

Region of Peel
Working for you

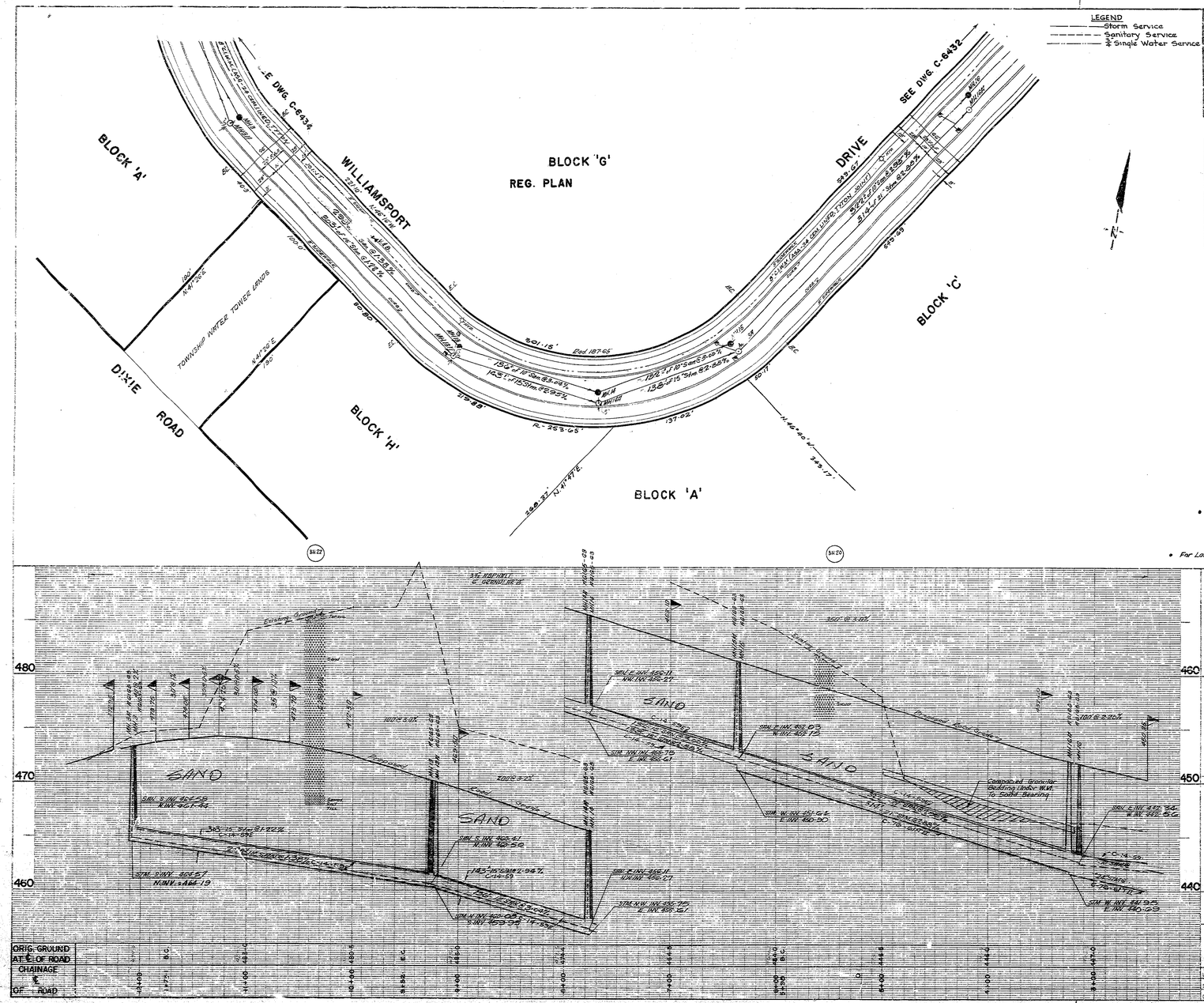
WILLIAMSPORT DRIVE

(FROM FIELDGATE DRIVE TO HAVENWOOD DRIVE)

PROP. 300 WATERMAIN

STA. 1+485 TO STA. 1+760

CAD Area	Area Z-19	Project No.	09-1346S
Checked by N.M.S.	Drawn by D.E.		
Date AUGUST 2009	Sheet 3 of 5	Plan No.	39812-D



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAIN		
STORM SEWERS			BELL TEL CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
15 SEPT 64	Changes Following 1st Submission	
28 JAN 65	Revision for 3rd Submission.	
APR 14/65	P.O.C. Revisions	
OCT 1/65	AS CONSTRUCTED	M.W.
FEB 1966	MICROFILMED	

SCHEDULE OF WATERMAIN QUANITITIES			
ITEM	QTY.	SIZE	TYPE
WATERMAIN BC TO 2+60	890'	8"	C.I.M.M. (ASA-26 CEM. LINED TYTON JOINT)
VALVES	1	8" V.B.	McAVITY No. 2007S-O OR EQUAL
HYDRANTS	2		McAVITY M-59-M OR EQUAL
WATER SERVICES			
FITTINGS TEES			
FITTINGS REDUCERS			
FITTINGS BANDS			
FITTINGS ELBOWOFFS			

- Double Sewer Services to Lot Line
  Single Sewer Services to 5' from ℄ of Line
  Water Services to ℄ of Lot
- For Largest Pipe 10" To 18" Use MH As Per AGI65 or AGI63
  21" To 36" Use MH As Per AGI66
  Over 39" Use MH As Per AGI67

GENERAL NOTES

- ALL DRIVEWAYS GRAVEL UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
- ⊕ DENOTES BUILDING NOT LOCATED
- ⊕ DENOTES BUILDING LOCATED.
- T.T.B.M. No. 28 ELEV. 466.251
- TEMP. BENCH MARK ELEV. 473.34 SEE DWG. C-6435
  DESCRIPTION TOP OF HYD., TOP OF S/W NUT
- ALL SEWER BEDDING TYPE 'B' UNLESS SHOWN OTHERWISE.

REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — H.V. AMBER

DESIGNED BY ____ DRAWN ____ APPROVED BY

R.E. WINTER & ASSOCIATES LIMITED
CONSULTING ENGINEERS

BURNHAMDALE WOODS SUBDIVISION

PROJECT No. 297

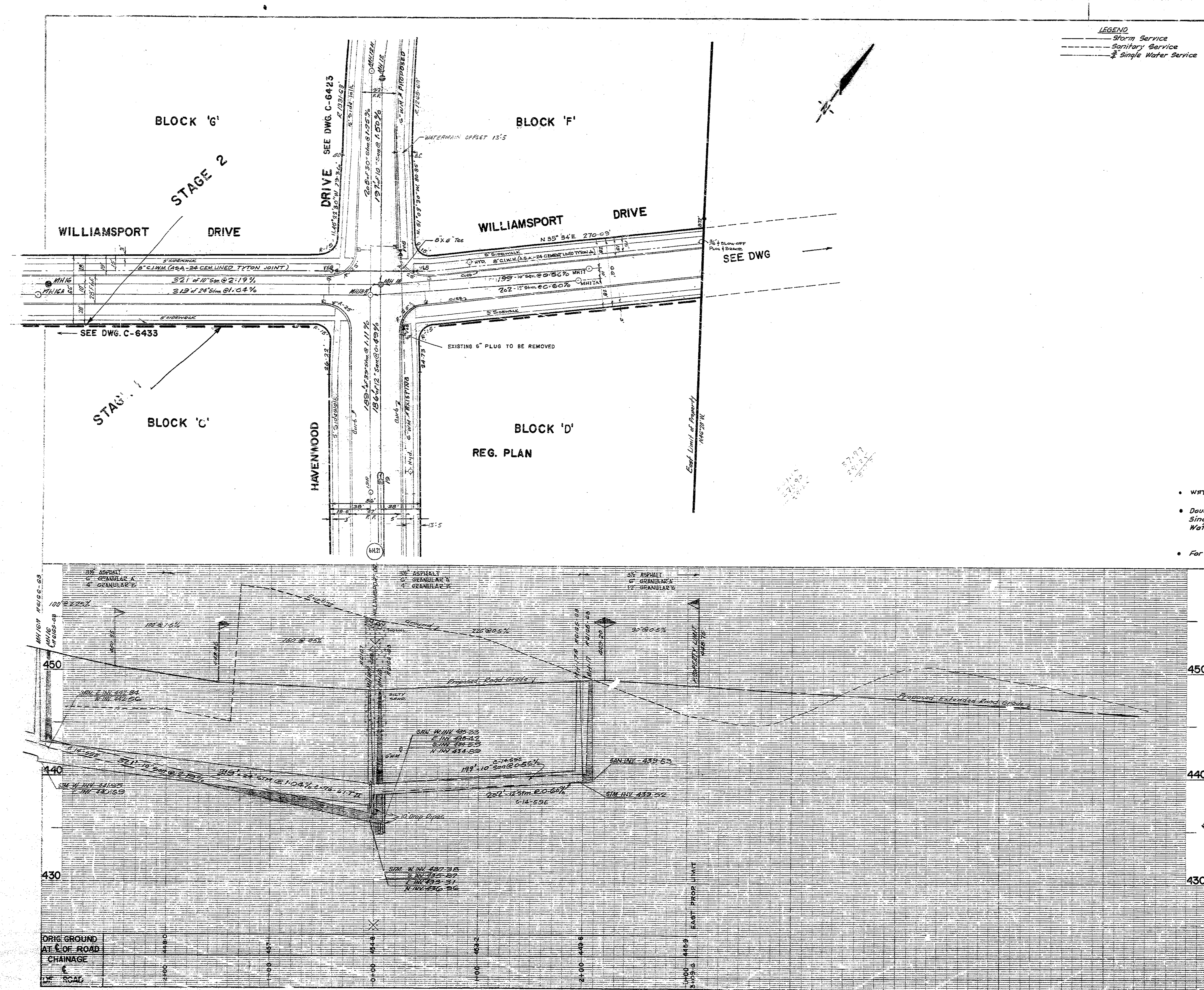
TOWNSHIP OF TORONTO
COUNTY OF PEEL
ENGINEERING DEPARTMENT

WILLIAMSPORT DRIVE

STN. 2+50 TO STN. 17+00

LOT/S	5	CON./RANGE 1 NDS	PROJECT NO. 297
SCALE	HOR. 1"=50' VERT. 1"=5'	DRAWN BY D.R. - MW	CHECKED BY
DATE	FEBRUARY 14, 1964	SHEET OF	PLAN NO. C-6433

41-63



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
10 April/64	Changes following 1st Submission	
28 JULY /64	REVISIONS FOR 3RD SUBMISSION.	
23 SEPT. /64	Revision to Williamsport Drive	D.H.R.
APR. 16/65	P.U.C. REVISIONS	
SEPT 5/67	AS CONSTRUCTED	M.V.
FEB 1968	MICROFILMED	

SCHEDULE OF WATERMAIN QUANTITIES

ITEM		QTY.	SIZE	TYPE
WATERMAIN		570'	8"	C.I.W.M. (ASA-24 CEM. LINED TYTON JOINT)
VALVES		2	8" VB	Mc AVITY No. 20075-D OR EQUAL
HYDRANTS		1		Mc AVITY M-59-M OR EQUAL
WATER SERVICES				
FITTINGS	TEES	1	8"x6"	
	REDUCERS			
	BENDS			
	BLOW OFFS	1	3/4"	

- WATERMAIN & HYDRANTS TO BE LOCATED AS PER DWG. #6228.
- Double Sewer Services to Lot Line
  Single Sewer Services to 5' from Lot Line
  Water Services to ℄ of Lot.
- For Largest Pipe 10" To 18" Use MH As Per A6165 or 6163
  21" To 36" Use M.H As Per A6166
  Over 39" Use MH As Per A6167

GENERAL NOTES

- ALL DRIVEWAYS GRAVEL UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
- ● DENOTES BUILDING — NOT LOCATED.
- ⊏ DENOTES BUILDING LOCATED.
- T.T.B.M. No. 28 ELEV 466.251
- TEMP. BENCH MARK ELEV. 441.96 SEE DWG. C-6430 DESCRIPTION 1/2" S.I.B.

ALL SEWER BEDDING TYPE 'B' UNLESS SHOWN OTHERWISE.

REGISTERED PROFESSIONAL ENGINEER H. V. AMBER PROVINCE OF ONTARIO

DESIGNED BY | CHKD. | APPROVED BY

R.E.WINTER & ASSOCIATES LIMITED
CONSULTING ENGINEERS

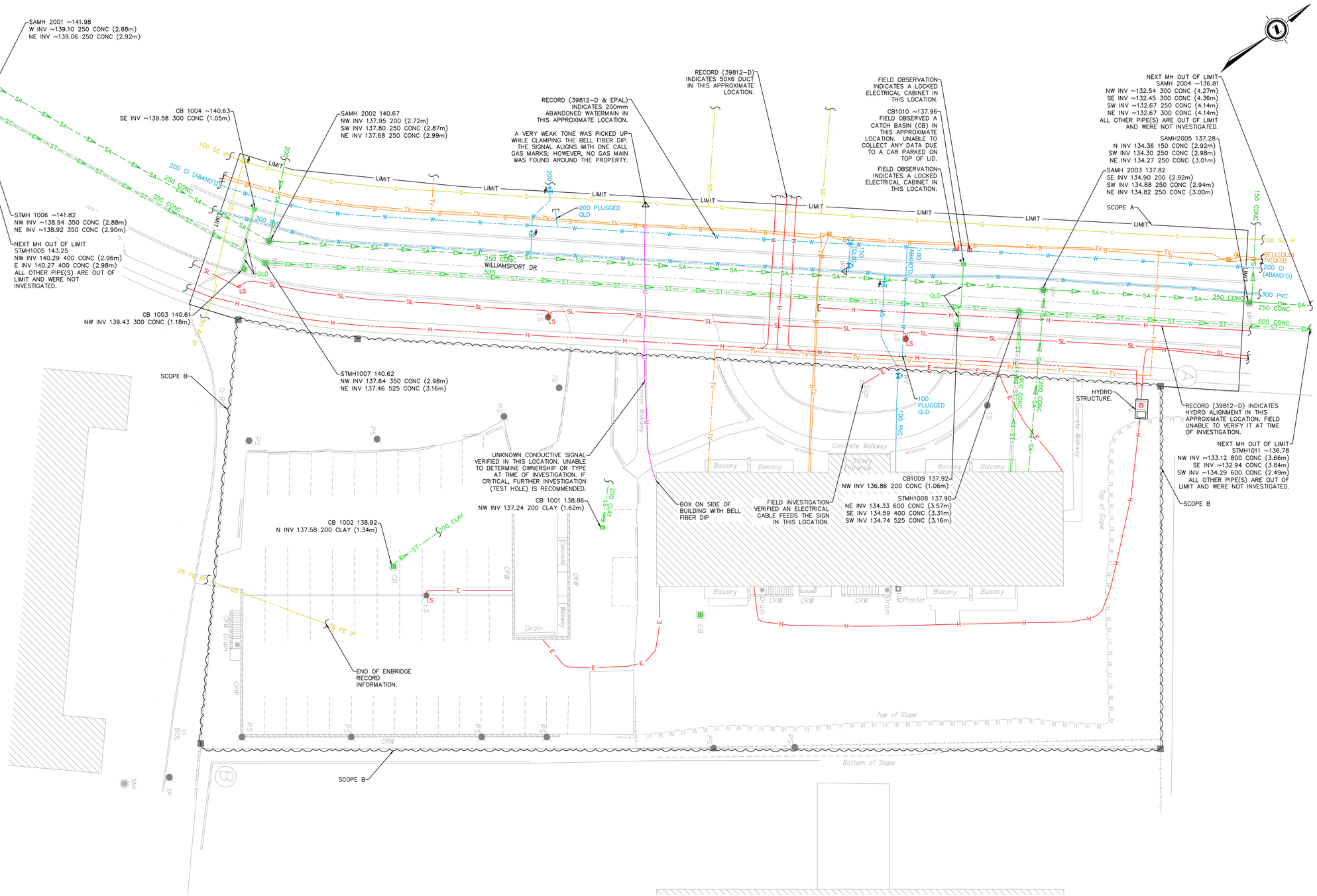
BURNHAMDALE WOODS SUBDIVISION
PROJECT No. 297

TOWNSHIP OF TORONTO
COUNTY OF PEEL
ENGINEERING DEPARTMENT

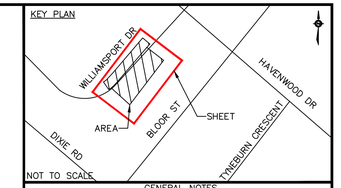
WILLIAMSPORT DRIVE
STN. 2+50W TO STN. 3+09.6E

LOT/S 5	CON./RANGE 1 NDS	PROJECT NO. 297
SCALE HOR. 1" = 40' VERT. 1" = 4'	DRAWN BY D.R.-M.W.	CHECKED BY
DATE FEBRUARY 14, 1964	SHEET OF	PLAN NO. C-6

41-63



KEY PLAN



GENERAL NOTES

1. THE FIELD INVESTIGATION WAS COMPLETED IN NOVEMBER 2024.
2. THE LIMITS OF THE INVESTIGATION ARE AS PER SHOWN ON THE DRAWING.
3. THE BASE PLAN FOR THIS DRAWING WAS PROVIDED BY THE CLIENT AND 4SIGHT IS NOT RESPONSIBLE FOR ITS ACCURACY.
4. UTILITY SIZES AND MATERIALS ARE SHOWN IF AVAILABLE FROM RECORD INFORMATION.
5. KNOWN UTILITY OWNERS IDENTIFIED WITHIN PUBLIC RIGHT OF WAY INCLUDE:
   a. WATER & SEWERS – REGION OF PEEL & CITY OF MISSISSAUGA
   b. ELECTRICAL – ALECTRA
   c. TELECOM – BELL, ROGERS
   d. GAS – ENBRIDGE
6. SEE PROJECT REPORT FOR ADDITIONAL DETAILS.

LEGEND:

B	BELL TELECOMMUNICATIONS
TV	ROGERS COAXIAL
C	PRIVATE COMMUNICATIONS
FO	FIBER OPTIC
BF	BELL FIBER OPTIC
RF	ROGERS FIBER OPTIC
CF	COGECO FIBER OPTIC
ZF	ZAYO FIBER OPTIC
H	HYDRO
SL	STREETLIGHT
TL	TRAFFIC LIGHT
E	PRIVATE ELECTRICAL
G	GAS
PL	PIPELINE
W	WATER
WS	WATER SERVICE
SA	SANITARY SEWER
FM	SANITARY FORCEMAIN
ST	STORM SEWER
U	UNKNOWN CONDUCTIVE SIGNAL
	QUALITY LEVEL "B"
	QUALITY LEVEL "C"
	QUALITY LEVEL "D"
LIMIT	LIMIT OF INVESTIGATION
	CONTINUES OUT OF LIMITS
	FLOW ARROW
	END CAP
#	LOCATION BASED ON RECORD INFO
*	LOCATION BASED ON FIELD OBSERVATION
	LOSS OF SIGNAL
	STORM MAINTENANCE HOLE
	SANITARY MAINTENANCE HOLE
	CATCH BASIN
	WATER CHAMBER
	FIRE HYDRANT
	WATER VALVE
	GAS VALVE
UP	UTILITY POLE
LS	LIGHT STANDARD
HW	HAND WELL
	HYDRO MAINTENANCE HOLE
	HYDRO VAULT / TRANSFORMER
	TELECOM PEDESTAL
	FLUSH-TO-GRADE
	BELL MAINTENANCE HOLE
	ROGERS MAINTENANCE HOLE
	UNKNOWN MAINTENANCE HOLE
TH	TEST HOLE

ASCE QUALITY LEVELS

THE UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COLLECTED IN ACCORDANCE TO ASCE STANDARD 38-22. THE INFORMATION IS SHOWN BY QUALITY LEVEL WHICH INDICATES THE LEVEL OF EFFORT USED TO DETERMINE THE LOCATION OF THE DATA

INCREASED QUALITY

QUALITY LEVEL "D" – INFORMATION DERIVED FROM EXISTING RECORDS OR VERBAL RECOLLECTIONS.

QUALITY LEVEL "C" – INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO THE QUALITY LEVEL "D" INFORMATION.

QUALITY LEVEL "B" – INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF THE UTILITIES.

QUALITY LEVEL "A" – PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES.

PREPARED BY.
4SIGHT UTILITY ENGINEERS

REVISIONS

DISCLAIMER.
THIS DRAWING WAS PRODUCED BY 4SIGHT INC FOR THE USE OF THE CLIENT. 4SIGHT INC DOES NOT ACCEPT ANY RESPONSIBILITY FOR ANY UNAUTHORIZED USE BY THIRD PARTIES, OR ANY MODIFICATION MADE TO THIS DRAWING.

		DATE (MM/DD/YY)
DRAWN	A. KHIAVI	11/20/24
CHECKED	J. GOSWAMI	11/27/24
APPROVED	C. LUKKA	11/27/24

SCALE 1:250 (0, 5, 10m)

THE ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN ACCORDANCE WITH STANDARD SUE INDUSTRY PRACTICES. ALL OTHER INFORMATION HEREON HAS BEEN PROVIDED BY OTHERS AND IS NOT A PART OF THIS CERTIFICATION.

