FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

6333 HURONTARIO STREET MULTI-STOREY COMMERCIAL SELF-STORAGE DEVELOPMENT CITY OF MISSISSAUGA

PREPARED FOR:

DYMON GROUP OF COMPANIES

PREPARED BY:

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CFCA FILE NO. 1644-5564

REGION FILE 0Z-21-001M

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev.0	October 30, 2020	Issued for First Submission (ZBA)
Rev.1	November 9, 2022	Issued for Second Submission (ZBA & SPA)

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by Dymon Group of Companies (Dymon) to prepare a Functional Servicing and Stormwater Management Report in support of a Zoning By-Law Amendment (ZBA) and Site Plan Application (SPA) for the proposed multi-storey commercial self-storage development at 6333 Hurontario Street (the Site) in the City of Mississauga (City). This report outlines the proposed functional servicing and stormwater management plan for the Site according to the requirements of the Province, Region, and the City. The following reports, design criteria, and as-constructed drawings were referenced during the preparation of this report:

- Provincial
    - Ministry of Transportation (MTO) Highway Corridor Management Controlled Areas under the Public Transportation and Highway Improvement Act.
- Regional
    - Region of Peel 2020 Water and Wastewater Master Plan for the Lake-based Systems (study completion June 2020).
    - Public Works Design, Specifications, and Procedures Manual. Linear Infrastructure. Watermain Design Criteria revised June 2010.
    - Public Works Design, Specifications, and Procedures Manual. Linear Infrastructure. Sanitary Sewer Design Criteria modified March 2017.
- Municipal:
    - Transportation and Works Development Requirements Manual dated August 2020.
    - Drawing D1: Storm Design Areas showing our Site as part of the World Drive (formerly Beckett Drive) drainage area dated December 1997.
- As-constructed drawings:
    - **24724-D**: servicing along World Drive dated December 1997.
    - **24725-D:** servicing along World Drive including easement information dated December 1997.
    - **56841-D:** servicing along Capstone Drive including stormwater information along Hurontario Street southwest of the Site dated October 2004.
    - **CF-40758:** site plan and services for 100 World Drive (formerly Beckett Drive) dated July 1999.

1.1 Project Background

The Site covers an area of approximately 0.80 hectares (ha) and is located north of the Highway 401 and Hurontario Street intersection. The Site currently consist of a one-storey stucco dwelling and unpaved parking areas for trailers and shipping containers. The Site is bounded by a commercial development to the north, Hurontario Street to the west, industrial buildings to the east, and a Ministry of Ontario property to the south. The Site is currently accessed from Hurontario Street via an MTO access road (approximately 0.20 ha).

1.2 Proposed Development

The Site is proposed to permit commercial uses based on the site plan provided by Global Architect Inc. dated November 2022. The Site is proposed to consist of one 7-storey commercial self-storage building with office area, storage areas and provide at grade parking and two underground parking levels. The proposed building has an approximate gross floor area (GFA) 36,106 m^2. The Site has two vehicular access points.

Vehicular access to the Site is proposed to connect to Hurontario Street along the southern boundary of the site. A secondary vehicular entrance is proposed to connect to the MTO lands located at the south-east corner of the Site.

1.3 Easement Overview

The Site is subject to a public servicing easement based on the site Topographic survey prepared by Speight, Van Nostrand & Gibson Limited dated February 4th, 2020. The easement is located within the adjacent commercial property to the west and is registered as PRB2478010 and its parts of 1-4 on 43R-35347. This easement was set in place to provide driveway access to the Site. This easement is required to be transferred to the owner and a private servicing easement will be required prior to issuance of the Region of Peels servicing permit. The easement which is proposed to be used to provide the Site Servicing connection to World Drive is shown on Drawing C102.

2.0 WATER SERVICING

The Region of Peel is responsible for the operation and maintenance of the public water system in the City of Mississauga, and any local system connecting to this public system.

2.1 Existing Water Servicing

According to as-constructed drawings, an existing concrete pressure pipe (CPP) 400 mm diameter watermain is located on the north side of World Drive. Existing developments near the Site along World Drive are serviced via 250 mm water connects to the existing 400 mm diameter watermain. There are two existing fire hydrants on the north side of World Drive. The first hydrant is 60 m east of Hurontario Street, and the second is 230 m east of Hurontario Street. The existing one-storey stucco dwelling is assumed to be of commercial land use based on the surrounding trucking activities. Refer to Drawing C102 for the locations of the existing regional water infrastructure surrounding the site.

2.2 Water Design Demand

Region of Peel Watermain Design Criteria was referenced to calculate water demands for the Site. An average water demand of 300 L/capita/day was used in conjunction with a population density of 50 persons/ha for commercial sites. Refer to Table 1 below for a summary of the Site's water domestic water demand.

The larger population estimate per the OBC method was used to estimate the existing and proposed water demands of the site. An average daily demand of 300 L/capita/day was used for an 'Industrial, Commercial, and Institutional' development to determine the domestic water

demand for the existing and proposed conditions. A summary of the results is presented in Table 1, with detailed water design demand calculations provided in Appendix A.

Table 1: Existing and Proposed Domestic Water Demand

	Average Daily Demand (L/s)	**Maximum Daily Demand** (L/s)	**Peak Hourly Demand** (L/s)
Existing Water Demand	0.14	0.19	0.42
Proposed Water Demand	0.18	0.25	0.53
Increase in Water Demand	0.04	0.06	0.11

As shown in Table 1, the peak hourly water demand for the proposed development was estimated to be 0.53 L/s, representing an increase of 0.11 L/s from existing conditions.