LICENSED PROFESSIONAL ENGINEER
C. A. LUKKA
100182823
24-0464
November 27, 2024
PROVINCE OF ONTARIO

PROJECT.
1470 WILLIAMSPORT DRIVE

DRAWING.
SUBSURFACE UTILITY ENGINEERING INVESTIGATION

CLIENT.
CROZIER

PROJECT NO. 24-0464

SHEET NO. 01 OF 01

	Floor	Gross Building Area (no exclusions) sm	Gross Building Area (no exclusions) sf	GFA Exclusions* sm	GFA Exclusions* sf	Mississauga By-Law 0225-2007 GFA (Res) sm	Mississauga By-Law 0225-2007 GFA (Res) sf	UNIT BREAKDOWN 1B	1B+D	2B	2B+D	3B	Total Units	Notes:
ABOVE GRADE	MPH	560.9	*6,037*	560.9	*6,037*									
	12	1,315.0	*14,155*	89.3	*961*	1,225.7	*13,193*	1	4	4	4	5	18	
	11	1,315.0	*14,155*	89.3	*961*	1,225.7	*13,193*	1	4	4	4	5	18	
	10	1,315.0	*14,155*	89.3	*961*	1,225.7	*13,193*	1	4	4	4	5	18	
	9	1,620.0	*17,438*	89.3	*961*	1,530.7	*16,476*	4	8	5	3	4	24	
	8	1,620.0	*17,438*	89.3	*961*	1,530.7	*16,476*	4	8	5	3	4	24	
	7	1,620.0	*17,438*	89.3	*961*	1,530.7	*16,476*	5	6	8	2	3	24	
	6	2,076.8	*22,354*	89.3	*961*	1,987.5	*21,393*	4	7	7	10	2	30	
	5	2,076.8	*22,354*	89.3	*961*	1,987.5	*21,393*	4	7	7	10	2	30	
	4	2,076.8	*22,354*	89.3	*961*	1,987.5	*21,393*	4	7	7	10	2	30	
	3	2,076.8	*22,354*	89.3	*961*	1,987.5	*21,393*	4	7	7	10	2	30	
	2	2,076.8	*22,354*	180.6	*1,944*	1,896.2	*20,411*	3	4	5	9	3	24	
	Ground	2,671.3	*28,754*	739.9	*7,964*	1,931.4	*20,789*	3	3	2	4	1	13	
BELOW GRADE	P1	4,730.8	*50,922*	4,730.8	*50,922*									
	P2	4,730.8	*50,922*	4,730.8	*50,922*									
	P2 Lower	778.2	*8,376*	778.2	*8,376*									
TOTALS						20,046.8 sm	*215,782 sf*	38	69	65	73			
					Indoor Amenity Deduction	806.1 sm	*8,677 sf*	107		138		38	283	
		32,661.0 sm	351,560 sf			19,240.7 sm	*207,105 sf*	38%		49%		13%	100%	**% of Unit Type**

Site Area Totals & FSI			
	Gross Site Area	**5,880.7 sm**	***63,299 sf***
	Landscape Buffers (North+South)	890.7 sm	*9,587 sf*
	Landscape Area (not including amenity areas or buffers)	1,075.0 sm	*11,571 sf*
	Outdoor Amenity Area at Grade	515.1 sm	*5,544 sf*
	Total Landscaped Area	**2,480.8 sm**	***26,703 sf*** **42.2% of Gross Site Area**
	Land Coverage	**2,671.3 sm**	***28,754 sf*** **45.4% of Gross Site Area**
	FSI (Total GFA/Net Site Area)	**3.3**	
	TOTAL GFA	**19,240.7 sm**	***207,105 sf***

GFA: *Means the sum of the areas of each storey of a building above or below grade, excluding a parking structure above or below grade, measured from the exterior of the outside walls. Includes all shafts, stairs, open to below areas, loading areas, below grade areas and mechanical penthouse.*

GFA - Apartment: **As per By-law 0225-2007, Gross Floor Area (GFA - Apartment) excludes any part of the building used for mechanical floor area, stairwells, elevators, vehicle parking, bicycle parking, storage lockers, below-grade storage, any enclosed area used for collection/storage of garbage/recycling, common facilities for the use of residents in the building, a day care and amenity area.*

NOTE: *All open to below areas are <u>included</u> in GFA, unless otherwise indicated in the Notes column above.*

The Statistics below are based on requirements as per the Mississauga Zoning By-law 0225-2007

VEHICULAR PARKING

Precinct 4 - Parking Master Plan 2019

		Required	Provided
Refer to Traffic Report prepared by C.F. Crozier & Associates Inc., for additional information.			
Rental Apartment			
Occupant	1.00 x 283	283	242
Res Visitor	0.20 x 283	57	30
Accessible Parking Spaces (equal number Type A & Type B)			
(13-100 Required Visitor Spaces = min. 4% of the total to be Accessible Spaces)		3	3
TOTAL PARKING		340	272

(20% of residential parking and 10% of visitor parking spaces are provided with EV ready spaces)

BICYCLE PARKING

				Required	Provided
Class A	(0.6/unit)	0.6 x	283	170	236
(in an enclosed area with controlled access)					
Class B	(greater of: 0.05/unit or 6 spaces)	0.05 x	283	15	24
(in a publicly accessible location)					
TOTAL BICYCLES				185	260

(50% of occupant bicycle parking to be located in secure weather protected area)

LOADING / GARBAGE

Loading Spaces			Required	Provided
Refer to Traffic Report prepared by C.F. Crozier & Associates Inc., for additional information.				
Residential	283 Units	(loading space size 3.5m x 9m)	1	1
TOTAL LOADING SPACES				1

GARBAGE & RECYCLABLE MATERIAL BIN CALCULATION

	# Units	Bin Type	Requirement	Required Bins
Garbage Bins	283	3-cubic Yards	1 bin/54 units	6
Recycle Bins	283	3-cubic Yards	1 bin/45 units	7

** 3-cubic Yard storage bin area: 1.26m high, 2.03m long, 1.07m deep*

AMENITY AREA

			Required	Provided
Total Amenity Area	5.6 sm/unit		1,584.8	1,836.5 sm
(Amenity Required - the greater of 5.6sm/unit or 10% of the Site Area)				
Indoor Amenity	*min. 50% contiguous area*	Ground		587.0 sm
		2nd		219.1 sm
		Total		806.1 sm
Outdoor Amenity	*min. 55sm provided at grade*	Ground		515.1 sm
		2nd		279.5 sm
		7th		235.8 sm
		Total		1,030.4 sm

PROJECT STATISTICS SUMMARY

Municipal Address:	1470 Williamsport Drive
Mississauga Zoning Bylaw 0225-2007:	RA2-40
Gross Site Area	5,880.7 sm
Established Grade:	139.26
(By-Law 0225-2007, average elevation of grade around the building)	
Building Height (Storeys): (excl. Mech Penthouse)	12 ST
Building Height above Established Grade: (excl. Mech Penthouse)	38.9 m
GFA - Residential Uses	19,240.7 sm
GFA - Non-Residential Uses	0.0 sm
Total Combined Gross Floor Area	19,240.7 sm
Floor Space Index **(FSI)**	3.3
Number of Residential **Units**	283
Amenity Space Required	1,584.8 sm
Indoor Amenity Space Provided	806.1 sm
Outdoor Amenity Space Provided	1,036.5 sm
Vehicular Parking Total Required	340
Vehicular Parking Total Provided	248
Bicycle Parking Total Required	185
Bicycle Parking Total Provided	234
Loading Spaces Required	
Loading Spaces Provided	1

RENTAL REPLACEMENT

Existing Building - Suite Breakdown

Floor	1B	2B	3B
6	3	*5*	1
5	3	*5*	1
4	3	*5*	1
3	3	*5*	1
2	3	*5*	1
Ground	4	3	1
Total	**19**	**28**	**6**
	53		

*The above suites will be replaced in proposed development with the equivalent configuration

1 A100.S Context Plan
1:2000

REVISION RECORD

ISSUE RECORD

BDP. Quadrangle

Quadrangle Architects Limited
The Well, 8 Spadina Avenue, Suite 2100, Toronto, ON M5V 0S8
t 416 598 1240 www.bdpquadrangle.com

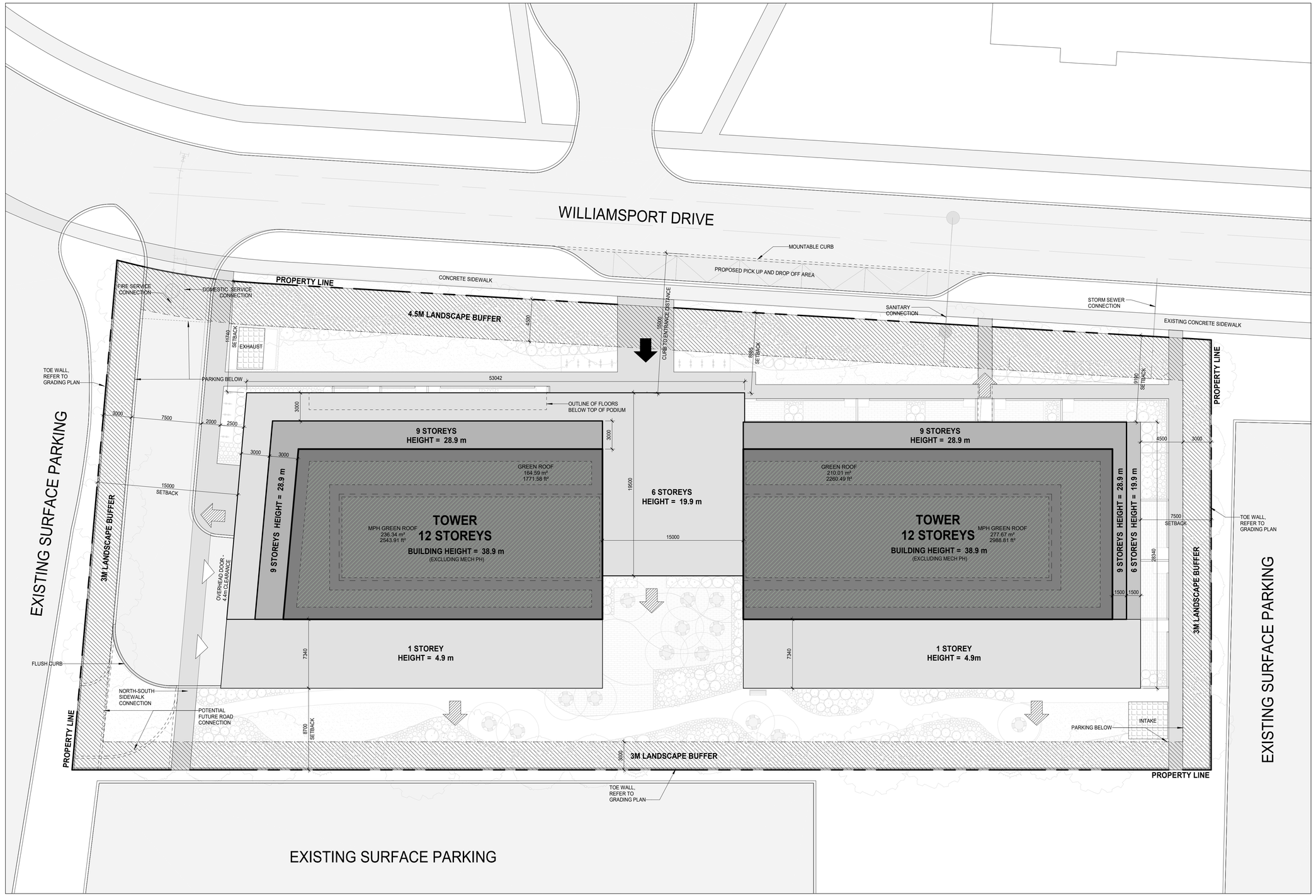
1470 Williamsport Drive

Mississauga, ON
for
1470 Williamsport Holdings Inc.

23057 1:1000 AS AB
PROJECT SCALE DRAWN REVIEWED

Context Plan & Statistics

A100.S



1 / A101.S SITE PLAN

SITE PLAN LEGEND

- PROPERTY LINE
- LINE OF UNDER GROUND GARAGE BELOW
- MAIN BUILDING ENTRANCE
- EXIT
- VEHICLE / LOADING ENTRANCE / EXIT
- ###.### PROPOSED ELEVATION
- BUILDING ENVELOPE

REVISION RECORD

ISSUE RECORD

BDP. Quadrangle

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t 416 598 1240 www.bdpquadrangle.com

1470 Williamsport Drive

Mississauga, ON
for
1470 Williamsport Holdings Inc.

23057	1:200	SJ	AB
PROJECT	SCALE	DRAWN	REVIEWED

Site Plan

A101.S

PARKING NOTES:

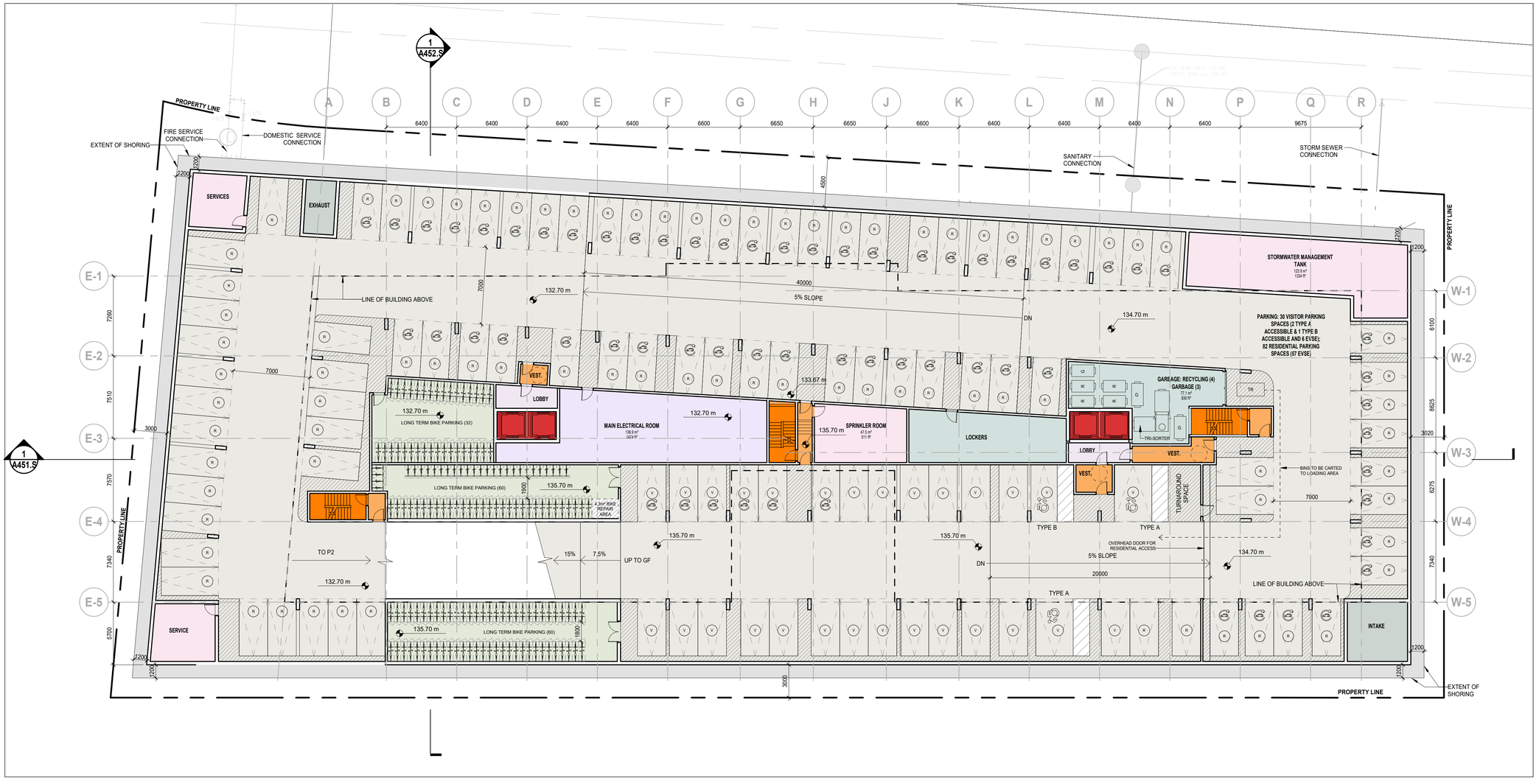
1. MINIMUM PARKING SPACE SIZES (UNLESS OTHERWISE NOTED):
   - 2600mm WIDE X 5200mm LONG (NO SIDES OBSTRUCTED)
   - 2750mm WIDE X 5200mm LONG (ONE SIDE OBSTRUCTED)
   - 2900mm WIDE X 5200mm LONG (TWO SIDES OBSTRUCTED)

2. MAINTAIN MININUM DRIVE AISLE WIDTH OF 7000mm UNLESS OTHERWISE NOTED.

3. MAINTAIN MINIMUM HEADROOM CLEARANCE OF 2100mm THROUGHOUT.

PARKING LEGEND:

- BIKE PARKING (HORIZONTAL)
- BIKE PARKING (VERTICAL)
- TRACTOR
- TYPICAL
- ONE SIDE OBSTRUCTRED
- TWO SIDE OBSTRUCTRED
- ACCESSIBLE
- ACCESSIBLE VISITOR - TYPE A
- ACCESSIBLE VISITOR - TYPE B
- COMMERCIAL PARKING SPACE
- RESIDENTIAL PARKING SPACE
- VISITOR PARKING SPACE
- EXISTING PARKING SPACE
- BIKE LOCKER
- BIKE PARKING (STACKED)
- BIKE PARKING (VERTICAL)
- ELECTRIC VEHICLE
- CONVEX MIRROR
- PAINTED LINES



1 A103.S P1 Underground Plan

REVISION RECORD

ISSUE RECORD

BDP. Quadrangle

Quadrangle Architects Limited
The Well, 8 Spadina Avenue, Suite 2100, Toronto, ON M5V 0S8
t 416 598 1240 www.bdpquadrangle.com

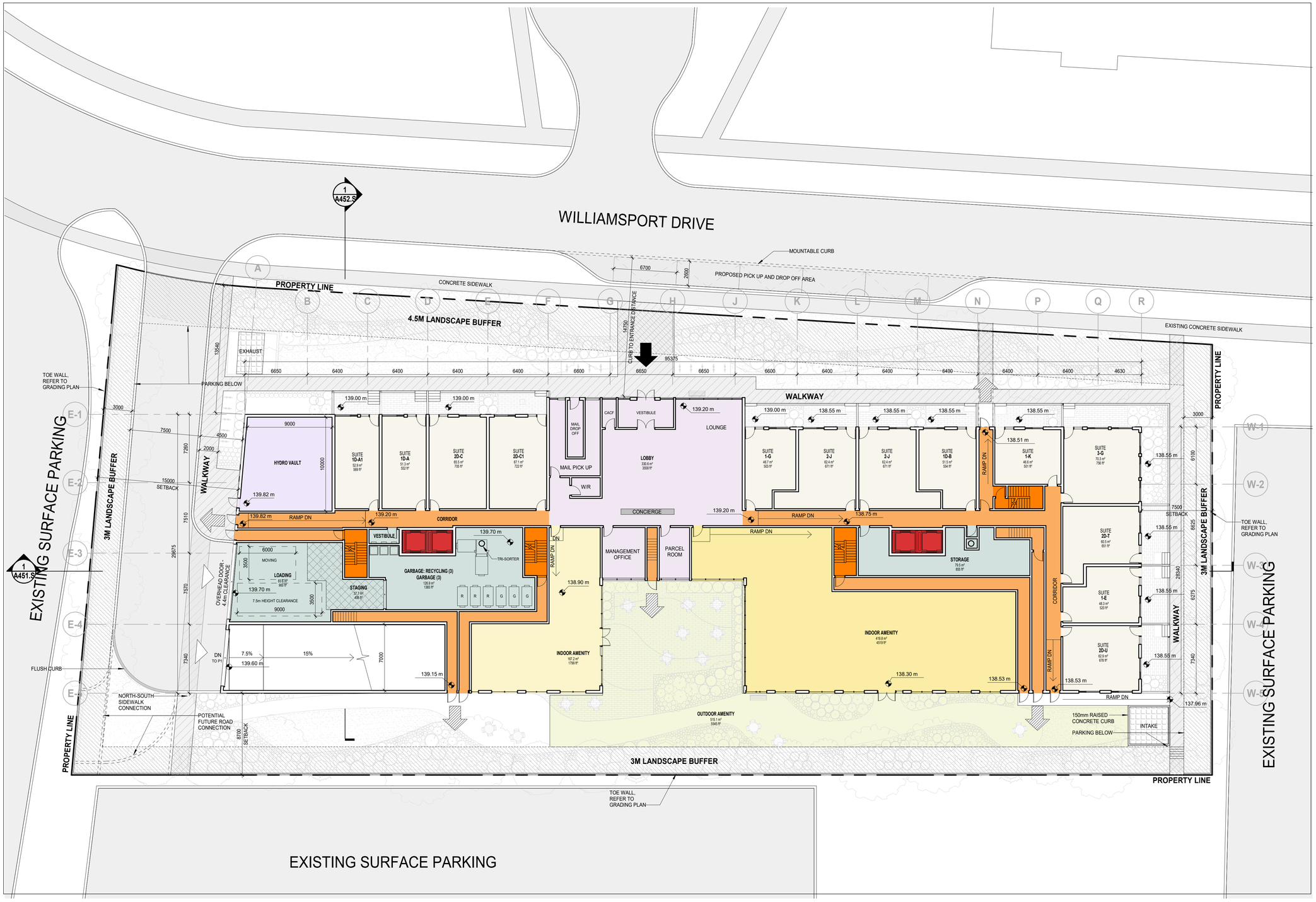
1470 Williamsport Drive

Mississauga, ON
for
1470 Williamsport Holdings Inc.