2.3 Fire Flow Demand

The Fire Underwriters Survey (FUS) method was used to complete the fire flow demand analysis for the Site. Flow requirements were calculated based on non-combustible construction and considered the area of the largest floor plus 25% of each of the two immediately adjoining floors, which was estimated to be 6,836 m^2, as calculated based on Levels 2, 3, and 4 from the site plan statistics prepared by Global Architect Inc. The proposed building is assumed to be of combustible fire hazard and will be designed to have a automatic sprinkler system. Exposure charges were included in the calculations to account for various existing buildings in proximity to the Site. The proposed development requires a fire flow of approximately 200.0 L/s for a duration of 2.5 hours per the FUS calculations.

A hydrant flow test was performed by Watermark on October 22, 2020, on the existing 400 mm diameter watermain located on World Drive. Based on the hydrant flow test at a minimum operation pressure of 20 psi the existing watermain has an available flow of 5,063 USGMP (319.4 L/s) which is above the required fire flow and maximum day demand per the fire flow analysis. As such, there is sufficient pressure and flow from the existing municipal water system to satisfy the Site's fire flow as per the FUS requirement.

Refer to Appendix A for the fire flow analysis prepared by Watermark for the supporting hydrant flow test results.

Note that the FUS value is a conservative estimate to assess the capacity of the municipal water supply system to provide fire protection for the Site. The Mechanical Engineer for this development will complete the required analyses for building fire protection and the Architect will design fire separation methods per the determined fire flow rate in order to meet municipally available flows and pressures.

2.4 Proposed Water Servicing

A proposed water servicing strategy for this Site proposes to utilize the adjacent access easement through the adjacent lands to the west. Prior to development, the public easement will be released, and a private easement will be created to accommodate water servicing infrastructure to the Site among other services and utilities.

Water is proposed to be sourced through a new 150 mm water main connection to the existing 400 mm diameter CPP watermain on the north side of World Drive, per Region standards. The proposed 150 mm diameter watermain will split into a 150 mm fire line and a 100 mm domestic line at the site's property line. A valve chamber is proposed to be installed at the World Drive property line, on the south side of the existing hydro easement. The 100 mm domestic line will subsequently connect into the Mechanical Room of the self-storage building. Internal building water servicing will be installed per Mechanical details and specifications. Fire hydrants are proposed around the site to provide adequate hydrant coverage in accordance with the City of Mississauga requirements. Refer to Drawing C102 for the proposed water servicing plan.

3.0 SANITARY SERVICING

The City of Mississauga is serviced by a network of local and trunk sanitary sewers. The Region of Peel is responsible for the operation and maintenance of the public sewage collection and treatment systems in the City of Brampton, and any local sewage system that connects to this public system.

3.1 Existing Sanitary Servicing

According to as-constructed drawings, an existing 250 mm sanitary sewer is located along the centreline of World Drive. This 250 mm sanitary sewer is plugged at its intersection with Hurontario Street and sanitary flows are conveyed northeast towards Edwards Boulevard at a slope of 0.50% at an approximate depth of 5 m below grade. Sanitary flows are subsequently conveyed northeast towards the combined trunk sewer along Etobicoke Creek and, ultimately, the G.E. Booth Wastewater Treatment Plant for treatment. Refer to Drawing C102 for further details on the location of the existing sanitary sewer near the Site.

3.2 Sanitary Design Flow

T To estimate the sanitary design flows from the proposed development, the Region of Peel Design Standards were referenced. An average water demand of 302.8 L/capita/day was used in conjunction with a population density of 50 persons/ha for commercial sites. Refer to Table 2 below for a summary of the Site's sanitary design flow.

Table 2: Existing and Proposed Sanitary Design Flows

	Average Flow (L/s)	**Peak Flow** (L/s)	**Infiltration Flow** (L/s)	**Total Peak Flow** (L/s)
Existing Sanitary Design Flow	0.14	0.61	0.16	0.77
Proposed Sanitary Design Flow	0.18	0.77	0.20	0.97
Increase in Sanitary Design Flow	0.04	0.16	0.04	0.20

As shown in Table 2, the total peak sanitary flow for the Site was estimated to be 0.97 L/s, representing an increase of approximately 0.20 L/s from existing conditions.

3.3 Proposed Sanitary Servicing

It is proposed that the Site is serviced by 200 mm diameter PVC sanitary sewer, and a sanitary property line manhole at the connection to World Drive through the easement within the adjacent lands to the west. From the easement limits to the Site's property line, a manhole and a 200 mm PVC sanitary sewer is proposed to collect and convey sanitary flows to World Drive.

The existing 250 mm sanitary sewer is sloped at approximately 0.5% downstream of the proposed connection location, which yields a capacity of approximately 44 L/s. A total peak flow of 0.97 L/s as listed in Table 2 represents approximately 2% of the pipe's total capacity. The internal building sanitary servicing will be installed per Mechanical details and specifications. The proposed sanitary sewer system is shown in Drawing C102.

4.0 STORM DRAINAGE

4.1 Existing Drainage

The existing minor and major system within the Site are conveyed overland westerly towards the MTO Patrol Yard. An existing swale along the western property line conveys flows south into an existing MTO culvert, ultimately conveyed into the MTO drainage system.

An existing ditch inlet catch basin is located within the MTO Patrol Yard near the south-west limits of the site collecting external flows from the landscaped area of the adjacent public property. This ditch inlet is assumed to be connected to the existing 375 mm diameter storm sewer within the Hurontario right-of-way.

The major system surrounding the subject site conveys flows towards the Hurontario and World Drive rights-of-way. An overland flow route conveys the adjacent commercial development's major system through the site's northern shared property line and ultimately travels south towards the MTO drainage system.

Site topography is generally uniform falling in a westerly direction, with an average slope of 2.0%. The majority of the site area consists of a gravel entrance, an existing commercial building and landscaped areas. A depiction of the existing drainage conditions presented in Figure 1.