23057	1:200	SJ	AB
PROJECT	SCALE	DRAWN	REVIEWED

P1 Underground Plan

A103.S



SITE PLAN LEGEND

- PROPERTY LINE
- LINE OF UNDER GROUND GARAGE BELOW
- MAIN BUILDING ENTRANCE
- EXIT
- VEHICLE / LOADING ENTRANCE / EXIT
- ###.### PROPOSED ELEVATION
- BUILDING ENVELOPE

REVISION RECORD

ISSUE RECORD

BDP. Quadrangle

Quadrangle Architects Limited
The Well, 8 Spadina Avenue, Suite 2100, Toronto, ON M5V 0S8
t 416 598 1240 www.bdpquadrangle.com

1470 Williamsport Drive

Mississauga, ON
for
1470 Williamsport Holdings Inc.

23057 1:200	SJ	AB
PROJECT SCALE	DRAWN	REVIEWED

Ground Floor Plan

A201.S

APPENDIX B

Water Demand Calculations

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive | **Created By:** AM | **Date:** 2024-08-16

Project No.: 2719-7179 | **Checked By:** ECM | **Updated:** 2025-02-14

Existing Domestic Water Demand

Site Area: 0.59 ha

Residential:

	Bachelor + 1 Bedroom	Greater than 1 Bedrooom
Population Density:	1.7	3.1
Number of Units:	19	34
Population:	33	106

Total Residential Population: **139** **persons**

Design Parameters:

Avg. Consumption Rate (L/capita/day)
270

Water Demand:

Average Daily Demand = 37,530 L/day
0.43 **L/s**

Peaking Factors

Max Day = 1.8
Peak Hour = 3.0

Average Day = 0.43 L/s
Max Day = **0.78** L/s
Peak Hour = **1.30** L/s

Municipality	Average Daily Water Demand (L/min)	Max Day Demand (L/min)	Peak Hourly Demand (L/min)
Region of Peel	26.1	46.9	78.2

Notes & References

2023 Region of Peel Linear Wastewater Standards. These unit rates were used to be conservative.

Region of Peel, 2020 Development Charges Background Study

Region of Peel, 2020 Development Charges Background Study

Max Day = Avg. Day Demand * Max Day Factor
Peak Hour = Avg. Day Demand * Peak Hour Factor

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive | **Created By:** AM | **Date:** 2024-08-16

Project No.: 2719-7179 | **Checked By:** ECM | **Updated:** 2025-02-14

Proposed Domestic Water Demand

Site Area: 0.59 ha

Residential:

	Bachelor + 1 Bedroom	Greater than 1 Bedrooom
Population Density:	1.7	3.1
Number of Units:	107	176
Population:	182	546

Total Residential Population: **728** **persons**

Design Parameters:

Avg. Consumption Rate (L/capita/day)
270

Water Demand:

Average Daily Demand = 196,560 L/day
2.28 **L/s**

Peaking Factors

Max Day = 1.8
Peak Hour = 3.0

Average Day = 2.28 L/s
Max Day = **4.10** L/s
Peak Hour = **6.83** L/s

Municipality	Average Daily Water Demand (L/min)	Max Day Demand (L/min)	Peak Hourly Demand (L/min)
Region of Peel	136.50	245.70	409.50

Notes & References

2023 Region of Peel Linear Wastewater Standards. These unit rates were used to be conservative.

Region of Peel, 2020 Development Charges Background Study

Region of Peel, 2020 Development Charges Background Study

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

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No.: 2719-7179

Date: 2025-02-14
Design: AM
Check: ECM

Required Fire Flow Worksheet - Proposed Development

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

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

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

where

RFF = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for Type V Wood Frame Construction (structure essentially all combustible)
=	0.8	for Type IV-A Mass Timber Construction (encapsulated mass timber)
=	0.9	for Type IV-B Mass Timber Construction (rated mass timber)
=	1.0	for Type IV-C Mass Timber Construction (ordinary mass timber)
=	1.5	for Type IV-D Mass Timber Construction (un-rated mass timber)
=	1.0	for Type III Ordinary Construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for Type II Non-combustible Construction (unprotected metal structural components)
=	0.6	for Type I Fire-resistive Construction (fully protected frame, floors, roof)

Area Inputs:

Largest Floors			
Ground	2,671	sq.m	100%
Level 2	2,077	sq.m	25%
Level 3	2,077	sq.m	25%

Fire Flow:

Type of Construction:	I		Assumes Type I Fire-resistive Construction (fully protected frame, floors, roof)
C =	0.6		
A* =	3710	m^2	Area of the single largest floor plus 25% of each of the two immediately adjoining floors.
RFF=	**9,000**	**L/min**	(rounded to nearest 1,000 L/min)

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

Non-Combustible (NC)	-25%	Free Burning (FB)	15%
Limited Combustible (LC)	-15%	Rapid Burning (RB)	25%
Combustible (C)	0% (No Change)		

Occupancy & Contents Adjustment Factor:

Contents Factor:	LC			
Reduction/Surcharge of:	-15%	**L/min reduction =**	**-1350**	**L/min**
RFF=	**7,650**	**L/min**		

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

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

Automatic Sprinkler Protection:

NFPA 13 Sprinkler:	Yes	-30%		
Standard Water Supply:	Yes	-10%		
Fully Supervised System:	Yes	-10%		
Total Adjustment:		-50%	**reduction =**	**-3825** **L/min**
RFF=	**3,825**	**L/min**		

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No.: 2719-7179

Date: 2025-02-14
Design: AM
Check: ECM

Required Fire Flow Worksheet - Proposed Development

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

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

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

Exposure Adjustment Charge:

Direction	Description	Distance (m)	Charge (%)
North	1485 Williamsport Drive	43.5	0%
East	3410 Havenwood Dr.	45.7	0%
South	1475 Bloor St.	26.4	10%
West	3415 Dixie Rd.	27.8	10%
			20%

surcharge = 765 L/min

RFF= 4,590 L/min

Note: Maximum exposure charge can be 75%

Determine Required Fire Flow = Summary

No.1	9,000	L/min
No. 2	-1,350	L/min adjustment
No. 3	-3,825	L/min adjustment
No. 4	765	L/min adjustment
Required Flow:	**4,590**	**L/min**
Rounded to nearest 1000 L/min:	**5,000**	**L/min** or **83.3 L/s** (1,321 USGPM)

Determine Required Duration

Rounded to nearest 1000 L/min: 5,000 L/min
Duration for 2,000 L/min: **1.75** **hour**

Hydrant Testing Ontario
Tel: 289-354-1942
Info@HTOntario.ca

REPORT
N°. 2523

September 5, 2024

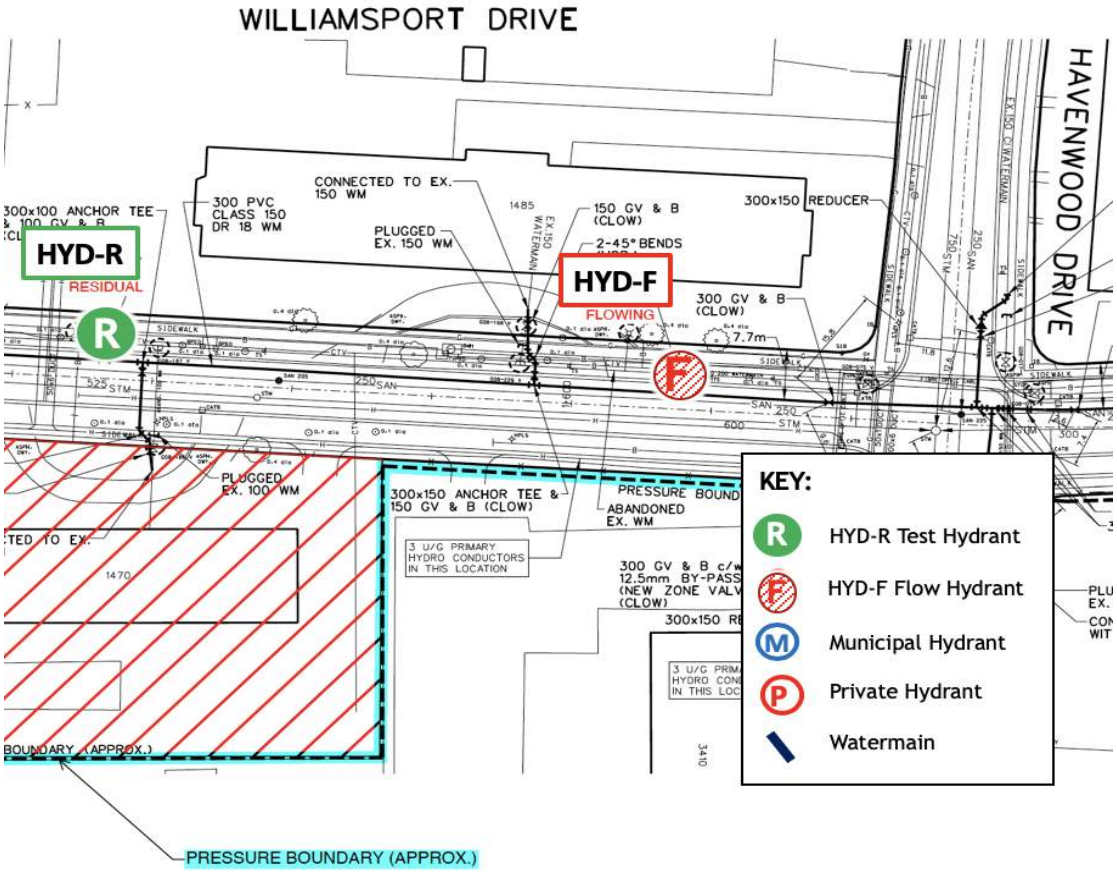
To:

Jack Greenberg
1470 Williamsport Holdings Inc. c/o Compten Management Inc.
181 Eglinton Ave East, Suite #204
Toronto, ON M4P 1J4

RE: Hydrant Flow Test - 1470 WILLIAMSPORT DRIVE, MISSISSAUGA

Please find the Report for the following works

Scope: Conducted two Hydrant Flow Test as per NFPA291 Recommended Practices for Water Flow Testing and Marking of Hydrants.



HYDRANT FLOW TEST

TORONTO

DATE: September 3, 2024 TIME: 11:00 AM

R -TEST HYDRANT 1470 WILLIAMSPORT DRIVE HYDRANT No. HYD-R

HYDRANT MODEL: McAVITY COLOUR: BLUE

STATIC PRESSURE psi (hr-20^0.54): **97** VARIANCE: 12.37%

Q - FLOW HYDRANT 1485 WILLIAMSPORT DRIVE HYDRANT No. HYD-F

HYDRANT MODEL: McAVITY COLOUR: BLUE

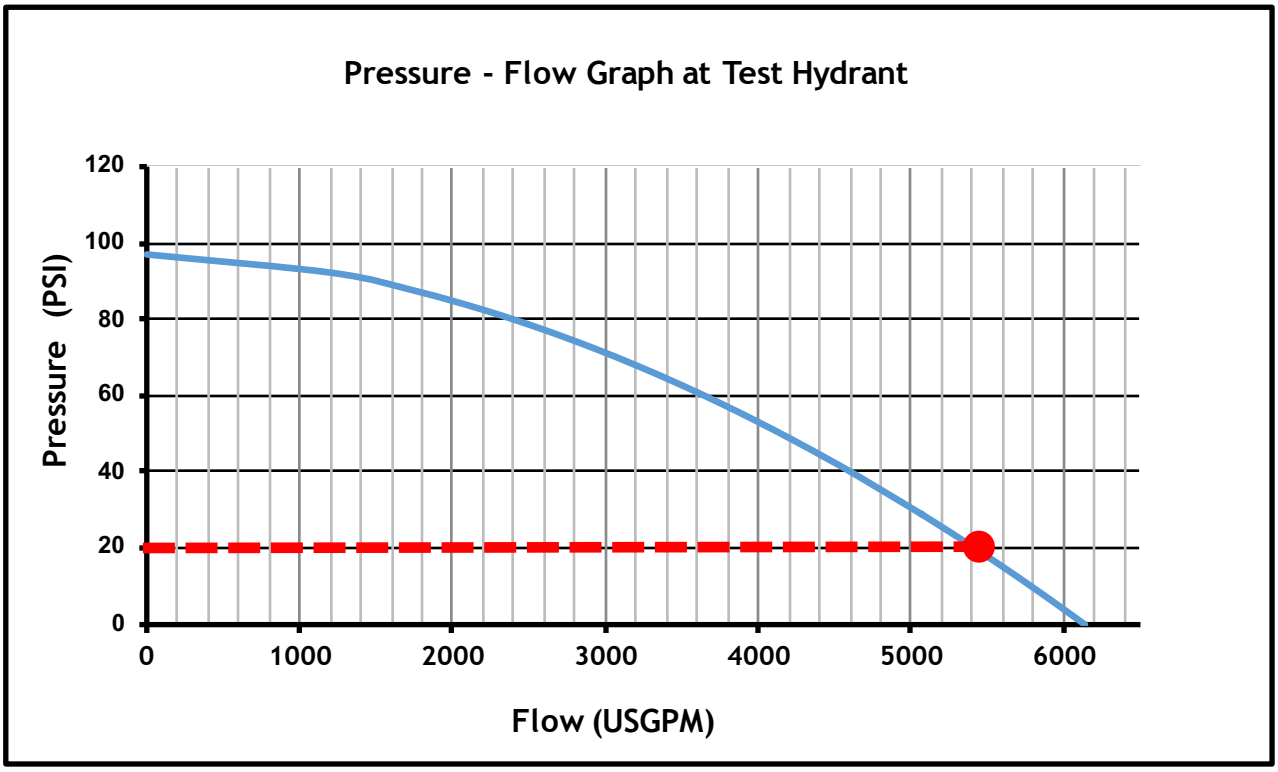
No. Outlets	Residual Pressure (hf-R^0.54)	Orifice Dia Dia. (in.) (d^2)	Coefficient	Nozzle PSI $(\sqrt{psi})$	Q = Flow (USGPM) $Q = 29.83\,(c)\,(d2)\,(\sqrt{psi})$
1	91	2.5	0.9	75	1453
2	85	2.5	0.9	35	993
			Q_F = Total Flow (USGPM)		**1985**

Q_R = flow predicted @ 20 psi

$Q_R = Q_F * (H_r - 20^{\wedge 0.54}) / (H_f - R^{\wedge 0.54})$

5417	USGPMA
342	L/s

NFPA Rating: **CLASS AA - BLUE**



Test Conclusion

The system at the time of testing produced a theorectical projected flow rate of:

LOCATION	Total USGPM	USGPM at 20 psi	lps at 20 psi	TEST #
WILLIAMSPORT DR	1985	5417	342	TEST 1

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

COLOUR	CLASS	Available Flow @ 20psi
BLUE	***AA***	***1500 GPM or more***
GREEN	A	1000 – 1499 GPM
ORANGE	B	500 – 999 GPM
RED	C	Below 500 GPM

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

We look forward to working with you in the future.

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

Best Reg

Rob Gam
Manager of Operations
Hydrant Testing Ontario
Info@HTOntario.ca

APPENDIX C

Sanitary Flow Calculations

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No.: 2719-7179

Created By: AM
Checked By: EM

Date: 2024-08-16
Updated: 2025-02-14

Existing Domestic Sanitary Design Flow

Site Area: 0.59 ha

Residential:

	Bachelor + 1 Bedroom	Greater than 1 Bedrooom	
Population Density:	1.7	3.1	persons/unit
Number of Units:	19	34	units
Population:	33	106	persons
Total Residential Population:	**139**	**persons**	

Design Parameters

Average Flow		
Residential	290	L/capita/d
No-residential	270	L/capita/d
Infiltration	0.26	L/s/ha

Harmon Peak Factor: M = 4.00

M = 1+ (14/(4+(P/1000)^(1/2)))
*Min of 2 and Max of 4.

Average Daily Flow =	0.47	L/s
Peaked Flow =	1.87	L/s
Infiltration =	0.15	L/s
Total Peak Flow =	**2.02**	L/s

Total Peak Flow = Peak Flow + Total Infiltration

Summary Table

Average Daily Flow* (L/s)	**Peaking Factor**	**Peak Flow** (L/s)	**Infiltration Flow** (L/s)	**Total Peak Flow** (L/s)
0.47	4.00	1.87	0.15	2.02

Notes & References

2023 Region of Peel Linear Wastewater Standards

2023 Region of Peel Linear Wastewater Standards

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No.: 2719-7179

Created By: AM
Checked By: EM

Date: 2024-08-16
Updated: 2025-02-14

Proposed Domestic Sanitary Design Flow

Site Area: 0.59 ha

Residential:

	Bachelor + 1 Bedroom	Greater than 1 Bedrooom	
Population Density:	1.7	3.1	persons/unit
Number of Units:	107	176	units
Population:	182	546	persons
Total Residential Population:	**728**	**persons**	

Design Parameters

Average Flow		
Residential	290	L/capita/d
No-residential	270	L/capita/d
Infiltration	0.26	L/s/ha

Harmon Peak Factor: M = 3.88

M = 1+ (14/(4+(P/1000)^(1/2)))
*Min of 2 and Max of 4.

Average Daily Flow = 2.44 L/s
Peaked Flow = 9.49 L/s
Infiltration = 0.15 L/s

Total Peak Flow = **9.65** L/s

Total Peak Flow = Peak Flow + Total Infiltration

Summary Table

Average Daily Flow* (L/s)	**Peaking Factor**	**Peak Flow** (L/s)	**Infiltration Flow** (L/s)	**Total Peak Flow** (L/s)
2.44	3.88	9.49	0.15	9.65

Notes & References

2023 Region of Peel Linear Wastewater Standards

2023 Region of Peel Linear Wastewater Standards

APPENDIX D

Stormwater Management Calculations

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Created By: ECM
Checked By: RS
Updated: 2025-02-14

Modified Rational Calculations - Summary

Storm Event (yr)	Peak Flow Rate		Required Storage (m^3)
	Allowable Release Rate (L/s)	Post-Development (L/s) Controlled	
2	21.02	20.09	50.9
5	27.91	24.10	73.2
10	32.61	27.35	94.4
25	38.57	31.51	125.2
50	43.02	35.52	159.1
100	47.49	38.80	189.9

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16
Updated: 2025-02-14

Modified Rational Calculations - Input Parameters

Storm Data: City of Mississauga

Time of Concentration: T_c = **15.00** **mins**

Return Period	A	B	C	I (mm/hr)
2 yr	610.0	4.6	0.78	59.89
5 yr	820.0	4.6	0.78	80.51
10 yr	1010.0	4.6	0.78	99.17
25 yr	1160.0	4.6	0.78	113.89
50 yr	1300.0	4.7	0.78	127.13
100 yr	1450.0	4.9	0.78	140.69

Pre-Development Conditions

Land Use	Area (ha)	Area (m^2)	C	Weighted Average C
Catchment 101 to Storm Sewers on Williamsport Drive				
Pervious	0.23	2310	**0.25**	**0.11**
Impervious	0.30	3035	**0.90**	**0.51**
Total Subcatchment	**0.53**	**5345**	**-**	**0.62**
Catchment 102 Overland to the South (Bloor Street)				
Pervious	0.05	536	**0.25**	**0.25**
Impervious	0.00	0	**0.90**	**0.00**
Total Subcatchment	**0.05**	**536**	**-**	**0.25**
Total	**0.59**	**5881**	**-**	**0.59**

Post-Development Conditions

Land Use	Area (ha)	Area (m^2)	C	Weighted Average C
Catchment 201 to Storm Sewer on Williamsport Drive via SWM TANK				
Pervious/Sodded	0.16	1562	**0.25**	**0.07**
Pervious (Green Roof)	0.09	889	**0.50**	**0.08**
Impervious	0.34	3430	**0.90**	**0.52**
Total	**0.59**	**5881**	**-**	**0.67**

References

Development Requriments Manual (Nov 2020)

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

Peak Flow
Q = 0.0028 • C • I • A

CROZIER
CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16
Updated: 2025-02-14

Modified Rational Calculations - Peak Flow Summary -

Pre-Development

Catchment 101 to Storm Sewers on Williamsport Drive					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.62	59.89	0.534	0.055	55.09
100 yr	0.62	140.69		0.129	129.42

Catchment 102 Overland to the South (Bloor Street)					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.25	59.89	0.05	0.002	2.23
100 yr	0.25	140.69		0.005	5.24

Little Etobicoke Creek Unit Flow Rates ($m^3/s/ha$)					
2-year	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**
0.03575	0.04746	0.05546	0.06559	0.07315	0.08075
Allowable Release Rates (L/s)					
2-year	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**
21.02	27.91	32.61	38.57	43.02	47.49

Post-Development

Catchment 201 to Storm Sewer on Williamsport Drive via SWM TANK					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.67	59.89	0.59	0.065	65.3
5 yr		80.51		0.088	87.8
10 yr		99.17		0.108	108.1
25 yr		113.89		0.124	124.2
50 yr		127.13		0.139	138.6
100 yr		140.69		0.153	153.4

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Modelled By: ECM
Date: 2024-09-16