4.2 Proposed Drainage

The proposed grading and stormwater management system for the site has been designed in accordance with the City of Mississauga's Storm Design Criteria and with reference to the overall stormwater catchment drawing (Storm Design Areas – D1) prepared by Winter Associates dated July 1998. Refer to Appendix C for the overall stormwater Catchment Plan provided by the City of Mississauga. Proposed drainage conditions and major drainage areas are illustrated in Figure 2.

The majority of the site's minor and major flows (Catchment 201) will be collected by catch basins, catch basin manholes and two trench drains located at the site entrances. Collected stormwater is then conveyed through an internal storm sewer system and discharged to the existing municipal storm sewers on World Drive through the easement within the adjacent property to the west. The proposed on-site storm sewer system will be designed to collect, controlled and convey runoff from all storms up to and including the 100-year storm. The emergency overland route will direct stormwater to the Hurontario Street right-of-way, as is the case under pre-development conditions.

The external drainage entering the site is proposed to be collected and infiltrated within the south-west corner of the Site. The Modified rational method and the 100-year storm event for the external drainage area was used to establish the required storage volume while using the most conservative infiltration rate provided by the project Hydrogeological investigation.

Details of the proposed storm sewer system are provided on Drawing C102 and storm sewer sizing and infiltration trench sizing calculations are provided in Appendix C. Refer to Figure 2 and Figure 3 for the site under post-development drainage conditions illustrating the minor and major drainage patterns.

5.0 GROUNDWATER DRAINAGE CONDITIONS

A Hydrogeological Investigation was prepared by Fisher Engineering dated November 4, which assess the sub-surface conditions in support the Site's development.

5.1 Short-Term Construction Ground Water Dewatering

The maximum short-term dewatering estimate is 95.54 m^3/day (including precipitation rate and a factor of safety), as summarized in Table 3 below.

Table 3: Construction Dewatering Summary

Construction Dewatering	
Estimated MAX Construction Dewatering Rate	135.5 m^3/day (1.6 L/s)

5.2 Permanent Ground Water Dewatering

The maximum permanent dewatering estimate is 48.7 m^3/day (including a factor of safety), as summarized in Table 4 below.

Table 4: Permanent Dewatering Summary

Permanent Dewatering	
Estimated MAX Permanent Dewatering Rate	48.7 m^3/day (0.56 L/s)

5.3 Groundwater Quality

The Investigation concludes that the groundwater samples indicate that the quality of groundwater does not meet the Peel Storm Sewer By-Law and is required to be treated prior to discharging into the existing system. An internal treatment unit will be designed to treat the groundwater prior to discharging into the on-site stormwater management system.

6.0 STORMWATER MANAGEMENT

Stormwater management design criteria was established through a detailed review of the City of Mississauga Development Requirements Manual. The stormwater management criteria include:

Quantity Control

City of Mississauga: Control 100-year post-development peak flows to the 10-year storm sewer design capacity as per the overall Stormwater Drainage Plan (Storm Drainage Areas – D1) dated 1998, prepared by Winter Associates.

MTO: The MTO will review the Stormwater Management Design and provide site specific comments. These comments will be incorporated once received.

Little Etobicoke Creek: Post to Pre-Control for the 2 through 100-year storm events using the unit flow release rate as per Table 6: Etobicoke Creek Unit Flows of the City of Mississauga Section 8 – Storm Drainage Design Requirements.

Quality Control

Quality Control: 80% Total Suspended Solids (TSS) removal on an annual loading basis of the stormwater runoff leaving the development per the MECP Enhanced Water Quality Control Criteria.

Water Balance

Retain first 5 mm of rainfall across the site.

6.1 Stormwater Quantity Control

The Rational Method was used to calculate pre- and post-development flow rates where the Modified Rational Method was used to determine the storage requirements necessary to meet the design objective (Little Etobicoke Creek). City of Mississauga Intensity-Duration-Frequency (IDF) Parameters and Unit Flow rates as prescribed by the City of Mississauga Storm Drainage Design requirements was used to evaluate the 2 through 100 year storm events. In order to account for the increase in runoff due to of the saturation of the soils, runoff coefficient adjustment factors were used for the lower frequency design storms (25,50, and 100-storms) according to the City of Mississauga criteria. Table 5 summarizes the parameters used and the resulting site target release rate.

Table 5: Target Release Rate (Unit Flows)

Storm	Unit Flow Rate ($m^3/s/ha$)	Area (ha)	Target Release Rate (m^3/s)	Target Release Rate (L/s)
2-year	0.03575	1.00	0.036	35.79
5-year	0.04746		0.048	47.51
10-year	0.05546		0.056	55.52
25-year	0.06559		0.066	65.66
50-year	0.07315		0.073	73.23
100-year	0.08075		0.081	80.84

To control the 2 through 100-year storm events, an underground concrete stormwater tank (Cupolex) is proposed to provide the required detention volume. A 140 mm orifice tube downstream of the proposed detention tank is proposed to restrict stormwater flows to meet the target flow rates

referenced above. The maximum permeant dewatering rate for the structure was included in the analysis and sufficient storage was provided to account for this additional drainage to the existing storm system. Refer to Table 6 for a summary of the controlled and uncontrolled 2 through 100-year peak flows and the required and provided storage volume.

Table 6: Post-Development Flow Rates and Required Storage Volumes

Storm	Target Release Rate (L/s)	Post-Development Controlled Flow Rate (Catchment 201) (L/s)	Post-Development Uncontrolled Flow Rate (Catchment 202) (L/s)	Storage Volume Required (m^3)	Storage Volume Provided (m^3)
2-year	35.79	34.93	0.26	93.41	100.77
5-year	47.51	41.54	0.34	133.40	136.33
10-year	55.52	48.18	0.42	169.30	195.61
25-year	65.66	54.00	0.54	226.08	254.88
50-year	73.23	56.69	0.65	295.36	299.34
100-year	80.84	61.71	0.75	351.18	355.31

Based on the Modified Rational Method, a total of 351.39 m^3 of storage is required for the 100-year storm event and 355.31 m^3 of storage is provided; therefore, the stormwater quantity volume requirement is achieved. Refer to Appendix C for the detailed stormwater management calculations and a summary of the 2 through 100-year storage design summarized within the Stage Storage Discharge relationship.