MODIFIED RATIONAL METHOD

Rainfall IDF Coefficients	100-Year
A =	1450.0
B =	4.9
C =	0.78

Rational Method Calculation

Area =	0.59	ha	
Runoff Coefficient, C* =	0.83	*100 Year Adjustment factor of 1.25 has been applied.	
C*A =	0.49		
Time of Concentration, t_c =	15.0	min	
Storm Duration Increment =	5.0	min	
Constant Inflow (groundwater seepage) =	0.63	L/s	*Rate provided by mechanical consultant (Novatrend)
Allowable Release Rate -	**47.49**	L/s	
Design 100-YR Release Rate =	38.80	L/s	
Storage Required =	189.9	m^3	

100-Year

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Notes
15.0	140.69	192.22	173	35	138.1		
20.0	118.12	161.49	194	41	153.0		
25.0	102.41	140.09	210	47	163.6		
30.0	90.77	124.24	224	52	171.3		
35.0	81.77	111.99	235	58	177.0		
40.0	74.58	102.19	245	64	181.2		
45.0	68.68	94.16	254	70	184.4		
50.0	63.75	87.45	262	76	186.7		
55.0	59.56	81.74	270	81	188.3		
60.0	55.95	76.82	277	87	189.3		
65.0	52.81	72.54	283	93	189.8		
70.0	50.03	68.77	289	99	189.9	189.9	
75.0	47.58	65.42	294	105	189.6		
80.0	45.38	62.42	300	111	189.0		
85.0	43.39	59.72	305	116	188.2		
90.0	41.60	57.28	309	122	187.1		
95.0	39.97	55.06	314	128	185.8		
100.0	38.47	53.02	318	134	184.3		
105.0	37.10	51.15	322	140	182.6		
110.0	35.84	49.43	326	146	180.7		
115.0	34.66	47.84	330	151	178.7		
120.0	33.58	46.36	334	157	176.6		
125.0	32.57	44.98	337	163	174.4		

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16

ORIFICE SIZING

100-Year

Orifice Sizing

Orifice Equation: $Q = CdxAx(2gH)^{0.5}$ *g=9.81 (m/s^2) gravity*

where:
Q =flow rate (m3/s)
H = head on the weir (m)
A =area of orifice (m^2)
C_d = coefficient of discharge
C_d = 0.63 for Sharp Orifice
C_d = 0.84 for Tube Orifice

100-yr HWL =	137.06	m
Orifice Invert =	135.30	m
Height =	1.76	m
C=	0.84	(orifice tube)
d_{orfice} =	100	mm
r_{orfice} =	50	mm
$Q_{Orifice}$ =	38.80	L/s
Allowable Flow	**47.49**	**L/s**

Tank Sizing

Required Quantity Storage	**189.9**	m^3
Required Reuse Storage	**17.2**	m^3

Tank Dimensions

Area	107.6	m^2

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Modelled By: ECM
Date: 2024-09-16

MODIFIED RATIONAL METHOD

Rainfall IDF Coefficients	50-Year
A =	1300.0
B =	4.7
C =	0.78

Rational Method Calculation			
Area =	0.59	ha	
Runoff Coefficient, C* =	0.80	*50 Year Adjustment factor of 1.2 has been applied.	
C*A =	0.47		
Time of Concentration, t_c =	15.0	min	
Storm Duration Increment =	5.0	min	
Constant Inflow (groundwater seepage) =	0.63	L/s	*Rate provided by mechanical consultant (Novatrend)
Allowable Release Rate -	**43.02**	L/s	
Design 50-YR Release Rate =	35.52	L/s	
Storage Required =	159.1	m^3	

50-Year

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Notes
15.0	127.13	166.83	150	32	118.2		
20.0	106.57	139.95	168	37	130.6		
25.0	92.30	121.29	182	43	139.3		
30.0	81.75	107.50	194	48	145.5		
35.0	73.60	96.85	203	53	150.1		
40.0	67.10	88.35	212	59	153.4		
45.0	61.77	81.38	220	64	155.8		
50.0	57.32	75.57	227	69	157.4		
55.0	53.54	70.62	233	75	158.5		
60.0	50.28	66.37	239	80	159.0		
65.0	47.45	62.66	244	85	159.1	159.1	
70.0	44.95	59.40	249	91	158.9		
75.0	42.74	56.50	254	96	158.3		
80.0	40.76	53.91	259	101	157.5		
85.0	38.97	51.58	263	107	156.5		
90.0	37.36	49.47	267	112	155.2		
95.0	35.89	47.55	271	117	153.8		
100.0	34.54	45.79	275	123	152.2		
105.0	33.31	44.18	278	128	150.4		
110.0	32.17	42.69	282	133	148.5		
115.0	31.12	41.31	285	139	146.5		
120.0	30.14	40.03	288	144	144.4		
125.0	29.23	38.84	291	149	142.1		

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16

ORIFICE SIZING

50-Year

Orifice Sizing

Orifice Equation: $Q = CdxAx(2gH)^{0.5}$ *g=9.81 (m/s^2) gravity*

where:
Q =flow rate (m3/s)
H = head on the weir (m)
A =area of orifice (m^2)
C_d = coefficient of discharge
C_d = 0.63 for Sharp Orifice
C_d = 0.84 for Tube Orifice

50-yr HWL =	136.78	m
Orifice Invert =	135.30	m
Height =	1.48	m
C=	0.84	(orifice tube)
d_{orfice} =	100	mm
r_{orfice} =	50	mm
$Q_{Orifice}$ =	35.52	L/s
Allowable Flow	**43.02**	**L/s**

Tank Sizing

Required Quantity Storage	**159.1**	m^3
Required Reuse Storage	**17.2**	m^3

Tank Dimensions

Area	107.6	m^2

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Modelled By: ECM
Date: 2024-09-16

MODIFIED RATIONAL METHOD

Rainfall IDF Coefficients	25-Year
A =	1160.0
B =	4.6
C =	0.78

Rational Method Calculation			
Area =	0.59	ha	
Runoff Coefficient, C* =	0.73	*25 Year Adjustment factor of 1.1 has been applied.	
C*A =	0.43		
Time of Concentration, t_c =	15.0	min	
Storm Duration Increment =	5.0	min	
Constant Inflow (groundwater seepage) =	0.63	L/s	*Rate provided by mechanical consultant (Novatrend)
Allowable Release Rate -	**38.57**	L/s	
Design 25-YR Release Rate =	31.51	L/s	
Storage Required =	125.2	m^3	

25-Year

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Notes
15.0	113.89	137.11	123	28	95.0		
20.0	95.40	114.95	138	33	104.9		
25.0	82.58	99.58	149	38	111.6		
30.0	73.11	88.24	159	43	116.3		
35.0	65.80	79.49	167	47	119.7		
40.0	59.98	72.50	174	52	122.0		
45.0	55.21	66.79	180	57	123.6		
50.0	51.22	62.01	186	61	124.6		
55.0	47.84	57.96	191	66	125.1		
60.0	44.92	54.47	196	71	125.2	125.2	
65.0	42.39	51.42	201	76	124.9		
70.0	40.15	48.75	205	80	124.4		
75.0	38.17	46.37	209	85	123.6		
80.0	36.40	44.25	212	90	122.6		
85.0	34.81	42.34	216	95	121.4		
90.0	33.36	40.61	219	99	120.1		
95.0	32.05	39.04	223	104	118.5		
100.0	30.85	37.60	226	109	116.9		
105.0	29.74	36.28	229	113	115.1		
110.0	28.73	35.06	231	118	113.2		
115.0	27.79	33.93	234	123	111.2		
120.0	26.91	32.88	237	128	109.1		
125.0	26.10	31.91	239	132	107.0		

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16

ORIFICE SIZING

25-Year

Orifice Sizing

Orifice Equation: $Q = CdxAx(2gH)^{0.5}$ *g=9.81 (m/s^2) gravity*

where:
Q =flow rate (m3/s)
H = head on the weir (m)
A =area of orifice (m^2)
C_d = coefficient of discharge
C_d = 0.63 for Sharp Orifice
C_d = 0.84 for Tube Orifice

25-yr HWL =	136.46	m
Orifice Invert =	135.30	m
Height =	1.16	m
C=	0.84	(orifice tube)
d_{orfice} =	100	mm
r_{orfice} =	50	mm
$Q_{Orifice}$ =	31.51	L/s
Allowable Flow	**38.57**	**L/s**

Tank Sizing

Required Quantity Storage	**125.2**	m^3
Required Reuse Storage	**17.2**	m^3

Tank Dimensions

Area	107.6	m^2

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Modelled By: ECM
Date: 2024-09-16

MODIFIED RATIONAL METHOD

Rainfall IDF Coefficients	10-Year
A =	1010.0
B =	4.6
C =	0.78

Rational Method Calculation			
Area =	0.59	ha	
Runoff Coefficient, C* =	0.67		
C*A =	0.39		
Time of Concentration, t_c =	15.0	min	
Storm Duration Increment =	5.0	min	
Constant Inflow (groundwater seepage) =	0.63	L/s	*Rate provided by mechanical consultant (Novatrend)
Allowable Release Rate -	**32.61**	L/s	
Design 10-YR Release Rate =	27.35	L/s	
Storage Required =	94.4	m^3	

10-Year							
Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Notes
15.0	99.17	108.66	98	25	73.2		
20.0	83.06	91.12	109	29	80.6		
25.0	71.90	78.96	118	33	85.6		
30.0	63.66	69.98	126	37	89.0		
35.0	57.30	63.05	132	41	91.4		
40.0	52.22	57.52	138	45	92.9		
45.0	48.07	53.00	143	49	93.9		
50.0	44.60	49.22	148	53	94.3		
55.0	41.65	46.01	152	57	94.4	94.4	
60.0	39.11	43.24	156	62	94.1		
65.0	36.91	40.84	159	66	93.6		
70.0	34.96	38.72	163	70	92.9		
75.0	33.24	36.84	166	74	91.9		
80.0	31.69	35.16	169	78	90.8		
85.0	30.31	33.65	172	82	89.5		
90.0	29.05	32.28	174	86	88.1		
95.0	27.90	31.03	177	90	86.6		
100.0	26.86	29.89	179	94	85.0		
105.0	25.90	28.84	182	98	83.3		
110.0	25.01	27.88	184	103	81.4		
115.0	24.19	26.99	186	107	79.5		
120.0	23.43	26.16	188	111	77.6		
125.0	22.72	25.39	190	115	75.5		

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16

ORIFICE SIZING

10-Year

Orifice Sizing

Orifice Equation: $Q = CdxAx(2gH)^{0.5}$ *g=9.81 (m/s^2) gravity*

where:
Q =flow rate (m3/s) — *C_d = coefficient of discharge*
H = head on the weir (m) — *C_d = 0.63 for Sharp Orifice*
A =area of orifice (m^2) — *C_d = 0.84 for Tube Orifice*

10-yr HWL =	136.18	m
Orifice Invert =	135.30	m
Height =	0.88	m
C=	0.84	(orifice tube)
$d_{orifice}$ =	100	mm
r_{orfice} =	50	mm
$Q_{Orifice}$ =	27.35	L/s
Allowable Flow	**32.61**	**L/s**

Tank Sizing

Required Quantity Storage	**94.4**	m^3
Required Reuse Storage	**17.2**	m^3

Tank Dimensions

Area	107.6	m^2

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Modelled By: ECM
Date: 2024-09-16

MODIFIED RATIONAL METHOD

Rainfall IDF Coefficients	5-Year
A =	820.0
B =	4.6
C =	0.78

Rational Method Calculation			
Area =	0.59	ha	
Runoff Coefficient, C* =	0.67		
C*A =	0.39		
Time of Concentration, t_c =	15.0	min	
Storm Duration Increment =	5.0	min	
Constant Inflow (groundwater seepage) =	0.63	L/s	*Rate provided by mechanical consultant (Novatrend)
Allowable Release Rate -	**27.91**	L/s	
Design 5-YR Release Rate =	24.10	L/s	
Storage Required =	73.2	m^3	

5-Year							
Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Notes
15.0	80.51	88.34	80	22	57.8		
20.0	67.43	74.09	89	25	63.6		
25.0	58.37	64.22	96	29	67.4		
30.0	51.68	56.93	102	33	69.9		
35.0	46.52	51.31	108	36	71.6		
40.0	42.40	46.82	112	40	72.6		
45.0	39.02	43.14	116	43	73.1		
50.0	36.21	40.08	120	47	73.2	73.2	
55.0	33.82	37.47	124	51	73.0		
60.0	31.76	35.23	127	54	72.6		
65.0	29.96	33.27	130	58	71.9		
70.0	28.38	31.55	133	61	71.1		
75.0	26.98	30.03	135	65	70.0		
80.0	25.73	28.66	138	69	68.9		
85.0	24.60	27.44	140	72	67.6		
90.0	23.58	26.32	142	76	66.2		
95.0	22.66	25.31	144	80	64.7		
100.0	21.81	24.39	146	83	63.2		
105.0	21.03	23.54	148	87	61.5		
110.0	20.31	22.75	150	90	59.8		
115.0	19.64	22.03	152	94	58.0		
120.0	19.02	21.36	154	98	56.1		
125.0	18.45	20.73	155	101	54.2		

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16

ORIFICE SIZING

5-Year

Orifice Sizing

Orifice Equation: $Q = CdxAx(2gH)^{0.5}$ *g=9.81 (m/s^2) gravity*

where:
Q =flow rate (m3/s)
H = head on the weir (m)
A =area of orifice (m^2)
C_d = coefficient of discharge
C_d = 0.63 for Sharp Orifice
C_d = 0.84 for Tube Orifice

5-yr HWL =	135.98	m
Orifice Invert =	135.30	m
Height =	0.68	m
C=	0.84	(orifice tube)
$d_{orifice}$ =	100	mm
$r_{orifice}$ =	50	mm
$Q_{Orifice}$ =	24.10	L/s
Allowable Flow	**27.91**	**L/s**

Tank Sizing

Required Quantity Storage	**73.2**	m^3
Required Reuse Storage	**17.2**	m^3

Tank Dimensions

Area	107.6	m^2

Project: 1470 Williamsport Drive
Project No.: 2719-7179
Modelled By: ECM
Date: 2024-09-16

MODIFIED RATIONAL METHOD

Rainfall IDF Coefficients	2-Year
A =	610.0
B =	4.6
C =	0.78

Rational Method Calculation			
Area =	0.59	ha	
Runoff Coefficient, C* =	0.67		
C*A =	0.39		
Time of Concentration, t_c =	15.0	min	
Storm Duration Increment =	5.0	min	
Constant Inflow (groundwater seepage) =	0.63	L/s	*Rate provided by mechanical consultant (Novatrend)
Allowable Release Rate -	**21.02**	L/s	
Design 2-YR Release Rate =	20.09	L/s	
Storage Required =	50.9	m^3	

2-Year

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Notes
15.0	59.89	65.88	59	18	41.2		
20.0	50.16	55.28	66	21	45.2		
25.0	43.42	47.94	72	24	47.8		
30.0	38.45	42.51	77	27	49.4		
35.0	34.60	38.33	80	30	50.4		
40.0	31.54	34.99	84	33	50.8		
45.0	29.03	32.26	87	36	50.9	50.9	
50.0	26.94	29.97	90	39	50.8		
55.0	25.16	28.04	93	42	50.3		
60.0	23.62	26.37	95	45	49.7		
65.0	22.29	24.91	97	48	49.0		
70.0	21.12	23.63	99	51	48.0		
75.0	20.07	22.50	101	54	47.0		
80.0	19.14	21.48	103	57	45.9		
85.0	18.30	20.57	105	60	44.6		
90.0	17.54	19.74	107	63	43.3		
95.0	16.85	18.99	108	66	42.0		
100.0	16.22	18.30	110	69	40.5		
105.0	15.64	17.67	111	72	39.0		
110.0	15.11	17.09	113	75	37.5		
115.0	14.61	16.55	114	78	35.8		
120.0	14.15	16.05	116	81	34.2		
125.0	13.72	15.58	117	84	32.5		

CROZIER CONSULTING ENGINEERS

Project: 1470 Williamsport Drive
Project No: 2719-7179
Created By: ECM
Checked By: RS
Date: 2024-09-16

ORIFICE SIZING

2-Year

Orifice Sizing

Orifice Equation: $Q = CdxAx(2gH)^{0.5}$ *g=9.81 (m/s^2) gravity*

where:
Q =flow rate (m3/s)
H = head on the weir (m)
A =area of orifice (m^2)
C_d = coefficient of discharge
C_d = 0.63 for Sharp Orifice
C_d = 0.84 for Tube Orifice

5-yr HWL =	135.77	m
Orifice Invert =	135.30	m
Height =	0.47	m
C=	0.84	(orifice tube)
d_{orfice} =	100	mm
r_{orfice} =	50	mm
$Q_{Orifice}$ =	20.09	L/s
Allowable Flow	**21.02**	**L/s**

Tank Sizing

Required Quantity Storage	**50.9**	m^3
Required Reuse Storage	**17.2**	m^3

Tank Dimensions

Area	107.6	m^2

CROZIER CONSULTING ENGINEERS

PROJECT: 1470 Williamsport Drive
PROJECT No.: 2719-7179

DESIGN: ECM
CHECK: RS

DATE: 2024-09-16
UPDATED: 2025-02-14

WATER BALANCE CALCULATIONS

Impervious Area =	3430	m2
Rainfall Depth =	**0.005**	mm
Required Retention Volume =	**17.2**	m3

Hydro Up-Flo® CPZ Filter

Rev. 13

Project Name:	1470 Williamsport Drive	***Report Date:***	9/20/2024 Paste
Street:	1470 Williamsport Drive	***City:***	Mississauga
Province:	Ontario	***Country:***	Canada
Designer:		***email:***	

Rev. 13

Treatment Parameters:

Site ID:
Area: 0.59 ha
Percent Impervious:
Rational C value: 0.75
Rainfall Station: Toronto Pearson Intl AP, ONT MAP
Peak Storm Flow: 44.5 L/s
Peak Storm Flow Return: 100 yrs

Number of Filter Modules **6**

Installation Configuration:

Required head pressure for maximum flow is approximatley 750 mm. This design assumes full head pressure is available.

Outlet Pipe Size: mm
Inlet Pipe Size: mm

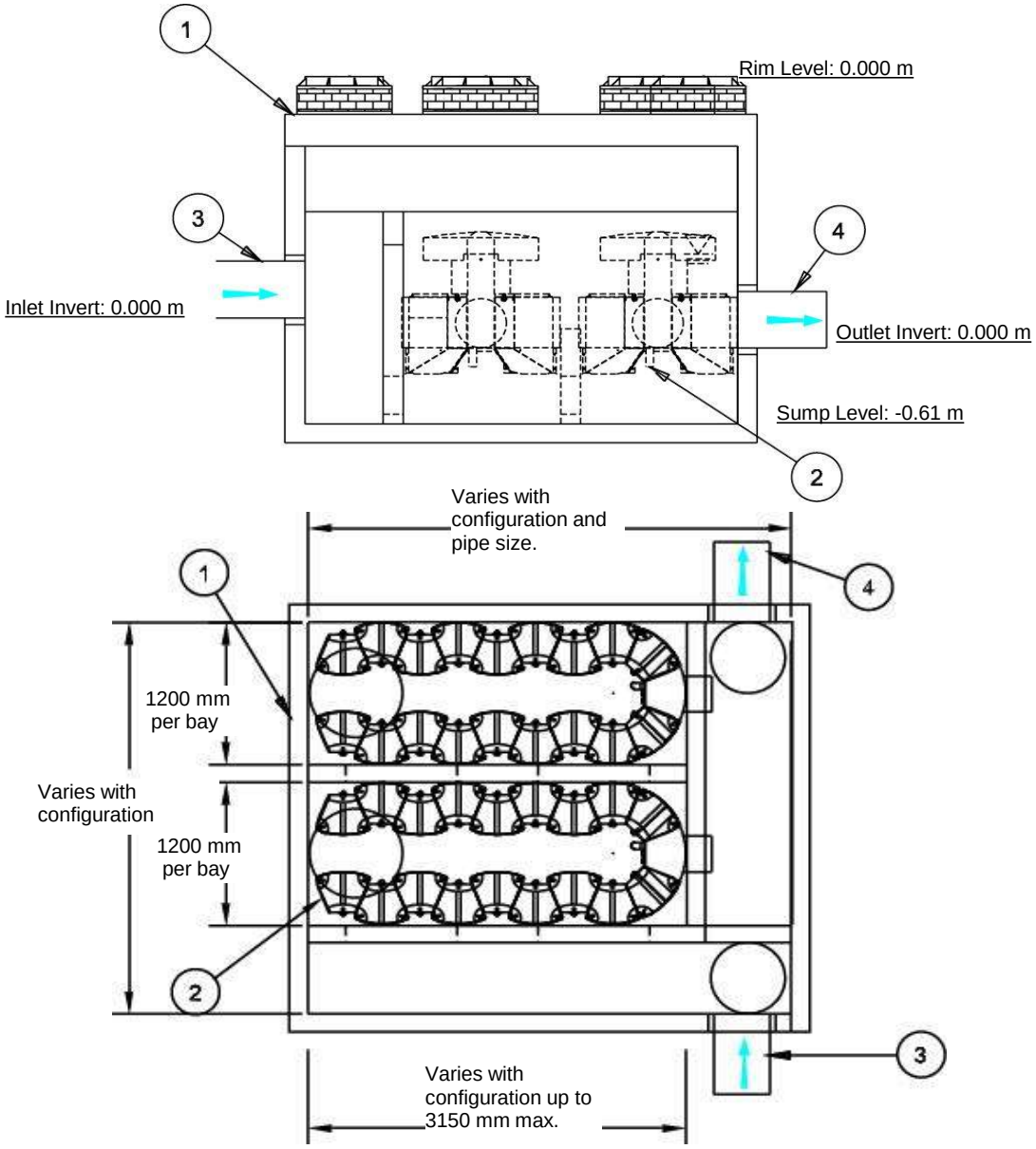
Rim Level: m
Outlet Pipe Invert: m
Inlet Pipe Invert: m *Rim Level to low*

Intensity*	Fraction of Annual Distribution*	Filter Removal Efficiency	Weighted Net Annuall Efficiency
(mm/hr)	(%)	(%)	(%)
0.50	0.2%	92.2%	0.17%
1.00	16.3%	91.2%	14.87%
1.50	13.1%	90.2%	11.86%
2.00	13.2%	89.2%	11.82%
2.50	4.5%	88.3%	3.96%
3.00	2.2%	87.3%	1.91%
3.50	8.4%	86.3%	7.25%
4.00	4.8%	85.3%	4.06%
4.50	1.5%	84.3%	1.26%
5.00	5.0%	83.3%	4.14%
6.00	4.4%	81.3%	3.57%
7.00	4.8%	79.4%	3.80%
8.00	3.5%	77.4%	2.74%
9.00	2.2%	75.4%	1.67%
10.00	2.4%	73.4%	1.77%
20.00	8.8%	53.7%	4.74%
30.00	2.7%	33.9%	0.91%
40.00	0.9%	14.1%	0.13%
50.00	0.4%	0.0%	0.00%
100.00	0.5%	0.0%	0.00%
150.00	0.1%	0.0%	0.00%
200.00	0.0%	0.0%	0.00%
		Total Net Annual Removal Efficiency:	**80.6%**
		Total Runoff Volume Treated:	**90.0%**

1. Rainfall Data: 1960:2013, HLY03, Toronto Pearson Intl AP , ON, 6158733.
2. Based on NJDEP test protocols post 2015 independently verified.
3. Adjustment for use of 60 minute time step data with Tc < 30 min.