6.2 Water Balance

The water balance objective for the Site is to provide a 5 mm retention across the site area. A total retention volume requirement of 50.1 m^3 is required. The proposed stormwater management tank has been designed to provide a dead storage sump area below the active storage outlet to provide a total retention volume of 56.3 m^3. Irrigation calculations provided by MHBC Landscape conclude that the site irrigation demand over a 72-hour period of 57.0 m^3. The supporting water balance design calculations can be found in Appendix C.

5.4 Stormwater Quality Control

Stormwater quality control for the Site will be accomplished by a Hydro International Up-Flo Filter treatment unit. The Up-Flo filter has been sized to provide a net annual water quality TSS removal rate of 81%. Controlled drainage from Catchment 201 will discharge through the proposed stormwater treatment unit located downstream of the stormwater management tank.

Refer to Appendix C for the stormwater quality control detailed calculations and drawing C102 for details.

6.1 Underground Storage Facilities

6.1.1 Access

Maintenance can be provided through the manhole that is connected to the upstream end of underground chamber. An inspection port is also included to provide easy access to the system from the surface, eliminating the need for entry during inspections. Detailed design and shop drawings of the underground storage facilities are provided in Appendix C.

6.1.2 Inspection and Maintenance

Maintenance of the underground storage facilities is performed using the JetVac process. This process requires the use of a vacuum/JetVac combination truck, which most cleaning service providers with experience in the maintenance of underground storage facilities have. The maintenance truck should utilize a high-pressure water nozzle to propel itself down in the chambers while scouring and suspending sediments. This allows for the pollutants to be flushed back into the manhole for vacuuming. Further, the cleaning service should also remove any sediment, debris and trash at the inlet and outlet manholes. Inspection and maintenance of the underground storage chambers should occur twice in the first year so that sediment accumulation rates can be monitored. After the first-year inspections may occur annually unless excessive sediment levels are accumulated during the first year, indicating more frequent inspections and maintenance may be required. Owners and operators of these systems may refer to the documentation available on the Cupolex website (https://cupolex.ca/) for additional information or assistance in maintaining these chambers.

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. The Erosion & Sediment Control Plan (Drawing C101) identifies the location of the recommended control features. Controls will be inspected after each significant rainfall event and maintained in proper working condition. 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 in order 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

A silt sack will be installed in all existing nearby storm sewer catch basins within the Right-of-Way. The silt sack will provide sediment control to prevent silt and sediment from entering the stormwater system.

Interceptor Swale with Rock Check Dam

Interceptor swales utilize the existing drainage features on Site. These conveyance systems collect and convey runoff to the downstream sediment control pond. The rock check dams are designed to reduce velocities within the swales to prevent channel erosion.

Temporary Sediment Trap

A temporary sediment trap will be implemented during construction phase to promote settling of suspended sediment particles and to prevent erosion.

8.0 CONCLUSIONS & RECOMMENDATIONS

Based on the information contained within this summary report, we offer the following conclusions:

1. Water servicing is proposed via a 150 mm diameter watermain connecting tying into the existing 400 mm diameter watermain on World Drive through a proposed private easement.

2. The domestic average day water demand is 0.18 L/s, a maximum day demand of 0.25 L/s, and a peak hourly demand of 0.53 L/s was estimated for the Site.

3. A fire flow demand of 200 L/s for 2.5 hours is required. Available fire flow supply was confirmed through a Hydrant flow test on the existing hydrants along World Drive.

4. The Site will be serviced by a proposed sanitary sewer connection to the existing 250 mm diameter sanitary sewer within World Drive through the proposed private easement.

5. The average daily sanitary flow is 0.18 L/s, a peak flow of 0.77 L/s, and a total peak flow of 0.97 L/s was estimated for the Site.

6. Peak flow control for the 2-year to 100-year design storms will be achieved through an underground stormwater chamber designed by Cupolex complete with a 140 mm orifice tube and will provide approximately 355.3 m^3 of active storage.

7. Approximately 56 m^3 of dead storage is provided within the underground concrete water re-use chamber for landscaping irrigation purposes.

8. The water quality requirement of 80% TSS removal from the site is achieved through the use of a Hydro International Up-Flo filtration system.

Based on the previously presented information and conclusions, we request consideration for approval of the Zoning By-Law Amendment and Site Plan Application from the perspective of servicing and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Andrew Farina, P.Eng
Project Manager

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APPENDIX A

Water Demand Calculations

CROZIER CONSULTING ENGINEERS

PROJECT: 6333 Hurontario
PROJECT NO.: 1644-5564

CREATED BY: AS
CHECKED BY: ADF

DATE: 2020-03-19
UPDATED: 2022-11-10

Existing Water Demand Calculations

Site Statistics:

Land Use	Area (ha)	Population Density	Units	Population
Commercial	0.80	50	capita/ha	39.9

Total Population: **40**

Design Parameters

Average Demand (L/capita/d)
300

Water Demand:

Average Commercial Daily Demand = 12,000 L/day
0.14 L/s

Peaking Factors
Max Day = 1.4
Peak Hour = 3.0

Average Day = 0.14 L/s
Max Day = **0.19** L/s
Peak Hour = **0.42** L/s

Summary Table:

Municipality	Average Daily Water Demand (L/s)	Max Day Demand (L/s)	Peak Hourly Demand (L/s)
Region of Peel	0.14	0.19	0.42

Notes & References

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009)