Designer Notes:

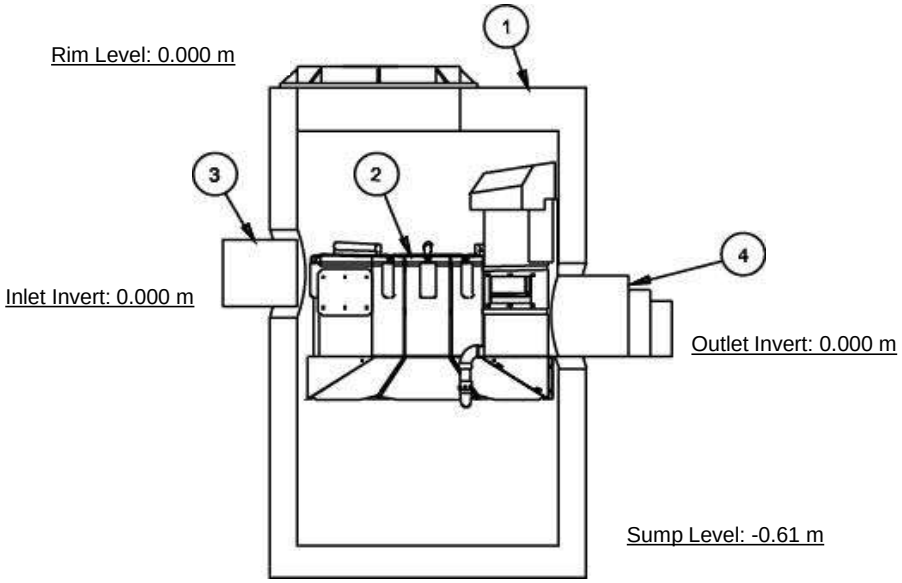
Detail 1 - Up-Flo® Filter - Vault Configuration

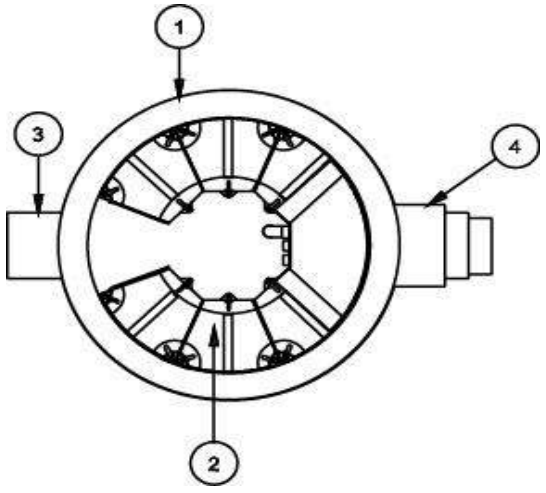


Up Flo® Filter Vault Layout

1	Filter Vault	1 Bay(s)
2	Modules	6 Filter Modules
3	Inlet Pipe	0 mm
4	Oulet Pipe	0 mm

Detail 2 - Up-Flo® Filter - Manhole Configuration





Up Flo® Filter Vault Layout

1	Manhole	1200	mm
2	Modules	6	Filter Modules
3	Inlet Pipe	0	mm
4	Oulet Pipe	0	mm

Verification Statement

Hydro International Up-Flo® Filter with CPZ™ Media

Registration number: (V-2019-06-01)
Date of issue: (2020-May-13)

Technology type	Stormwater Filtration Device		
Application	Technology to remove sediment, nutrients and metals from stormwater runoff		
Company	Hydro International	**Website**	https://www.hydro-int.com
Address	94 Hutchins Drive, Portland, Maine USA 04102		
E-mail	TechSupport@hydro-int.com	**Phone**	+1 (207) 756 6200

This Verification Statement was prepared by VerifiGlobal to summarize the results reported in the Verification Report for the Hydro International Up-Flo® Filter with CPZ™ Media, dated November 26, 2019. The Verification Report was prepared by Good Harbour Laboratories Inc. (GHL) for VerifiGlobal in accordance with the requirements of the International Organization for Standardization (ISO) 14034 Environmental Technology Verification (ETV) standard and the VerifiGlobal Performance Verification Protocol. All the information provided in this Statement are based on the independent, third-party review and verification of technical information, performance test reports, performance data and specific performance claims documented in the Verification Report.

Technology Description

The Up-Flo® Filter with CPZ™ Media is a stormwater remedial device that incorporates gravitational separation of floating and settling materials, screening, and filtration of polluted stormwater to offer treatment train capabilities in a standalone device. Each Up-Flo® Filter consists of a highly configurable array of modules that are typically supplied as a complete system housed in a 4-ft (1.2 m) diameter manhole or precast vault. Manhole configurations consist of a single ring assembly containing one to six modules. Vaulted systems are highly configurable and may contain single or multiple arrays each consisting of one to 18 Filter Modules depending on availability of vault sizes.

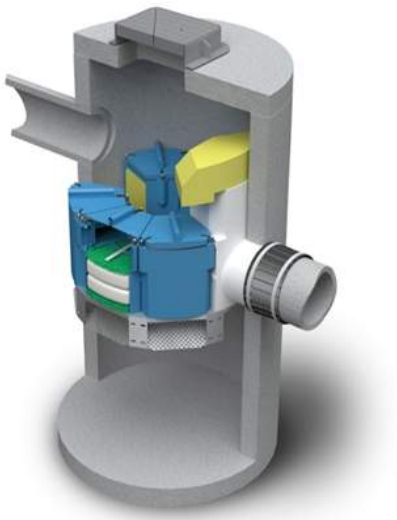


Figure 1: Up-Flo® Filter with CPZ™ Media

Verified Performance Claims

Verification of the Hydro International Up-Flo® Filter with CPZ™ Media is based on existing performance test data from two different locations with different rainfall characteristics, catchment areas and pollutant loadings. Supporting data were obtained from three independent perfomance monitoring studies. One was conducted by Engineering School of Sustainable Infrastructure and Environment (ESSIE) at the University of Florida (UF) under the supervision of Dr. John Sansalone and two were conducted by Department of Civil, Construction, and Environmental Engineering (CCEE) at the University of Alabama (UA) under the supervision of Dr. Bob Pitt.

All three studies performance monitoring studies were conducted following the requirements of the New Jersey Department of Environmental Protection (NJDEP) Technology Acceptance Reciprocity Partnership (TARP) Tier II Protocol for Stormwater Best Management Practice Demonstrations (2003) and its 2006 and 2009 amendments. In total, there were 66[1] storms assessed to verify that an Up-Flo® Filter with CPZ™ Media achieves the performance listed in Tables 1 and 2, when designed to the following parameters:

- System hydraulic loading rate of 25 gpm (1.58 L/s) per filter module, with bypass of higher flows.
- Filter flux rate of 22.7 gpm/ft2 (15.4 L/s/m2)
- Operating head of ≤30 in. (76.2 cm)
- Effective Sedimentation/ Filtration Treatment Area (ESA/EFTA) –12.6/6.6 (1.91)
- Maximum sediment storage volume of 16.8 ft3 (0.476 m3) at a sediment depth of 16 inches (0.41m).

Table 1. Up-Flo® Filter with CPZ™ Media – Verified Concentration Removal Efficiency

Constituent	Lower 95% Confidence Interval	Median	Upper 95% Confidence Interval
SSC *	85.9%	92.8%	94.7%
SSC **	73.9%	82.8%	86.3%
TSS *	79.0%	89.2%	91.0%
TSS **	72.0%	78.3%	85.2%
TN *	9.0%	28.5%	64.7%
TP *	33.8%	43.9%	50.9%
Zn **	39.4%	50.0%	62.1%
Cu **	72.6%	80.7%	85.2%
* Based on ESSIE (UF) Performance monitoring results ** Based on CCEE (UA) Performance monitoring results			

Table 2. Up-Flo® Filter with CPZ™ Media – Verified Flow Weighted Mass Removal Efficiency

Constituent	ESSIE (UF) Performance monitoring results		CCEE (UA) Performance monitoring results
	6-month	12-month	12-month
SSC	93%	92%	86%
TSS*	89%	87%	87%
TN **	68%	39%	***
TP **	48%	48%	***
Zn	***	***	59%
Cu	***	***	70%
* TSS results for UF are a function of SSC. ** TN and TP load data was time dependent after 6-months *** No data submitted			

[1]Of the total 66 storms (16 storms from UF and 50 storms from UA), 62 were identified as qualifying events having quality data for TSS, and 59 for SSC. Fewer events with metals detected in the runoff limited the metals data sets. There were a total of 28 and 17 storms for Zn and Cu, respectively, solely from the UA data. Total Nitrogen and Total Phosphorous claims were based on the 16 storms recorded solely from the UF data.

Description of Test Procedure

Table 3 shows the target criteria as outlined by the TARP and TAPE programs as well as the results achieved at the two locations. Table 4 provides a more detailed description of the observed operating conditions over the testing period. At the time of testing, the TARP and TAPE programs both allowed for field testing data to be used to obtain certification in participating states. They were the most widely used protocols and were generally accepted as industry standards. The TARP program has since stopped accepting field data, but the TAPE program remains in effect and is currently referenced to benchmark the quality of data obtained from stormwater monitoring programs.

Table 3. Up-Flo® Filter with CPZ™ Media Performance Testing - Specified TARP & TAPE criteria, and achieved results, for storm selection and sampling

Description	TARP Criteria	TAPE Criteria	Achieved value	
			ESSIE - UF	CCEE - UA
Total rainfall/storm	≥2.5 mm (0.1”)	≥3.81 mm (0.15”)	>2.5 mm (0.1")	≥4.6 mm (0.18”)
Minimum inter-event period	6 h	6 h	≥ 6 h	≥ 6 h
Minimum flow-weighted composite sample storm coverage	70% including as much of the first 20% of the storm	75% including as much of the first 20% of the storm	100%	87.6%
Minimum influent/effluent samples	10, but a minimum of 5 subsamples for composite samples	12, but a minimum of 10 subsamples for composite samples	5, whole manual samples	11
Total sampled rainfall	≥ 381 mm (15”)	NA	195 mm (7.66”)	765 mm (30.07”)
Total sampled storms	≥ 20	≥ 12	16	29

Table 4. Up-Flo® Filter with CPZ™ Media Performance Testing - Observed operational conditions for events monitored over each performance test period

Operating parameter	Observed range	
	ESSIE - UF	CCEE - UA Total*
Storm duration	0.35-5.78 h	0.67-64.7 h
Previous dry hours**	6-213	> 6 hrs for the 20 storms in 1st study and 12-632 hrs for 30 storms in second study
Rainfall depth	0.10-1.64 in	0.18-2.44 in
Runoff volume	223-4095 gal (0.84-15.5 m^3)	2,065-61,131 gal(7.82-231 m^3)
Peak rainfall intensity (5 min)	1.2-5.4 in/h (3.0-13.7 cm)	0.24-4.68 in/h (0.61-11.9 cm)
Peak runoff flow rate	27.7-233 gpm (1.75-14.7 L/s)	68-1023 gpm (4.29-64.5 L/s)
Event median flow rate	2.4-21.4 gpm (0.15-1.35 L/s)	28-175 gpm (1.75-11.0 L/s)

* The UA data ranges cover the storms for both studies; ranges for individual studies might be narrower.
** This is the same as the time period between events, or time since it last rained a qualifying event.

For the UF study, performance monitoring was conducted at the Reitz Union surface parking lot, which had a drainage area of 0.12-0.20 acres (0.049-0.081 ha),which was 76% impervious, depending on storm intensity and wind direction. The area generated a flow rate in excess of the 150 gpm (9.55 L/s) maximum treatment flow rate (MTFR) in 3 of the 16 storms. The 4-ft diameter (1.2 m) test unit was installed above ground in a temporary installation at the bottom of a hill sloping down from the lot. An inlet catch basin conveyed runoff from the parking lot through a Pashall flume into the filter. Monitoring occurred over a period of 12 months and the UF team recovered the captured mass at the end of the perfomance monitoring study. No maintenance was required or conducted during the year long monitoring period from 12 September 2015 through 1 September 2016.

The UA perfomance monitoring studies covered a total of 50 storms, but not all of them yielded useful data for all parameters. The site used in both cases was the Riverwalk parking lot near the Bama Belle in Tuscaloosa, Alabama. The drainage area was about 0.9 acres (0.36 ha), 68% impervious. The unit was installed in a 4 ft. (1.2 m) diameter below-grade catch basin inlet manhole on the site. Monitoring occurred in two stages of approximately 12 months each over a total of 32 months. The first round of testing occurred from July 16, 2010 to April 11, 2011 and the second from May 31st, 2012 to March 30th, 2013.

The UA perfomance monitoring study used autosamplers to generate the flow-weighted composite samples and the event mean concentration data. This data was used to calculate removal efficiencies. However, in the UF performance monitoring study, sediment removal performance was assessed by taking full cross section samples of the influent and effluent streams at regular intervals for the duration of the storm and combining the samples into flow-weighted composites. The data was converted into event mean concentrations for the purposes of calculating removals.

The following approved analytical methods were used:

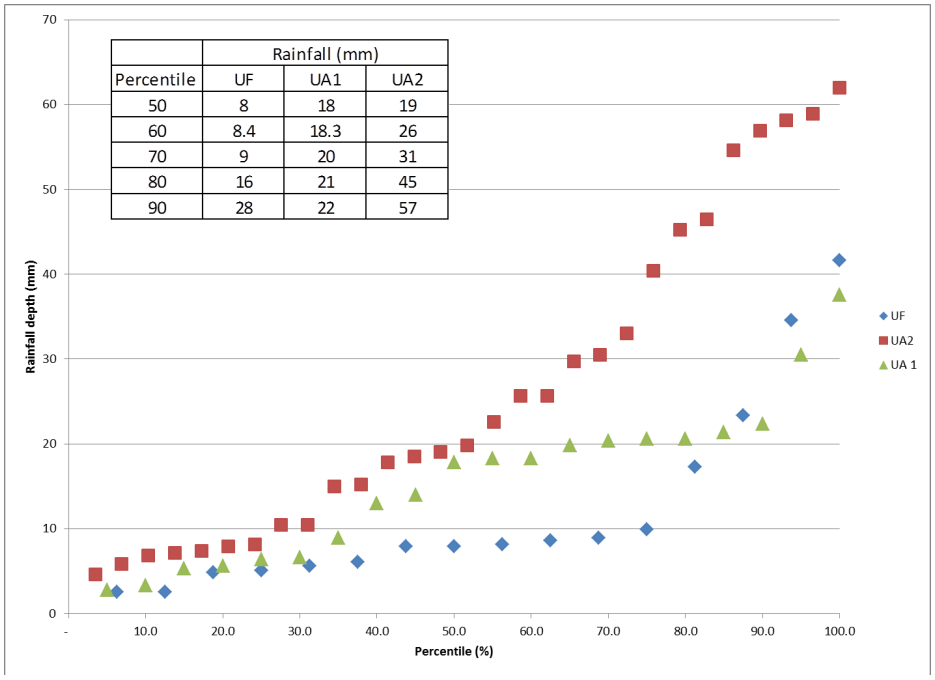
- TSS – ASTM D2540
- SSC – ASTM D3977-97(2013) Standard Test Methods for Determining Sediment Concentration in Water Samples
- PSD – ASTM D422 – 63 Standard Test Method for Particle-Size Analysis of Soils and ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- PSD – ASTM 2560- C, D (UF used 2560D laser diffraction or light-scattering method and UA used 2560C Coulter Counter or light-blocking method)
- TP – S.M.4500-P-B Acid Hydrolysis
- TN – Persulfate Digestion Method
- Cu – EPA 200.8 Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry
- Zn - EPA 200.8 Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry

As part of the mass balance measurements, the UF team allowed all samples to sit for an hour and reported concentrations of suspended solids, measured using ASTM 2540D, as TSS, in addition to the usual SSC measurement using SM3977. In order to be able to report a TSS comparable to other perfomance monitoring studies, Dr. Sansalone developed a correlation equation for TSS* = f(SSC) as well as equations for the 95% confidence limits of TSS*.

Summary of Verification Results

The cumulative frequency of rainfall depths monitored during the three perfomance monitoring studies is presented in Figure 2. The median rainfall depths in the three perfomance monitoring studies were 0.31, 0.71, and 0.75 inches (8, 18 & 19 mm) while the 90th percentile rainfall depths were 1.1, 0.9 and 2.2 inches (28, 22 and 57 mm). Thus the data presented covers a comparatively wide range of rain events.

Figure 2. Rainfall depth frequency curves



	Rainfall (mm)		
Percentile	UF	UA1	UA2
50	8	18	19
60	8.4	18.3	26
70	9	20	31
80	16	21	45
90	28	22	57

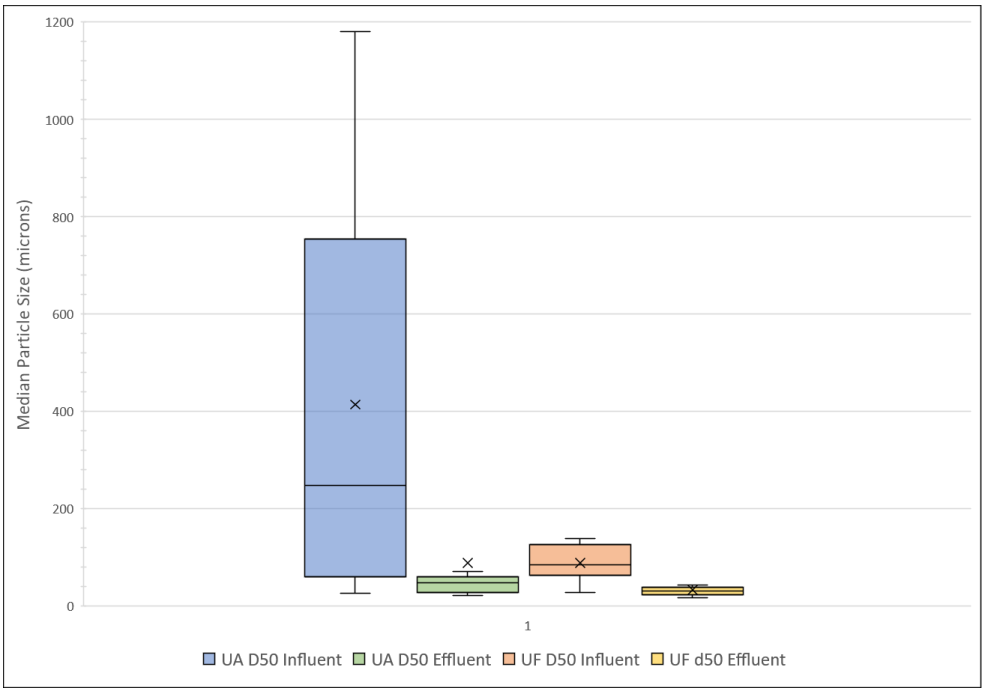
For UF monitoring, a total of 16 storm events, with varying rainfall intensity and runoff volume from event to event, were monitored. The cumulative rainfall depth was 7.66 inches (195 mm) and the cumulative influent runoff volume was 20,022 gallons (7.65 m^3). The entire volume was treated by the Up-Flo® Filter system. Of the 16 storms treated, three storms generated flow rates exceeding the MTFR of 150 gpm (9.55 L/s) but there was no bypass, because the excess was not sufficient to top the overflow weir, and all sampled flows passed through the filtration media. Median driving head difference for an event never exceeded 13.1 inches (33.3 cm) and peak driving head difference never exceeded 27.1 inches (68.8 cm), which indicates the media was not occluded.