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

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

Max Day = Average Day Demand * Max Day

Peak Hour = Average Day Demand * Peak Hour

CROZIER CONSULTING ENGINEERS

PROJECT: 6333 Hurontario
PROJECT NO.: 1644-5564

CREATED BY: AS
CHECKED BY: ADF

DATE: 2020-03-18
UPDATED: 2022-11-10

Proposed Water Demand Calculations

Site Statistics:

Land Use	Area (ha)	Population Density	Units	Population
Commercial (Self-Storage Building)	1.00	50	capita/ha	50.1

Total Population: **51**

Design Parameters:

Average Demand (L/capita/day)
300

Water Demand:

Average Commercial Daily Demand = 15,300 L/day
0.18 L/s

Peaking Factors
Max Day = 1.4
Peak Hour = 3.0

Average Day = 0.18 L/s
Max Day = **0.25** L/s
Peak Hour = **0.53** L/s

Summary Table:

Municipality	Average Daily Water Demand (L/s)	Max Day Demand (L/s)	Peak Hourly Demand (L/s)
Region of Peel	0.18	0.25	0.53

Notes & References

Site statistics sourced from the site plan provided by Nicholas Caragianis Architect Inc. dated October 13, 2021

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009)

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

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

Max Day = Average Day Demand * Max Day

Peak Hour = Average Day Demand * Peak Hour

CROZIER & ASSOCIATES Consulting Engineers

6333 Hurontario Street
Fire Protection Volume Calculation
CFCA File: 1644-5564

Date: 2022.11.09
Design: AS
Check: ADF

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

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

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

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

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

Proposed Buildings

Floor 2	4,557	sq.m	100%
Floor 3	4,557	sq.m	25%
Floor 4	4,557	sq.m	25%

Area = 6,836 sq.m — Area of the largest floor plus 25% of each of the two immediately adjoining floors

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

Therefore F = 14,551 L/min

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

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

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

Non-Combustible	0% reduction

0 L/min reduction
14,551 L/min

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

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

As part of this analysis, the building will have automatic sprinkler protection: 50%

7,276 L/min reduction

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

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

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		**Distance (m)**	**Charge (%)**	**Surcharge (L/s)**
NW	Commercial Plaza	12	15%	2,183
NE	Warehouse	40	5%	728
SE	Warehouse	22	10%	1,455

4,365 L/min Surcharge

Determine Required Fire Flow

No.1	14,551		
No. 2	0 reduction		
No. 3	-7,276 reduction		
No. 4	4,365 surcharge		
Required Flow:	**11,641 L/min**		
Rounded to nearest 1000 L/min:	**12,000 L/min**	or	**200.0 L/s**
			3,170 USGPM

Determine Required Duration

Rounded to nearest 1000 L/min:	12,000 L/min
Duration for 2,000 L/min:	**2.50 hour**

Dymon Group of Companies
2-1380 Walkley Road
Ottawa, Ontario
K1H 8K3

October 22nd, 2020

RE: Fire Flow Testing, 8333 Hurontario Street, Mississauga, ON

Watermark has conducted one fire flow capacity test in the vicinity of 8333 Hurontario Street, Mississauga, Ontario. The testing was completing in accordance with NFPA 291. Region of Peel operations staff were on hand to assist.

Static pressure prior to the test was observed to be 44 PSI. Using 1 x 4" port plus 2 x 2.5" ports, a maximum flow rate of 2400 USGPM was achieved. Residual pressure was observed to be 38 PSI, or 13% of static. As the pressure drop was less than 25%, this test should not be used for NFPA purposes; however the high flow rate achieved can be used to validate the results.

Equipment:

Flow: 1 x 4" HoseMonster with integrated 4" Pitotless Nozzle
Flow: 2 x 2.5" HoseMonster with integrated 2" Pitotless Nozzle
Pressure: HYDREKA Octopus LX Data Logger

We strongly feel that all attempts have been made to ensure that the required data as stipulated will be captured, stored and presented in an accurate, efficient and timely manner for the required period. We are pleased you have selected Watermark again as your data provider, and we look forward to working with you in the future.

Please feel free to contact us if you require any further information.

Kind Regards,

Colin Powell

(519) 217-3439
colin.powell@watermark.ca

Watermark Solutions Limited
117-115 George Street
Oakville, Ontario
L6J 0A2
www.watermark.ca

Hydrant Flow Test Report

Date: 22-Oct-20 Time: 10:15 AM Operator: Colin Powell

Test Location: 1 World Drive Project No.

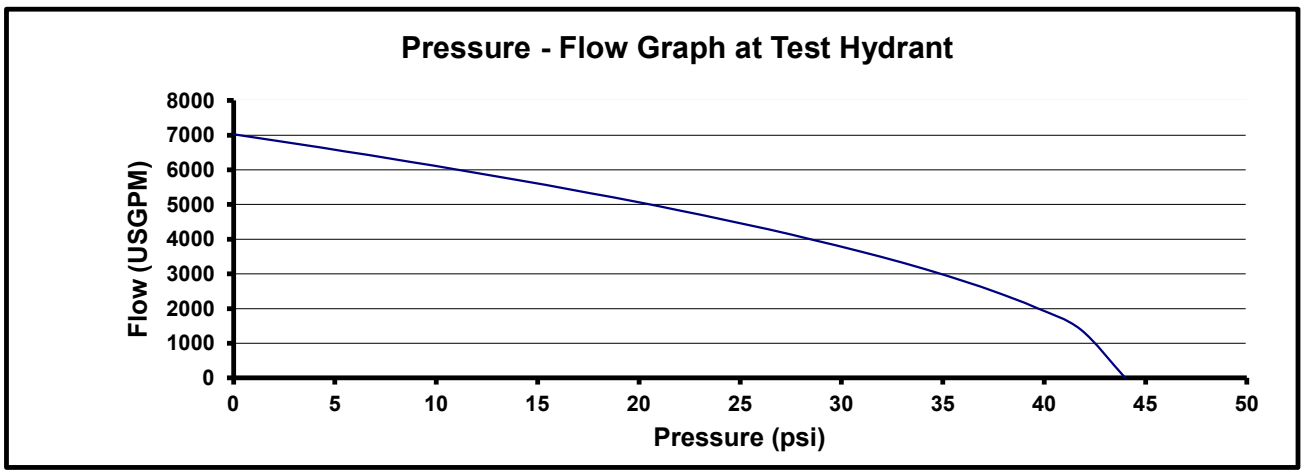
Test Number: 1
N.F.P.A. Colour Code: **BLUE**