For the UA site, all of the storm events from May 31st, 2012 to March 30th, 2013 were monitored for flow but only 30 events were sampled. The total rainfall depth for this period was 49 inches (124.5 cm) or 982,192 gal. (3,718 m^3) of runoff volume that was routed through the filter. Actual storm data from the monitoring period showed about 624,503 gal. (2,364 m^3) of runoff (from about 30 inches or 76.2 cm of rainfall) was treated by the media filter system. This included about 28.5 % of bypass flow volume, which was sampled and included in the performance results. Given that the total bypassed volume was almost three times the expected bypass volume at the UA site, the UA results are considered conservative.

Influent particle sizes varied considerably between the two monitored locations and between storm events. Catchment characteristics and available sources, sampling methods (auto sampling vs. grab sampling), storm intensities, duration and volumes all influence the particle size range. The particle size analyses were completed for just the median particle size for each storm. A comparison of statistical descriptive values for influent and effluent median particle sizes for the two monitored sites is illustrated with the Whisker-Box-Plot shown in Figure 3.

Due to larger storm events and curbside erosion, the median UA influent particle size range and d_{50} were substantially the larger of the two monitored sites. The interquartile range for the influent median particles sizes was 659 µm for UA compared to 59 µm for UF and the UA d50 was 247 µm compared to 85 µm for UF. However, despite the influent particle size differences between locations, the median UA and UF effluent particle size range and d50 were similar. The interquartile range for the effluent median particles sizes was 33 µm for UA compared to 13 µm for UF and the UA d50 was 48 µm compared to 30 µm for UF.

Figure 3. UF and UA Summary of Influent and Effluent Median Particle Sizes



Summary statistics for the influent and effluent concentration removal efficiencies as well as the overall mass load reductions are shown in Table 4 and Table 5 for UF and UA, respectively.

While the flow weighted removal efficiency for TP and TN were 48% and 39%, respectively, TP and TN reduction tended to decrease with the overall volume treated. Results showed that if the filter maintnenance cycle is limited to 6-8 months, the long-term load reduction for TP and TN would have been 50% and 70%, respectively.

Table 4: Up-Flo® Filter with CPZ™ Media Performance Testing - Summary statistics for influent and effluent event mean concentrations (EMCs) and the overall mass load reductions for selected constituents (UF Test)

Parameter	Sample Location	Min	Max	Median	SD	Mass Load Reduction
SSC	Influent	146	1584	487	360	92%
	Effluent	19.9	96.5	43.25	20.2	
TSS*	Influent	93.3	870	277	194	87%
	Effluent	25.0	66.4	37.6	10.9	
TP	Influent	0.79	6.05	1.9	1.70	48%
	Effluent	.56	2.19	1.1	0.56	
TN	Influent	.41	7.89	2.1	2.18	39%
	Effluent	.52	3.84	1.2	1.21	

Table 5. Up-Flo® Filter with CPZ™ Media Performance Testing - Summary statistics for influent and effluent event mean concentrations (EMCs) and the overall mass load reductions for selected constituents (UA Tests)

Parameter	Sample Location	Min	Max	Median	SD	Mass Load Reduction
SSC (mg/L)	Influent	23	879	88	166	86%
	Effluent	3	69	17	18	
TSS (mg/L)	Influent	11	571	89	128	87%
	Effluent	3	64	19	22	
Total Zn (µg/L)	Influent	7.0	157	22.0	0.71	59%
	Effluent	2.5*	72	14.0	0.68	
Total Cu (µg/L)	Influent	6	181	9	42	70%
	Effluent	1.3**	42	1.3	20.9	

* There was a single effluent value that was non-detect (ND). Since it was only 1 value ½ the detection limit 1.3 µg/L, was substituted when calculating statistics.
**The Cu data was highly censored (many non-detect, ND, effluents). Statistics were calculated by substituting ½ the detection limit, 1.3 µg/L, for all ND data then bootstrapping as usual.

As the independent third-party verifier, following the requirements of ISO 14034, GHL has confirmed that:

- The Hydro International Up-Flo® Filter with CPZ™ Media is based on sound scientific and engineering principles, providing a net environmental benefit.
- Performance testing of the Hydro International Up-Flo® Filter with CPZ™ Media was based on defined parameters and was conducted following the requirements of the NJDEP TARP Tier II Protocol for Stormwater Best Management Practice Demonstrations (2003) and its 2006 and 2009 amendments.
- Performance testing of the Hydro International Up-Flo® Filter with CPZ™ Media was performed by a qualified testing organization.
- Sample analyses were carried out as part of the test plan by a third-party analytical laboratory in a manner that meets the quality requirements of ISO 17025. Operating conditions and performance during each testing run were documented.
- Frequency of sampling and duration of each performance test were determined based on the specifications in a credible test plan and the requirements to produce sufficient data to support the performance claim at a 95% confidence level.
- Performance measurements and calculations were based on the technology application and relevant performance parameters as outlined in the Verification Plan.
- Performance calculations were done according to generally accepted test methods described in the test design, including the applicable mathematical and statistical principles and procedures.
- Data storage, transfer and control were adequate, carried out in accordance with the intent of ISO 9001 enabling control and retrieval of documents and records.
- Quality assurance requirements were addressed throughout the performance testing process and in the generation of performance test results. This confirmation included reviewing all data sheets and data downloads, as well as overall management of test system quality.

Quality Assurance

Performance testing and verification of the Hydro International Up-Flo® Filter with CPZ™ Media were performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. The verifier, Good Harbour Laboratories, has confirmed that quality assurance requirements were addressed throughout the performance testing process and in the generation of performance test results. This includes reviewing all data sheets and data downloads, as well as overall management of the test system, quality control and data integrity.

References

Technology Acceptance Reciprocity Partnership (TARP) Protocol and New Jersey Department of Environmental Protection (NJDEP amendments to the TARP Protocol, dated August 5, 2009 and Revised December 5th, 2009

"Development and Testing of Protocols for Evaluating Emerging Technologies for the treatment of Stormwater", Noboru Togawa, Dissertation, Department of Civil, Construction, Construction, and Environmental Engineering, Graduate School of the University Of Alabama, Tuscaloosa, Alabama, 2011.

"Up-Flo® Filter Verification Testing, Quality Assurance Project Plan, Bama Belle Field Verification Test Site", Tuscaloosa, AL, Hydro International, July 2012.

"Full-Scale Up-Flo® Filter Field Performance Verification Tests", Department of Civil, Construction, and Environmental Engineering University of Alabama, Tuscaloosa, AL 35487 USA - December 26, 2013.

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"Physical Model Testing and Monitoring of a Hydro International (HI) Up-Flo® Filter Subject to Rainfall-Runoff Loading Events", University of Florida Engineering School of Sustainable Infrastructure and Environment (ESSIE), University of Florida, Gainesville, FL 32611 USA - Version 7-12-17.

Particulate Matter Fraction Analyses. (Sansalone & Kim: Transport of Particulate Matter Fractions in Runoff, Journal of Environmental Quality • Volume 37 • September–October 2008)

New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device, January 2013

2009 Urban Stormwater BMP Performance Monitoring Guidelines
http://www.bmpdatabase.org/contacts.html

Description of Up-Flo® Filter

Up-Flo® Filter Design Manual https://www.hydroint.com/sites/default/files/uff_dg_nashville_f1504.pdf

Up-Flo® Filter Verification Brochure

ISO/IEC 14034, Environmental management – Environmental technology verification

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories

ISO/IEC 9001, Quality Management Systems.

VerifiGlobal Performance Verification Protocol (Applying ISO 14034:2016)

VerifiGlobal Test Body Assessment – Guidance (2018)

What is ISO 14034?

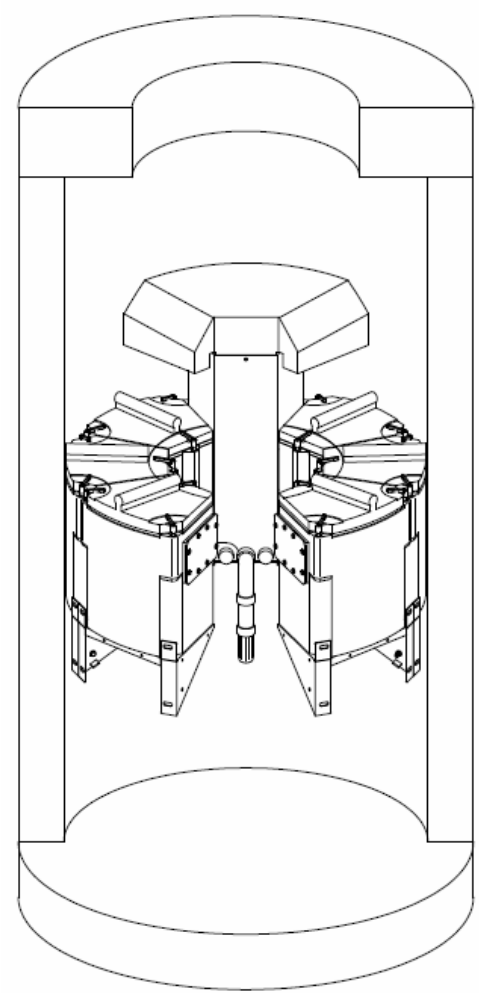
The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

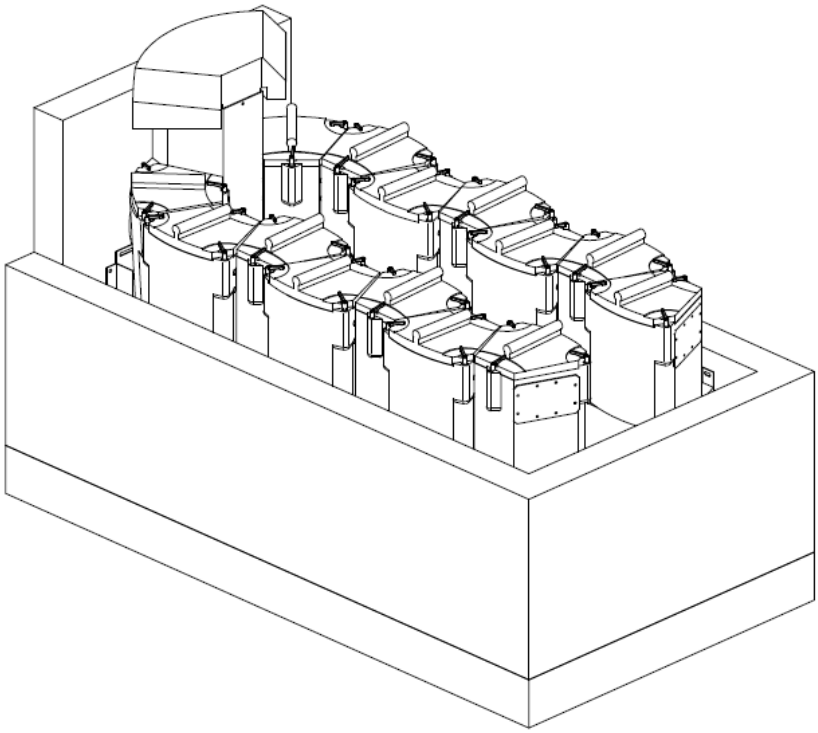
Benefits of ETV

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

For more information on the Hydro International Up-Flo® Filter, contact:	For more information on VerifiGlobal, contact:
Hydro International 94 Hutchins Drive, Portland, ME USA 04102 t +1 (207) 756 6200 e: TechSupport@hydro-int.com w: www.hydro-int.com	VerifiGlobal c/o ETA-Danmark A/S Göteborg Plads 1, DK-2150 Nordhaven t +45 7224 5900 e: info@verifiglobal.com w: www.verifiglobal.com
Signed for Hydro International: *Original signed by:* *Phillip Taylor* Phillip Taylor Technical Product Manager, Americas Stormwater	Signed for VerifiGlobal: *Original signed by:* *Thomas Bruun* Thomas Bruun, Managing Director *Original signed by:* *John Neate* John Neate, Managing Director

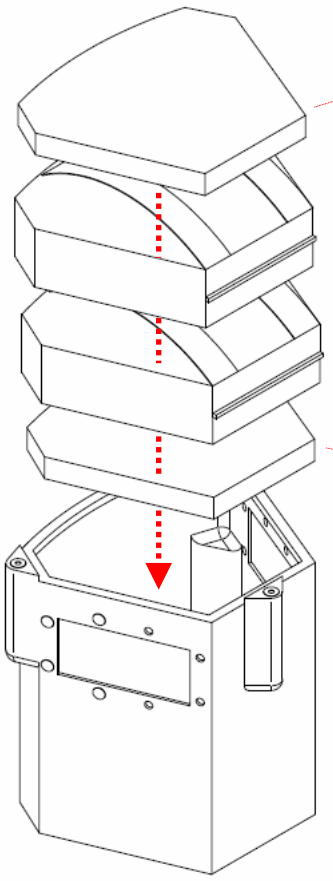
Up-Flo® Filter Media Pack
Installation Guidelines



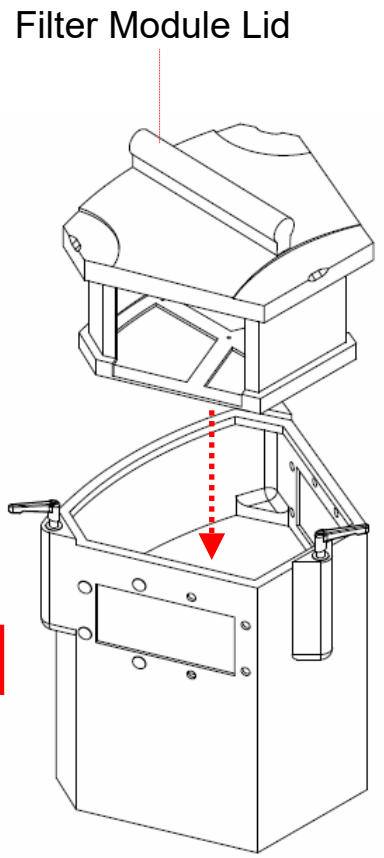


Hydro International, 94 Hutchins Drive, Portland, Maine 04102

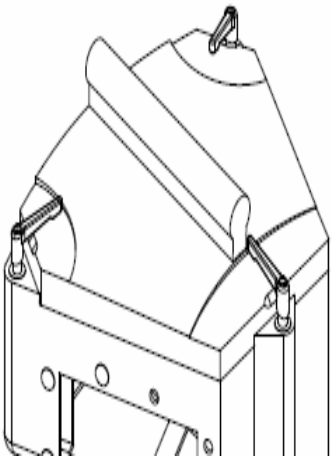
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro.com

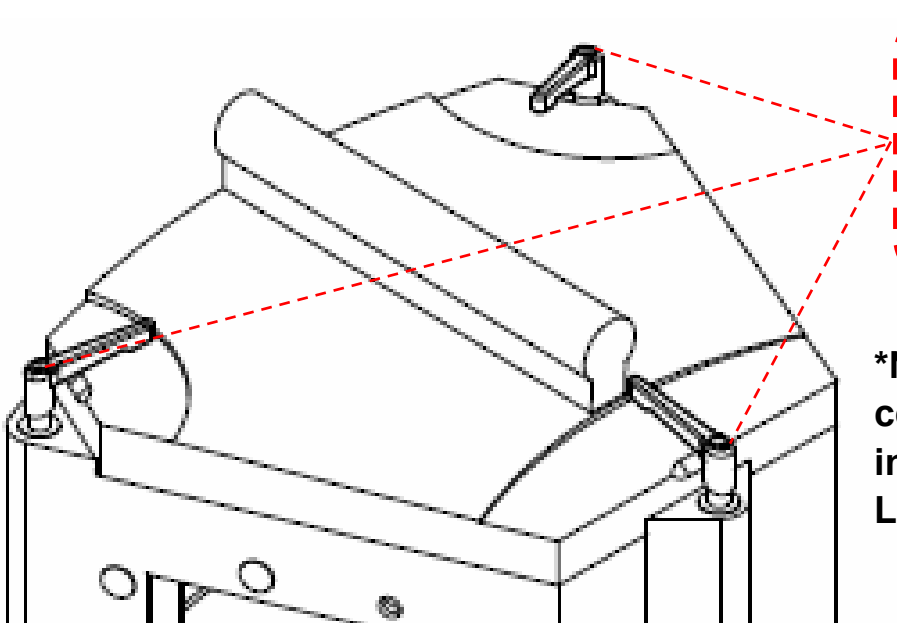


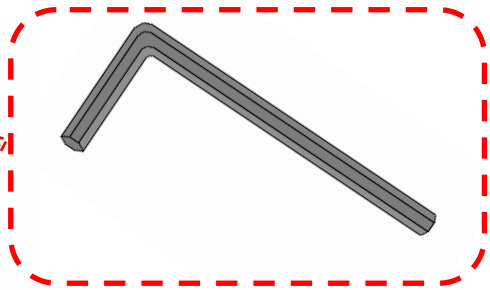
***Note: using the palm of your hand ensure the top surface of each media bag is leveled out in each filter module**



***Note: Ensure top layer of flow distribution media is leveled out below the conveyance channels and the Filter Module Lid forms a tight seal.**

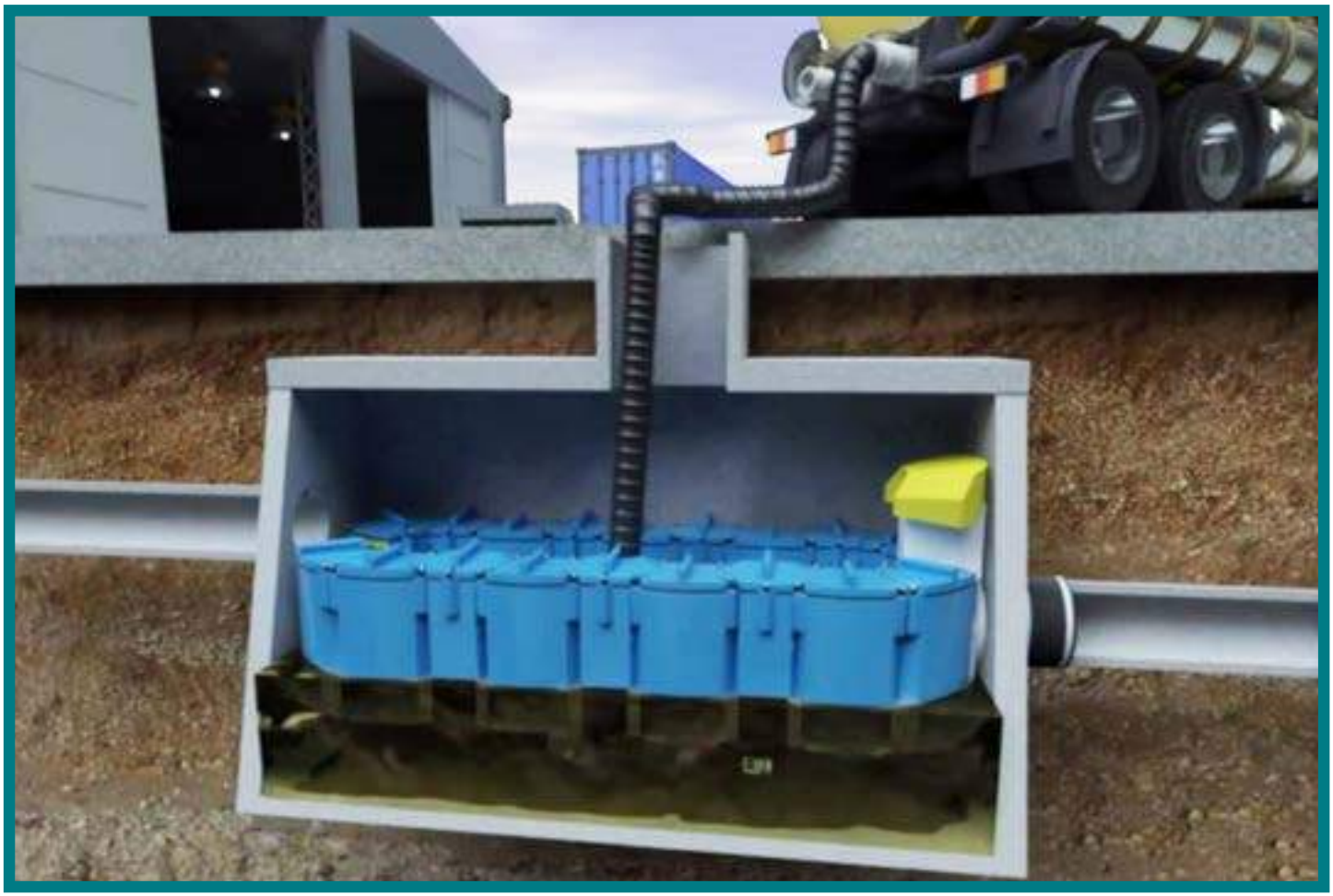






***Note: Ensure each cam latch is centered over its corresponding indentation in the Filter Module Lid before fully tightening.**

Hydro International®



Operation and Maintenance Manual

Stormwater Solutions

Up-Flo® Filter

Filtration System for Stormwater Treatment

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Table of Contents

IMPORTANT - ORDER REPLACEMENT PARTS FOR MAINTENANCE - IMPORTANT

Annual maintenance requires replacement of the Media Packs and the Drain Down Filter. Contact Hydro International to order replacements. Allow 2-4 weeks for delivery.

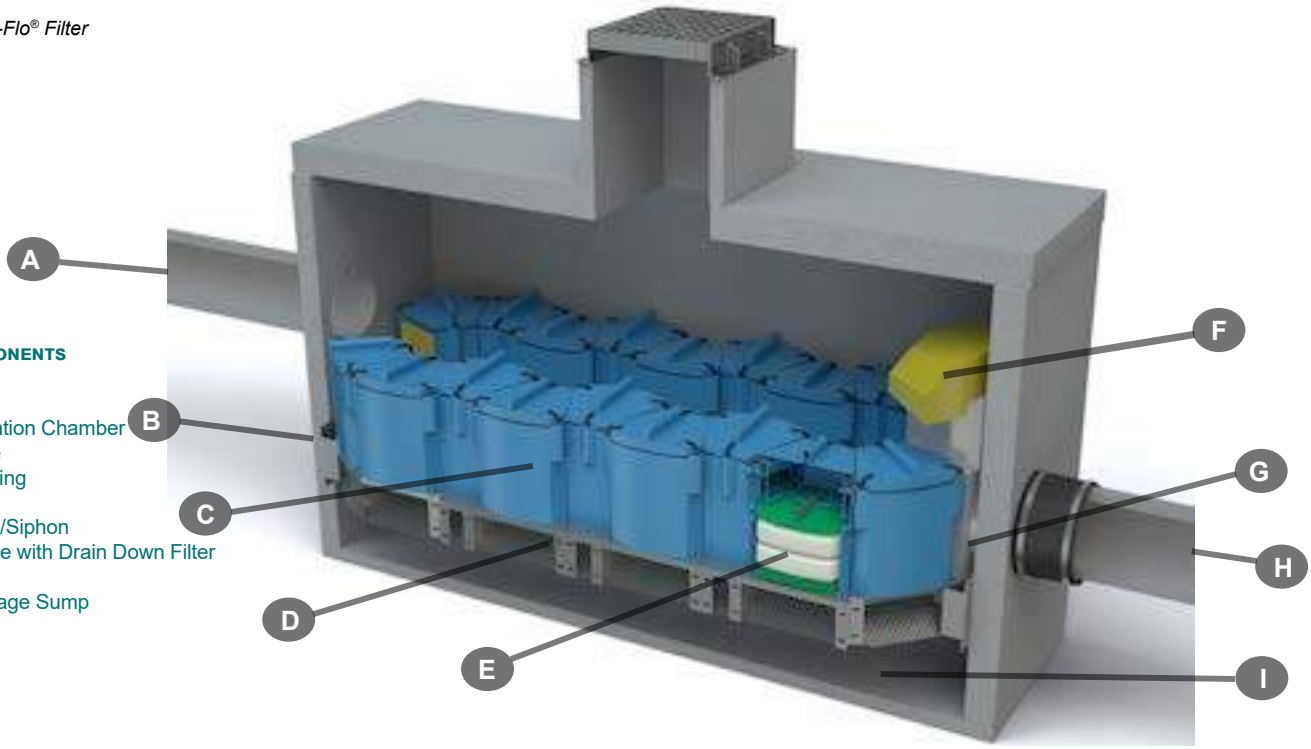
Office hours Monday thru Friday 8:00 A.M. to 5:00 P.M. EST
Toll free: 1-888-382-7808
Phone: 207-756-6200
Fax: 207-756-6212
Email: services@hydro-int.com

Overview & Product Description

The Up-Flo® Filter is a modular high-rate stormwater filtration device designed to capture trash, oil, sediment and remove fine pollutants such as dissolved and particulate metals and nutrients from stormwater runoff. Designed with efficiency, longevity and upkeep in mind, this high performance, low maintenance filter option that offers higher loading rates and longer media life for higher quality stormwater for longer periods between servicings.

In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo® Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the Media Pack and removal of accumulated sediment from the sump is mandatory.

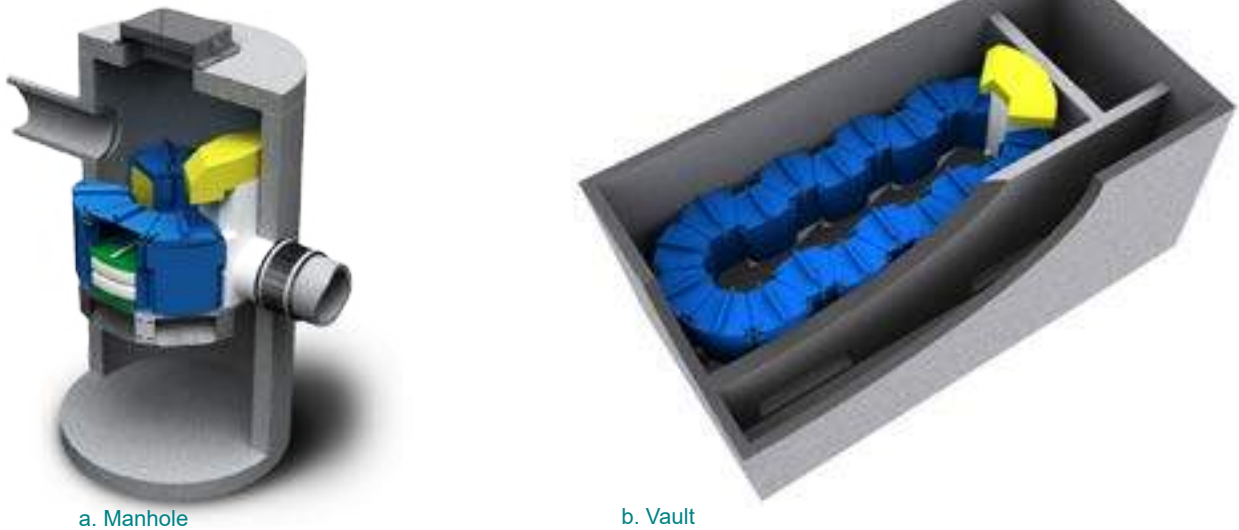
Fig.1 *The Up-Flo® Filter*



System Components

A. Inlet Pipe
B. Precast Filtration Chamber
C. Filter Module
D. 4mm Screening
E Media bag
F. Bypass Hood/Siphon
G. Outlet Module with Drain Down Filter
H. Outlet pipe
I. Pollutant Storage Sump

Product Configurations



a. Manhole

b. Vault

Fig.2 *The Up-Flo® Filter is installed in a) 4-ft (1.2m) round manholes or b) in rectangular precast vaults. Both configurations have a wide central opening in the Up-Flo® Filter.*

Hydro Maintenance Services

Hydro International has been engineering stormwater treatment systems for over 30 years. We understand the mechanics of removing pollutants from stormwater and how to keep systems running at an optimal level.

Nobody Knows our Systems Better than we do

Avoid Service Negligence

Sanitation services providers not intimately familiar with stormwater treatment systems are at risk of the following:

- Inadvertently breaking parts or failing to clean/replace system components appropriately.
- Charging you for more frequent maintenance because they lacked the tools to service your system properly in the first place.
- Billing you for replacement parts that might have been covered under your Hydro warranty plan
- Charging for maintenance that may not yet have been required.

Leave the Dirty Work to us

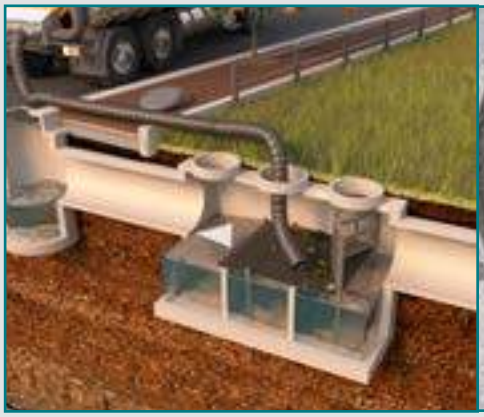
Trash, sediment and polluted water is stored inside treatment systems until they are removed by our team with a vactor truck. Sometimes teams must physically enter the system chambers in order to prepare the system for maintenance and install any replacement parts. Services include are are not limited to:

- Solids removal
- Removal of liquid pollutants
- Replacement media installation (when applicable)

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Better Tools, Better Results

Not all vactor trucks are created equal. Appropriate tools and suction power are needed to service stormwater systems appropriately. Companies who don't specialize in stormwater treatment won't have the tools to properly clean systems or install new parts.



Service Warranty

Make sure you're not paying for service that is covered under your warranty plan. Only Hydro International's service teams can identify tune-ups that should be on us, not you.

Treatment Systems Serviced by Hydro:

- Stormwwater filters
- Stormwater separators
- Baffle boxes
- Biofilters/biorention systems
- Storage structures
- Catch basins
- Stormwater ponds
- Permeable pavement



SAVE TIME & MONEY: CALL HYDRO FOR A QUOTE

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LEARN MORE AT HYDRO-INT.COM/SERVICE

Operation

Introduction

The Up-Flo® Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal, Media Pack replacement and Drain Down Filter replacement.

Pollutant Capture

The Up-Flo® Filter is designed to operate as a "treatment train" by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration media, preventing surface blinding of the filter media. The Up-Flo® Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump (see **Fig.1**). The high-capacity bypass siphon acts as a floatables baffle to prevent washout of captured floatable pollutants during high intensity events.

Reduced Clogging

The Up-Flo® Filter has been designed to minimize the occurrence of clogging and blinding and employs a unique Drain Down Filter that allows the water level in the chamber to drop below the filter media between events. The Drain Down Filter mechanism creates a reverse flow that flushes captured pollutants off the surface of the Media Bag, helping to prevent blinding. By allowing the water to drain out, the Drain Down Filter also reduces the weight of the Media Bags. This makes the bags easier and safer to remove during maintenance operations.

Overflow Protection

The Angled Screens are designed to prevent ragging and blinding and are situated below the Filter Modules, sheltering them from the direct path of the influent. Coarse debris settles in the sump before the runoff flows up through the screens, protecting them from blinding. In the unlikely event of a blockage, the high capacity siphonic Bypass Hood is designed to convey high enough flow to minimize the risk of large storm creating upstream flooding.

Best Practices

Good housekeeping upstream of the Up-Flo® Filter can significantly extend Media Bag life. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. Media Packs should not be installed in the Filter Modules until construction activities are complete and site stabilization is effective.

Damage Due to Lack of Maintenance

Delayed maintenance would result in clogged Media Bags and/or blinded Angled Screens. In that situation, the Up-Flo® Filter would go into bypass and there would be no treatment of the incoming stormwater. Because the Bypass Weir can easily convey all of the flow to the Outlet Module, there would be no lasting damage to the system. Replacement of the Media Bags and removal of sediment from the sump would restore the Up-Flo® Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.

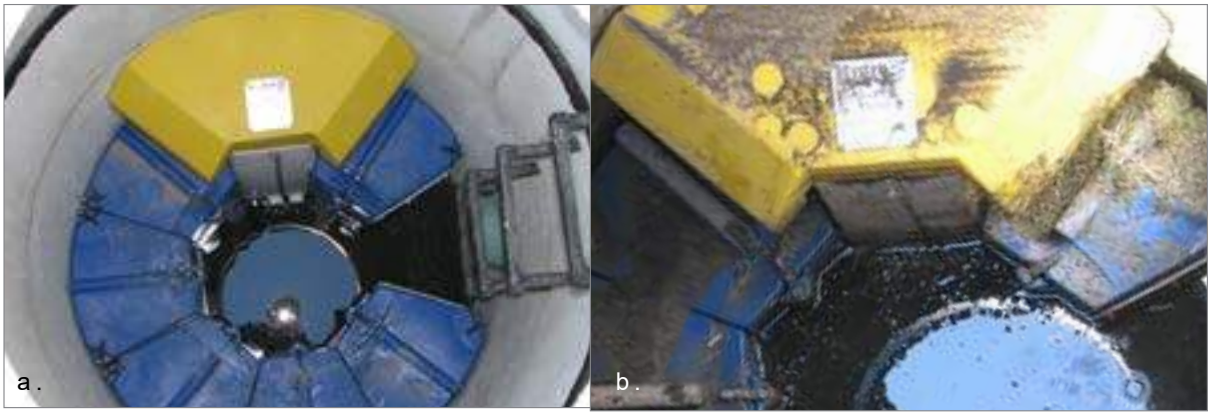

Fig.3 a) The water level in a properly functioning Up-Flo® Filter will drain down to the base of the Filter Modules. b) When the Drain Down Filter becomes clogged, the base of the Filter Modules will be submerged in standing water. Note, above right, that the Drain Down Filter is submerged in standing water.

Inspection & Maintenance

Overview

The Up-Flo® Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo® Filter.

Maintenance activities can be categorized as those that may be performed from outside the Up-Flo® vessel and those that are performed inside the vessel. Maintenance performed from outside the modules includes removal of floatables and oils that have accumulated on the water surface and removal of sediment from the sump. Maintenance performed inside the vessel includes removal and replacement of Media Bags, Flow Distribution Media and the Drain Down Filter. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. If you are not using Hydro Internatioanl or a trained servcie provider you must follow OSHA Confined Space Entry procedures when entering the Up-Flo® vessel.

The Up-Flo® Filter design has a wide central opening between the Filter Modules for easy access to all of the components (see **Fig.3**). In the case of inspection and floatables removal, a vactor truck is not required. Otherwise, a vactor truck is normally required for oil removal, removal of sediment from the sump, and replacement of the Media Packs and Drain Down Filter. In most cases, entry into the Up-Flo® Filter vessel is required for replacement of the Media Packs and Drain Down Filter.

The minimum required frequency for replacement of the Media Pack is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo® Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 16 inches, sediment removal is required.

Fig.4 a) A new Media Bag of Hydro Filter Sand. b) A spent media bag of Hydro Filter Sand.

At a minimum, media bags must be replaced at least once a year.

Make Sure your System was Installed Correctly

First Year Inspection and Maintenance

The frequency of inspection and maintenance can be determined in the field after installation. The frequency of ongoing maintenance needs is based on site characteristics such as contributing area, types of surfaces (e.g., paved and/or landscaped), site activities (e.g., short-term or long-term parking), and other site maintenance (e.g., sanding and sweeping). At a minimum, inspection and maintenance should be conducted at intervals of no more than six months during the first year of operation. Maintenance personnel should observe and record pollutant accumulations during the first year of service in order to benchmark the maintenance intervals that will later be established for the site. Pollutant accumulations should be measured or monitored using the following procedures:

- Measurement of sediment depth in the sump: A minimum of 8 inches (20 cm) should separate the Drain Down Filter inlet from stored sediment in the sump in order to minimize sediment migration into the Drain Down Filter. A simple probe, such as the Sludge-Judge®, can be used to determine the depth of the solids in the sump. In a typical 4-ft (1.2m) diameter manhole installation, the sediment depth should be no more than 16 inches (41 cm).

- Maintenance personnel should then enter the structure, remove the Media Pack from one of the Filter Modules, and weigh the Media Bags. Media Bags with a wet weight of approximately 40 lbs (18 kg) or more are an indication that the filter media has become full and that the Media Packs in all of the Filter Modules will require replacement (Fig.4). Minimum filtration rate is generally reached when the Media Bags have accumulated approximately 20 lbs (9 kg) of sediment. Determining the amount of accumulated sediment will be accomplished by removing both of the Media Bags from one of the Media Packs and weighing the bags separately. Since a new Media Bag weighs approximately 30 lbs (14 kg) wet, the difference in weight will approximately equal the weight of solids that have accumulated in the bag. A spent Media Bag weighs approximately 50 lbs (23 kg) wet.

- Measurement of oil layer on water surface: Since water in the Up-Flo® vessel drains down to an elevation below the bottom of the Filter Modules when the system is idle, the amount of accumulated oil must be minimized so that oil is not entrained in the Media Pack when stormwater begins to fill the vessel at the start of a storm event. Oil accumulation should be limited to 1.5 inches (4 cm) or less. Probes can be used to measure oil thickness.

- Monitoring for Drain Down Filter clogging: The water level in the Up-Flo® Filter should be monitored to ensure that the Drain Down Filter is operating properly. The Drain Down Filter is designed to lower the water level in the Up-Flo® vessel to an elevation below the bottom of the Filter Modules between storm events. Periodically conduct an inspection one to two days after a storm event during the first year of operation. Approximately 36 hours after a 1-in (2.5-cm) rainfall, the water level inside the vessel should have dropped to a point where it is equal with the base of the Filter Modules. If the water level has not reached that point, then the Drain Down Filter has either become clogged or blinded by trash or debris (Fig.5 a and b). If there is no evidence of trash or debris around the Drain Down Filter inlet, then it has likely become clogged with particles.

- Monitoring for slime and debris covering the Flow Distribution Media or Angled Screens: After removal of the Media Bags, the bottom Flow Distribution Media should be removed and inspected to determine if it is coated with slime or debris. Similarly, the Angled Screen should be inspected for blockages and ragging.

Find out how Frequently your System Needs Maintenance

Monitoring for floatables on the water surface: Similar to oil, the amount of accumulated floatables must be minimized to prevent trash and loose debris from becoming trapped on the Angled Screens when stormwater begins to fill the Up-Flo® vessel at the start of a storm event. Visual inspection is adequate to determine the amount of floatables. Floatables should be removed before they form a mat on the surface of the water.

The solids loading rate in the sump will be calculated by measuring the sediment depth in the sump and dividing the depth by the correlating interval of time since the sump was last cleaned. Similarly, starting with fresh Media Bags, the solids loading rate in the Media Packs will be calculated by weighing the Media Bags and dividing the weights by the correlating interval of time since they were installed. The wet weight of the heaviest bag will be used to determine the loading rate. As previously mentioned, a spent Media Bag weighs approximately 50 lbs (23 kg) wet. The spent Media Bag weight estimate was based on calculations of sediment loading in an Up-Flo® Filter that was run to exhaustion during laboratory testing.

The rate of oil accumulation will be calculated by measuring the thickness of the oil layer and dividing the thickness by the correlating interval of time since the sump was last cleaned. Ordinarily, oil thickness will not be measurable unless a spill has occurred. Consequently, any oil will typically be removed along with water when cleaning the sump.

Monitoring the Drain Down Filter for clogging, monitoring the Flow Distribution Media and Angled Screens for slime and debris, and monitoring the accumulation of floatables will provide an estimate of how long the Up-Flo® Filter can operate before its performance can become impaired by one of these factors.

Routine Inspection and Maintenance

After completion of the first year of operation, determining and then following the established inspection and maintenance intervals will keep pollutant loadings within their respective limits. Removal of oils and floatables, replacement of the Drain Down Filter, replacement of Flow Distribution Media (see Fig.9, pg 11), and cleaning of Angled Screens will occur at the same frequency as cleaning of the sump and replacement of Media Bags unless the first year of operation indicates otherwise. Keeping to the established maintenance intervals will keep treatment flow rates at, or above, the design flow rate. Typically, annual maintenance is adequate.

In addition to scheduled maintenance, occasional checks for Up-Flo® Filter clogging can be performed by removing the manhole cover during a storm, monitoring the water level in the manhole or vault, and determining whether the filter is in bypass. A properly-sized filter (on-line or off-line) that is in bypass during a storm that is producing runoff at, or below, the filter's design filtration rate needs maintenance.

Inspection & Maintenance

Routine Inspection

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo® Filter and its components prior to inspection.

The following instructions are intended for non-Hydro maintenance service providers and/or those intending to maintain thier own Up-Flo® Filter:

Scheduling

- Inspection may be conducted during any season of the year but should occur shortly after a predicted rainfall to ensure components are operating properly.

Necessary Equipment

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Scale to measure the weight of the Media Bags
- Crow bar to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge-Judge®)
- Hydro International Up-Flo® Filter Maintenance Log
- Trash bags for removed floatables

Routine Inspection Procedures

1. Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside and to determine whether the high-water level indicator has been activated. Make note of any irregularities. See Fig.6 for a typical Inspection View.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe such as a Sludge-Judge®, measure the depth of sediment that has collected in the sump of the vessel.
   Maximum sediment depth is 16 inches (41 cm).
6. If the high-water level indicator has been activated after two consecutive storms, remove the Filter Module lid by turning the cam latch and remove the Filter Media Pack (*refer to page 11 Replacement Procedures*). Weigh the Media Bags from one or two modules. Media Bags should be replaced if the wet weight exceeds 40 lbs (18 kg).
7. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level (see Fig.6 for the standard standing water level).
8. Securely replace the grate or lid.
9. Remove safety equipment.
10. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during inspection.

Fig.6 Inspection view of the Up-Flo® Filter.

Routine Maintenance

Maintenance activities are grouped into two categories:

- *Activities **Not Requiring** Man Entry Into the Up-Flo® Filter*
  These activities include floatables removal, oil removal and removal of sediment from the sump.
- *Activities **Requiring** Man Entry Into the Up-Flo® Filter*
  Media Pack replacement and Drain Down Filter replacement.

Maintenance intervals are determined from monitoring the Up-Flo® Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others. In the case of floatables removal, a vactor truck is not required. Floatables and loose debris can be netted with a skimmer and pole.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the Media Packs and Drain Down Filter (Fig.7). All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

Completion of all the maintenance activities for a typical 4-ft (1.2m) diameter manhole installation takes less than one hour. Approximately 360 gallons of water and up to 0.6 yd^3 (0.5 m^3) of sediment may be removed in the process. In an installation equipped with six Filter Modules, 12 Media Bags (2 bags per module) would be removed and replaced. Assuming a spent Media Bag weight of 50 lbs (23 kg), up to 600 lbs (272 kg) of spent Media Bags would be removed. All consumables, including Media Bags, Flow Distribution Media, and replacement Drain Down Filters are supplied by Hydro International.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.

Maintenance Activities Not Requiring Man Entry

These activities include floatables removal, oil removal and removal of sediment from the sump.