STATIC PRESSURE: 44 psi Pressure Drop
RESIDUAL PRESSURE: 38 psi 13.6%

Flow Hydrants Location: 3 World Drive
Opposite 100 World Drive

Hydrant No.	Flow Device	Outlet Dia. (in.)	Coefficient (~0.9)	Pitot Gauge Reading (psi)	Flow (USGPM)
	HoseMonster	2.5	0.9	0	493
	HoseMonster	2.5	0.9	0	562
	HoseMonster	4"			1340
		2.5	0.9		
			Total Flow (USGPM)		2395

Available Flow At Test Hydrant at 20 psi 5063 USGPM 4184 IGPM
Available Flow At Test Hydrant at 10 psi 6111 USGPM 5050 IGPM



Comments/Discrepencies/Diagram:

Watermark Solutions Limited
(705) 250-0368 www.watermark.ca

APPENDIX B

Sanitary Flow Calculations

CROZIER CONSULTING ENGINEERS

PROJECT: 6333 Hurontario
PROJECT NO.: 1644-5564

CREATED BY: AS
CHECKED BY: ADF

DATE: 2020-03-19
UPDATED: 2022-11-10

Existing Sanitary Design Flow

Site Statistics:

Land Use	Area (ha)	Population Density	Units	Population
Existing Commercial	0.80	50	capita/ha	39.9

Total Commerical Population: **40**

Sanitary Design Flow:

Type of Development	Unit Sewage Flow	Units
Institutional, Commercial, Industrial	302.8	L/cap/day

Sanitary Design Flow:

Average Daily Flow = **12,112** L/d
Average Daily Flow = **0.140** L/s

Harmon Peak Factor: M = 4.33

Peak Flow = **0.61** L/s

Infiltration Flow: Infiltration = 0.20 L/ha/s
Total Infiltration = **0.16** L/s

Total Peak Flow: Total Peak Flow = **0.77** L/s

Summary Table:

Municipality	Average Daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)
Region of Peel	0.14	4.33	0.61	0.16	0.77

Notes & References

Site statistics sourced from the site plan provided by Nicholas Caragianis Architect Inc. dated October 19, 2020

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009) - 2.1 - Modified March 2017 REV 0.9 (CS)

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009) - 2.1 - Modified March 2017 REV 0.9 (CS)

Average Daily Flow = Unit Sewage Flow * Population
Average Daily Flow = Unit Sewage Flow * Population / 86,400

M = 1 + 14 / (4 + (p/1000)^.5)

Peak Flow = Average Daily Flow * M

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009) - 2.1 - Modified March 2017 REV 0.9 (CS)

Total Peak Flow = Peak Flows + Total Infiltration

CROZIER CONSULTING ENGINEERS

PROJECT: 6333 Hurontario Street
PROJECT NO.: 1644-5564

CREATED BY: GS
CHECKED BY: AF

DATE: 2020-03-19
UPDATED: 2022-11-10

Proposed Sanitary Design Flow

Site Statistics:

Land Use	Area (ha)	Population Density	Units	Population
Commercial (Self-Storage Building)	1.00	50	capita/ha	50.1

Total Population: **51**

Unit Sewage Flow:

Type of Development	Unit Sewage Flow	Units
Institutional, Commercial, Industrial	302.8	L/cap/day

Average Daily Flow:

Average Daily Flow = **15,443** L/d
Average Daily Flow = **0.179** L/s

Harmon Peak Factor: M = 4.31

Peak Flow: Peak Flow = **0.77** L/s

Infiltration Flow: Infiltration = 0.20 L/ha/s
Total Infiltration = **0.20** L/s

Total Peak Flow: Total Peak Flow = **0.97** L/s

Summary Table:

Municipality	Average Daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)
Region of Peel	0.18	4.31	0.77	0.20	0.97

Notes & References

Site statistics sourced from the site plan provided by Nicholas Caragianis Architect Inc. dated October 13, 2021

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009) - 2.1 - Modified March 2017 REV 0.9 (CS)

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009) - 2.1 - Modified March 2017 REV 0.9 (CS)

Average Daily Flow = Unit Sewage Flow * Population
Average Daily Flow = Unit Sewage Flow * Population / 86,400

M = 1 + 14 / (4 + (p/1000)^.5)

Peak Flow = Average Daily Flow * M

Region of Peel Public Works Design, Specifications & Procedures Manual - Linear Infrastructure Sanitary Sewer Design Criteria (July, 2009) - 2.1 - Modified March 2017 REV 0.9 (CS)

Total Peak Flow = Peak Flows + Total Infiltration

APPENDIX C

Stormwater Management Calculations

CROZIER CONSULTING ENGINEERS

Project: 6333 Hurontario
Project No.: 1164-5564
Created By: AS
Checked By: ADF
Date: 2020-06-18
Updated: 2022-11-10

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	4.60	0.78	59.9
5 yr	820.0	4.60	0.78	80.5
10 yr	1010.0	4.60	0.78	99.2
25 yr	1160.0	4.60	0.78	113.9
50 yr	1300.0	4.70	0.78	127.1
100 yr	1450.0	4.90	0.78	140.7