Scheduling

- Floatables and sump cleanout may typically be done during any season of the year - before and after rainy season
- Floatables and sump cleanout should occur as soon as possible following a contaminated spill in the contributing drainage area

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge-Judge®)
- Vactor truck (flexible hose preferred)
- Pressure nozzle attachment or other screen-cleaning device

Fig.7 Sediment is removed from the sump with a vactor hose. Man entry is not required for this step.

No Man Entry Required: Floatables, Oil and Sediment:

1. Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole or vault.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. If the standing water level in the sump is above the base of the Filter Modules (see Fig.8), tug the Pull Chain(s) to release the Drain Down Filter plug(s). Allow the excess water to drain out of the chamber.

5. Use the skimmer pole to fit the Drain Down Filter plug back into the open port.

6. Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor. Up to 0.3 yd^3 (0.2 m^3) of sediment and 360 gallons (1,363 L) of water will be removed from a typical manhole Up-Flo® Filter during this process.

7. Retract the vactor hose from the vessel.

8. Inspect the Angled Screens for blockages and ragging. If present, remove the obstruction or ragging materials from the surface using a hose or other screen-cleaning device.

9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.

10. Securely replace the grate or lid. Remove safety equipment.

11. Dispose of sediment and gross debris following local regulations.

12. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.

13. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during cleanout.

Maintenance Activities Requiring Man Entry

These activities include replacement of the Media Packs and Drain Down Filter.

Unless the Up-Flo® Filter has been installed as a very shallow unit, it is necessary to have an OSHA-confined space entry trained person enter the vessel to replace Media Packs.

The access port located at the top of the manhole or vault provides access to the Up-Flo® vessel for maintenance personnel to enter the vessel and remove and replace Media Packs. The same access would be used for maintenance personnel working from the surface to net or skim debris and floatables or to vactor out sediment, oil, and water. Unless the Up-Flo® Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Scheduling

- Call Hydro International to order replacement Media Packs and Drain Down Filter prior to scheduling maintenance.

- Because Media Pack replacement requires entry into the Up-Flo® chamber, maintenance events should be scheduled during dry weather.

- Media Pack replacement should occur immediately after a contaminated spill in the contributing drainage area.

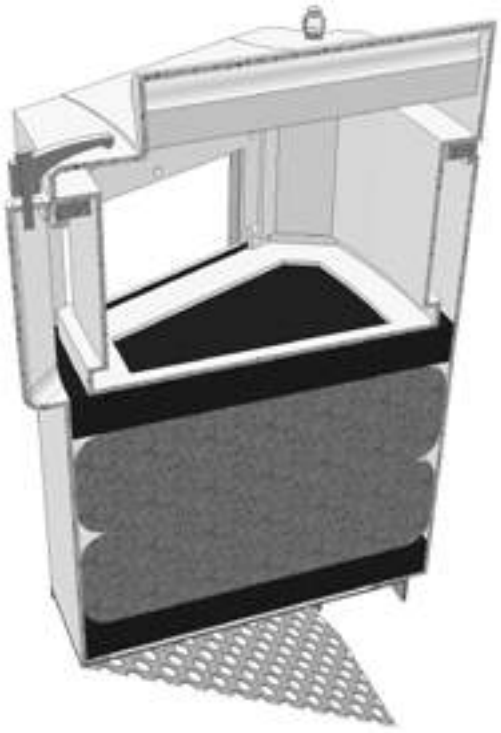

Fig.8 Cutaway view of the Filter Module

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if floatables removal is not to be done with vactor hose)
- Sediment probe (such as a Sludge-Judge®)
- Vactor truck (flexible hose preferred)
- OSHA Confined Space Entry Equipment
- Up-Flo® Filter Replacement Media Packs (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)
- Replacement Drain Down Filter components supplied by Hydro International

Man Entry Required: Media Pack and Drain Down Filter

1. Follow Floatables and Sump Cleanout Procedures, 1 – 13.
2. Following OSHA Confined Space Entry procedures, enter the Up-Flo® Filter Chamber.
3. Open the Filter Module by turning the three cam latches on the front and sides of the module. Remove the lid (1) to gain access to the Media Pack (Fig.9).
4. Remove and discard the spent Media Pack. The Media Pack contents include:
    - A top layer of (A) Flow Distributing Sheets
    - Two (2) Media Bags (B) equipped with nylon handles.
    - A bottom layer of (A) Flow Distributing Media.
5. Insert a new Media Pack, supplied by Hydro International.
    - First, insert a bottom layer of green Flow Distributing Media. Be sure that the media sits snugly and level at the bottom of the Filter Module.
    - Next, insert the first of two (2) replacement Media Bags. Smooth the bag out with your hands to make sure that the bag extends snugly to the walls and corners of the Filter Module.
    - Insert the second Media Bag, following the same procedure.
    - Insert the top layer of green Flow Distributing Media.

1. Filter Module Cover and Media Restraint

2. Replaceable Media Pack:
    a) Flow distribution sheets
    b) Filter Media Bags

3. Cam Latch

4. Conveyance Channel

5. Filter Module

6. Support Bracket / Angled Screen

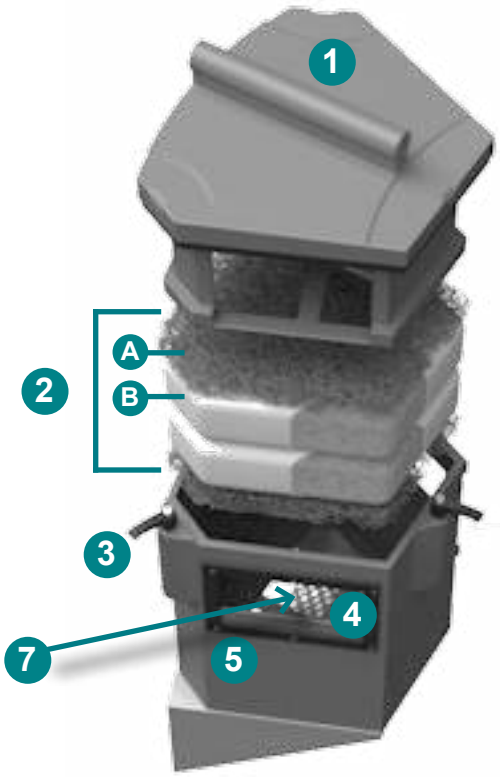

Fig.9 The Filter Module houses the Media Restraint and the Media Pack.

Be sure that the piece fits snugly against the walls and corners of the Filter Module.

- Put the lid on and secure the three latches. Check to make sure that the latches are closed properly.

6. Use a screwdriver to unscrew the Drain Down Filter from the face of the Outlet Module (see Fig.10). DO NOT DISCARD THIS PIECE.
7. Install new Drain Down Filter supplied by Hydro International.
8. Exit the Up-Flo® Filter chamber and securely replace the grate __or lid.
9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of Media Packs replaced. Note any irregularities such as damaged components or blockages.

Fig.10 *The Drain Down Filter.*

1. Drain Down Filter
2. Drain Down Plug
3. Pull Chain for Drain Down

10. Remove safety equipment.
11. Dispose of spent media packs at your local landfill, following local regulations.
12. Return the spent Drain Down Filter to Hydro International.
13. Contact Hydro International to discuss any irregularities noted during annual maintenance.

Solids Disposal

Sediment, floatables, gross debris, and spent Media Bags can generally be disposed of at the local landfill in accordance with local regulations. The toxicity of the residues captured will depend on the activities in the contributing drainage area, and testing of the residues may be required if they are considered potentially hazardous.

Sump water can generally be disposed of at a licensed water treatment facility but the local sewer authority should be contacted for permission prior to discharging the liquid. Significant accumulations of oil removed separately from sump water should be transported to a licensed hazardous waste treatment facility for treatment or disposal. **In all cases, local regulators should be contacted about disposal requirements.**

Maintenance at a Glance

Activity	Frequency
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Floatables/Oils Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Sediment Removal	- Every six to 12 months, depending on the Up-Flo® Filter Configuration - The maximum allowable sediment depth in any Up-Flo Filter configuration is 16 inches (41 cm) - Following a contaminated spill in the drainage area
Media Pack Replacement	- Once per year - Replacement is required anytime inspection reveals that the high-water level indicator has been activated after two consecutive storms and the subsequent weighing of the Media Bags shows a wet weight greater than 40 lbs - Following a contaminated spill in the drainage area
Drain Down Filter Replacement	- Once per year with Media Pack replacement - Replacement is required anytime inspection reveals that the water level inside the vessel has not reached a level equal with the base of the Filter Modules approximately 36 hours after a 1-inch (2.5 cm) rainfall - As needed, in the event of continuous base flow conditions

Up-Flo® Filter Installation Log

SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:	
SITE NAME:	
SITE LOCATION:	
OWNER:	**SITE CONTRACTOR:**
CONTACT NAME:	**CONTACT NAME:**
COMPANY NAME:	**COMPANY NAME:**
ADDRESS:	**ADDRESS:**
TELEPHONE:	**TELEPHONE:**
FAX:	**FAX:**

INSTALLATION DATE: / /

CONFIGURATION (CIRCLE ONE): **MANHOLE** **VAULT SYSTEM**

TOTAL NUMBER OF UP-FLO® FILTER MODULES: _____

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Up-Flo® Filter Inspection Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions*: _____

(Stable, Under Construction, Needing Maintenance, etc.)

Inspection Frequency Key: A=annual; M=monthly; S=after major storms

Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	M			
Inlets and Outlets free of debris?	M			
Facility (internally) free of debris?	M			
Vegetation				
Surrounding area fully stabilized? (no evidence of eroding material into Up-Flo® Filter)	A			
Grass mowed?	M			
Water retention where required				
Water holding chamber(s) at normal pool?	A			
Evidence of erosion?	A			
Sediment Deposition				
Filtration Chamber free of sediments?	A			
Sedimentation sump not more than 50% full?	A			
Structural Components				
Any evidence of structural deterioration?	A			
Grates in good condition?	A			
Spalling or cracking of structural parts?	A			
Outlet/Overflow Spillway	A			
Other				
Noticeable odors?	A			
Any evidence of filter(s) clogging?	M			
Evidence of flow bypassing facility?	A			

Inspector Comments: _____

_____

_____

_____

Overall Condition of Up-Flo® Filter**: ☐ Acceptable ☐ Unacceptable

***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 15 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is schedule for approximately: (date) _____

Inspected by: (signature) _____

Inspected by: (printed) _____

Up-Flo® Filter Maintenance Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions: _____
**(Stable, Under Construction, Needing Maintenance, etc.)*

Estimated volume of oil/floatable trash removed: _____

Sediment depth measured in sump prior to removal: _____

Number of Filter Modules fitted with new media packs: _____

Inspector Comments: _____

_____

_____

_____

Overall Condition of Up-Flo® Filter: ☐ Acceptable ☐ Unacceptable
***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

Maintained by: (signature) _____

Maintained by: (printed) _____

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Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

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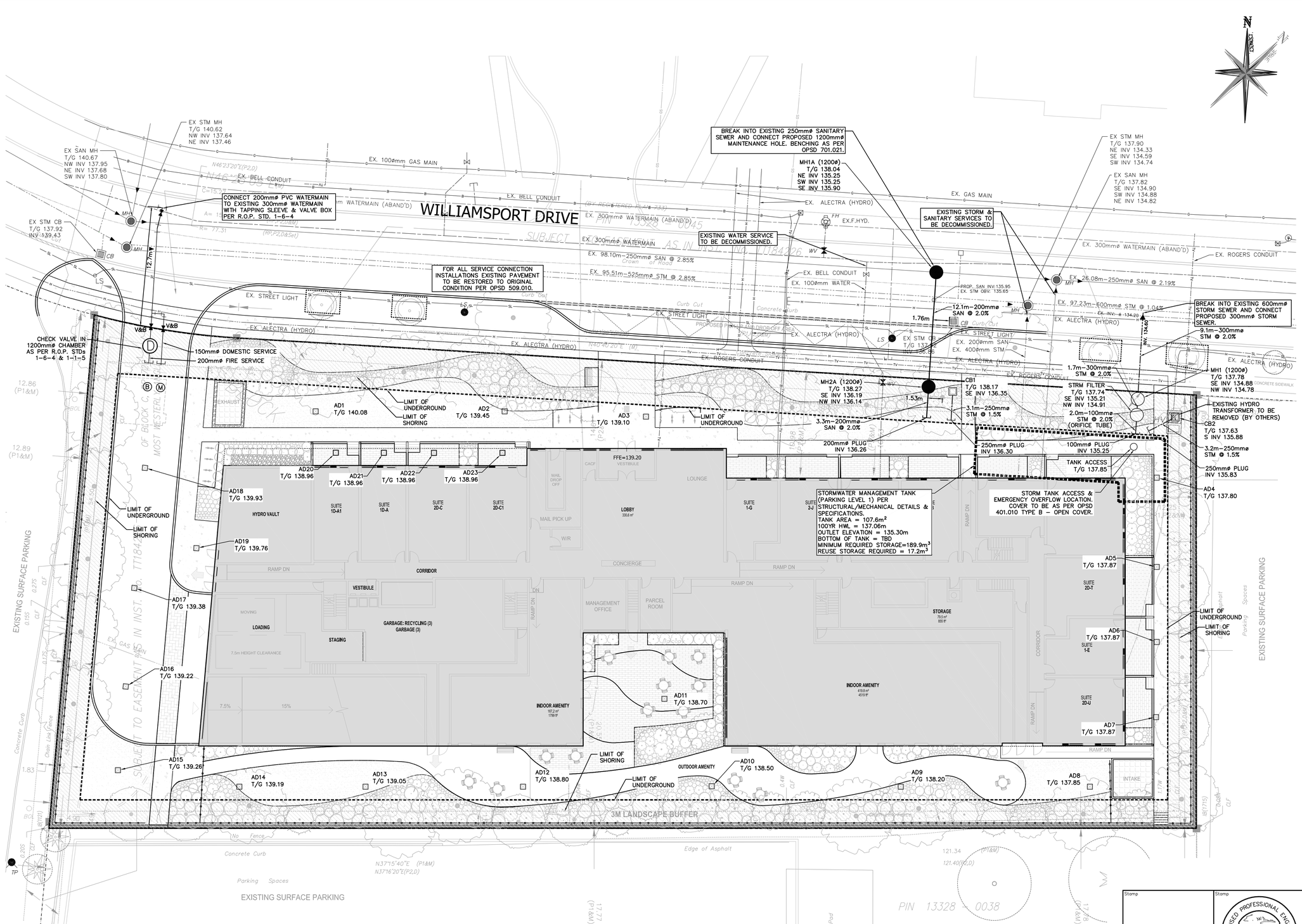
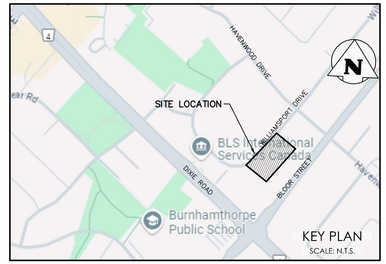
APPENDIX E

Preliminary Design Drawings





LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE CONNECTION
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE (FIRE DEPT.) CONNECTION

No.	ISSUE / REVISION	YYYY/MMM/DD
1	ISSUED FOR REZONING	2025/02/14

BEARING NOTE:

BEARINGS ARE UTM GRID, DERIVED FORM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK OBSERVATION, UTM ZONE 17 (81° WEST LONGITUDE), NAD83(CRS)v6(2010.

BENCHMARK NOTE:

ELEVATIONS ARE GEODETIC AND REFERRED TO CITY OF MISSISSAUGA B.M. No. 690, ELEVATION = 134.702m

SURVEY NOTES:

SURVEY COMPLETED BY IBW SURVEYORS

SURVEY PREPARED FOR 1470 WILLIAMSPORT HOLDINGS INC.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY BPD QUADRANGLE
DRAWING No.: A201.5 PROJECT No.: 23057

DRAWING NOTES:

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

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

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

MISSISSAUGA

Project

1470 WILLIAMSPORT DRIVE
CITY OF MISSISSAUGA
PEEL REGION

Drawing

PRELIMINARY SERVICING PLAN

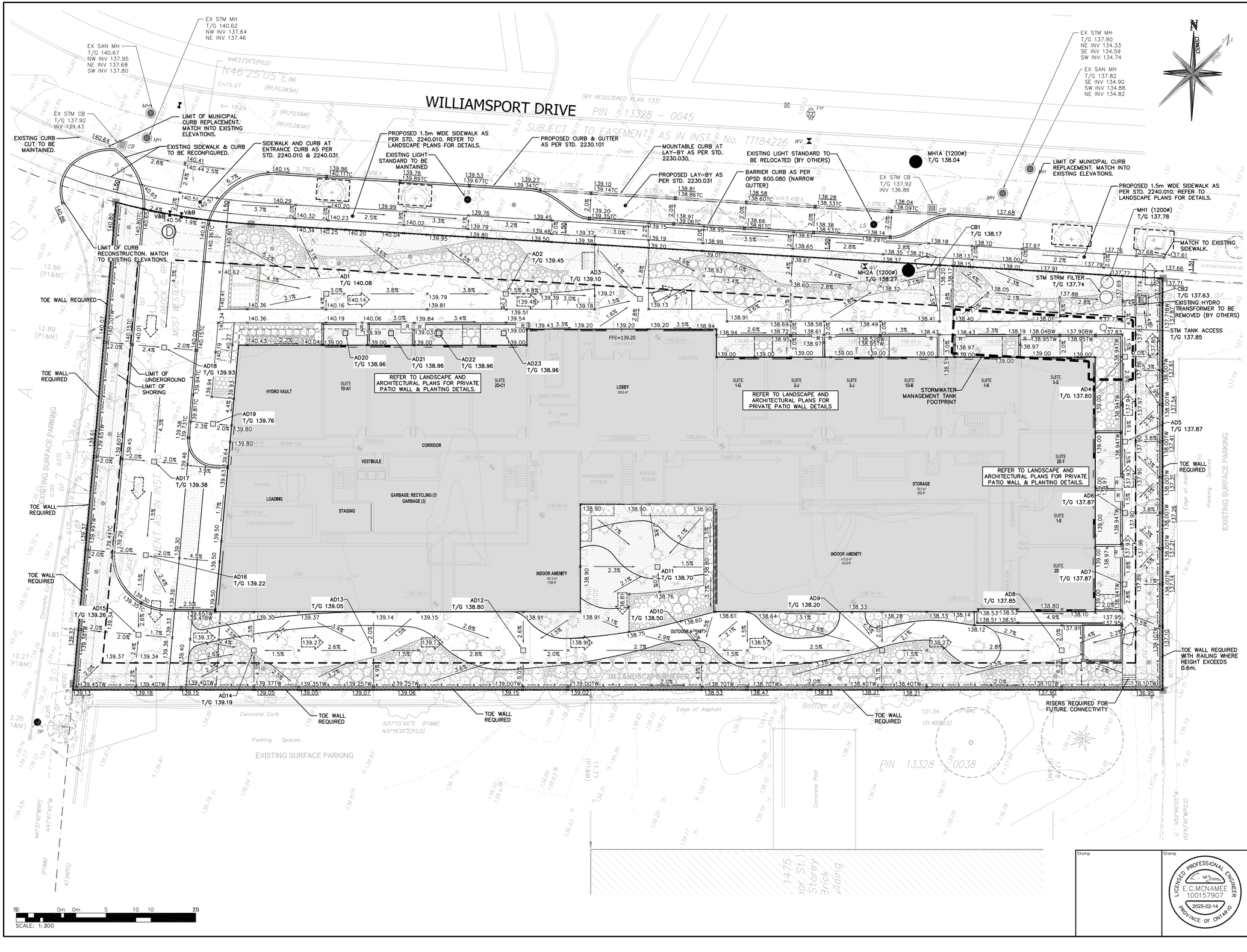
Stamp

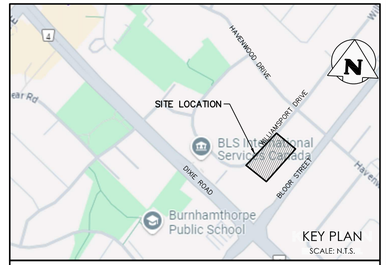
Stamp

LICENSED PROFESSIONAL ENGINEER
E.C.MCNAMEE
100157907
2025-02-14
PROVINCE OF ONTARIO

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

Drawn	D.B.	Design	E.M.	Project No.	2719–7179
Check	E.M.	Check	E.M.	Scale	1: 200
				Dwg.	C 102





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.25m)
- EXISTING CONTOUR (0.5m)
- x137.73 EXISTING ELEVATION
- x139.50 PROPOSED GRADE
- x137.88 PROPOSED GRADE (TO MATCH EXISTING)
- 2.9% PROPOSED MINOR FLOW DIRECTION
- PROPOSED RETAINING WALL
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE (FIRE DEPT.) CONNECTION

No.	ISSUE / REVISION	YYYY/MMM/DD
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MISSISSAUGA

Project

1470 WILLIAMSPORT DRIVE
CITY OF MISSISSAUGA
PEEL REGION

Drawing

PRELIMINARY GRADING PLAN

Stamp:

Stamp: LICENSED PROFESSIONAL ENGINEER — E.C.MCNAMEE — 100157907 — 2025-02-14 — PROVINCE OF ONTARIO

CROZIER CONSULTING ENGINEERS
211 YONGE STREET
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Drawn	Design	Project No.	
D.B.	E.M.	2719–7179	
Check	Check	Scale	Dwg.
E.M.	E.M.	1:200	C 103