External Conditions

Land Use	Area (ha)	Area (m^2)	C	Weighted Average C
Catchment EXT-1				
Pervious	0.04	351	0.25	0.25
Impervious	0.00	0	0.90	0.00
Total Sub catchment	**0.04**	**351**	**-**	**0.25**

Pre-Development Conditions

Land Use	Area (ha)	Area (m^2)	C	Weighted Average C
Catchment 101 - 6333 Hurontario				
Pervious	0.33	3250	0.25	0.10
Impervious	0.47	4733	0.90	0.53
Total Sub catchment	**0.80**	**7983**	**-**	**0.64**
Catchment 102 - MTO Patrol Yard				
Pervious	0.93	1301	**0.25**	**0.23**
Impervious	0.07	726	**0.90**	**0.07**
Total Sub catchment	**0.20**	**2027**	**-**	**0.30**
Total Site	**1.00**	**10011**	**-**	**0.75**

*Pre-development runoff coefficient for Catchment 101 is based on Drawing D1 - Storm Design Areas prepared by Winter Associates dated July 1998 that accounted for the entire site area to discharge to World Drive

Post-Development Conditions

Land Use	Area (ha)	Area (m^2)	C	Weighted Average C
Catchment 201 - Controlled to World Drive				
Pervious	0.15	1459	0.25	0.04
Impervious	0.85	8490	0.90	0.76
Total Sub catchment	**1.00**	**9949**	**-**	**0.80**
Catchment 202 - Uncontrolled to Hurontario Street				
Pervious	0.01	62	0.25	0.25
Impervious	0.00	0	0.90	0.00
Total Sub catchment	**0.01**	**62**	**-**	**0.25**
Total Site	**1.00**	**10011**	**-**	**0.80**

Equations:

Intensity
$i(T_d) = A / (T + B)^C$

References

City of Mississauga Development Manual (January 2020). Section 8 - Storm Drainage Design Requirements

CROZIER CONSULTING ENGINEERS

Project: 6333 Hurontario
Project No.: 1164-5564
Created By: AS
Checked By: ADF
Date: 2020-06-18
Updated: 2022-11-10

Rational Calculations - Peak Flow Summary

Peak Flows

External Flows

Catchment 101					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.25	59.89	0.04	0.001	1.46
5 yr	0.25	80.51		0.002	1.96
10 yr	0.25	99.17		0.002	2.42
25 yr	0.28	113.89		0.003	3.06
50 yr	0.30	127.13		0.004	3.72
100 yr	0.31	140.69		0.004	4.29

Pre-Development

Catchment 101					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.64	59.89	0.80	0.084	84.45
5 yr	0.64	80.51		0.114	113.53
10 yr	0.64	99.17		0.140	139.83
25 yr	0.70	113.89		0.177	176.66
50 yr	0.79	127.13		0.224	224.09
100 yr	0.79	140.69		0.248	247.98

Catchment 102					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.30	59.89	0.20	0.010	10.03
5 yr	0.30	80.51		0.013	13.48
10 yr	0.30	99.17		0.017	16.61
25 yr	0.33	113.89		0.021	20.98
50 yr	0.36	127.13		0.026	25.55
100 yr	0.37	140.69		0.029	29.46

Target Site Release Rates - Unit Flow Control

Catchment 201 - Controlled Flow				
Storm Event	**Unit Flow Rate m^3/s/Ha**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.03575	1.00	0.036	35.79
5 yr	0.04746		0.048	47.51
10 yr	0.05546		0.056	55.52
25 yr	0.06559		0.066	65.66
50 yr	0.07315		0.073	73.23
100 yr	0.08075		0.081	80.84

Post-Development

Catchment 201 - Controlled Flow					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.80	59.89	1.00	0.133	133.20
5 yr	0.80	80.51		0.179	179.06
10 yr	0.80	99.17		0.221	220.54
25 yr	0.88	113.89		0.279	278.63
50 yr	0.96	127.13		0.339	339.29
100 yr	1.00	140.69		0.391	391.12

Catchment 202 - Uncontrolled Flow					
Storm Event	**C**	**i (mm/hr)**	**A (ha)**	**Q (m^3/s)**	**Q (L/s)**
2 yr	0.25	59.89	0.01	0.000	0.26
5 yr	0.25	80.51		0.000	0.34
10 yr	0.25	99.17		0.000	0.42
25 yr	0.28	113.89		0.001	0.54
50 yr	0.30	127.13		0.001	0.65
100 yr	0.31	140.69		0.001	0.75

Storm Event (years)	**Peak Flows (L/s)**							**Required Storage** (m^3)
	Q_{EXT}	Q_{pre}	$Q_{post-201}$	$Q_{post-202}$	**Catchment 201**			
					Q_{target}*	Q_{design}	Q_{total}	
2 yr	1.46	94.49	133.20	0.26	35.79	34.93	35.18	93.41
5 yr	1.96	127.01	179.06	0.34	47.51	41.54	41.89	133.40
10 yr	2.42	156.44	220.54	0.42	55.52	48.18	48.60	169.30
25 yr	3.06	197.64	278.63	0.54	65.66	54.00	54.54	226.08
50 yr	3.72	249.64	339.29	0.65	73.23	56.69	57.34	295.36
100 yr	4.29	277.44	391.12	0.75	80.84	61.71	62.47	351.18

Equations:

Peak Flow
$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot A \cdot f$$

Intensity
$$i(T_d) = A / (T + B)^C$$

Adjustment Factor (f) for storms larger than a 10-Year Return Period

f_{25}: **1.1**
f_{50}: **1.2**
f_{100}: **1.25**

**According to Handbook of Engineering Hydrology (2014)*

Project:	6333 Hurontario	**Date:**	**2020-06-18**
Project No.:	1164-5564	**Revised:**	**2022-11-10**
		Designed By:	**AS**
		Checked By:	**ADF**

MODIFIED RATIONAL METHOD CALCULATIONS - 2 YEAR STORM EVENT

Rainfall Intensity Equation:

Intensity
i(Td) = A / (T + B)^C

City of Mississauga IDF (2-Year)	
a=	610
b=	4.60
c=	0.78

CONTROLLED AREA		**UNCONTROLLED AREA**	
Drainage Area ID =	201	Drainage Area ID =	202
Drainage Area =	1.00 ha	Drainage Area =	0.01 ha
Runoff Coefficient =	0.80	Runoff Coefficient =	0.25
Controlled Release Rate at MH1 =	**34.93 L/s**	**Target Site Release Rate =**	**35.79 L/s**
Long Term Groundwater Discharge =	**0.56 L/s**		
Max. Storage Volume Required =	93.41 m3	Controlled Release Rate at MH1 =	34.9 L/s
Storage Volume Provided =	100.77 m3	Uncontrolled Release Rate =	0.3 L/s
		Total Site Release Rate =	**35.18 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff} + Long Term Groundwater Discharge** (L/s)	**$Q_{Release}$** (L/s)	**Storage Volume Required** (m^3)	**Q_{Runoff}** (L/s)
15	59.9	133.9	34.9	89.0	0.3
20	50.2	112.2	34.9	92.7	0.2
25	43.4	97.2	34.9	93.4	0.2
30	38.4	86.1	34.9	92.2	0.2
35	34.6	77.6	34.9	89.6	0.1
40	31.5	70.8	34.9	86.0	0.1
45	29.0	65.2	34.9	81.7	0.1
50	26.9	60.5	34.9	76.7	0.1
55	25.2	56.5	34.9	71.3	0.1
60	23.6	53.1	34.9	65.6	0.1
65	22.3	50.2	34.9	59.4	0.1
70	21.1	47.6	34.9	53.0	0.1
75	20.1	45.2	34.9	46.4	0.1
80	19.1	43.2	34.9	39.5	0.1
85	18.3	41.3	34.9	32.5	0.1
90	17.5	39.6	34.9	25.3	0.1
95	16.9	38.1	34.9	17.9	0.1
100	16.2	36.7	34.9	10.4	0.1
105	15.6	35.4	34.9	2.8	0.1
110	15.1	34.2	34.2	0.0	0.1
115	14.6	33.1	33.1	0.0	0.1
120	14.2	32.1	32.1	0.0	0.1
125	13.7	31.1	31.1	0.0	0.1
130	13.3	30.2	30.2	0.0	0.1
135	13.0	29.4	29.4	0.0	0.1
140	12.6	28.6	28.6	0.0	0.1
145	12.3	27.9	27.9	0.0	0.1
150	12.0	27.2	27.2	0.0	0.1
155	11.7	26.5	26.5	0.0	0.0
160	11.4	25.9	25.9	0.0	0.0
165	11.1	25.3	25.3	0.0	0.0

Project:	6333 Hurontario	**Date:**	**2020-06-18**
Project No.:	1164-5564	**Revised:**	**2022-11-10**
		Designed By:	**AS**
		Checked By:	**ADF**

MODIFIED RATIONAL METHOD CALCULATIONS - 5 YEAR STORM EVENT

Rainfall Intensity Equation:

Intensity
i(Td) = A / (T + B)^C

City of Mississauga IDF (5-Year)	
a=	820
b=	4.60
c=	0.78

CONTROLLED AREA		**UNCONTROLLED AREA**	
Drainage Area ID =	201	Drainage Area ID =	202
Drainage Area =	1.00 ha	Drainage Area =	0.01 ha
Runoff Coefficient =	0.80	Runoff Coefficient =	0.25
Controlled Release Rate at MH1 =	**41.54 L/s**	**Target Site Release Rate =**	**47.51 L/s**
Long Term Groundwater Discharge =	**0.56 L/s**		
Max. Storage Volume Required =	133.40 m3	Controlled Release Rate at MH1 =	41.5 L/s
Storage Volume Provided =	165.97 m3	Uncontrolled Release Rate =	0.3 L/s
		Total Site Release Rate =	**41.89 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff} + Long Term Groundwater Discharge** (L/s)	**$Q_{Release}$** (L/s)	**Storage Volume Required** (m^3)	**Q_{Runoff}** (L/s)
15	80.5	179.7	41.5	124.4	0.3
20	67.4	150.6	41.5	130.9	0.3
25	58.4	130.5	41.5	133.4	0.2
30	51.7	115.6	41.5	133.3	0.2
35	46.5	104.1	41.5	131.3	0.2
40	42.4	94.9	41.5	128.1	0.2
45	39.0	87.4	41.5	123.8	0.2
50	36.2	81.1	41.5	118.8	0.2
55	33.8	75.8	41.5	113.1	0.1
60	31.8	71.2	41.5	106.9	0.1
65	30.0	67.2	41.5	100.2	0.1
70	28.4	63.7	41.5	93.2	0.1
75	27.0	60.6	41.5	85.8	0.1
80	25.7	57.8	41.5	78.2	0.1
85	24.6	55.3	41.5	70.3	0.1
90	23.6	53.0	41.5	62.1	0.1
95	22.7	51.0	41.5	53.8	0.1
100	21.8	49.1	41.5	45.3	0.1
105	21.0	47.4	41.5	36.6	0.1
110	20.3	45.8	41.5	27.8	0.1
115	19.6	44.3	41.5	18.8	0.1
120	19.0	42.9	41.5	9.8	0.1
125	18.4	41.6	41.5	0.6	0.1
130	17.9	40.4	40.4	0.0	0.1
135	17.4	39.3	39.3	0.0	0.1
140	16.9	38.3	38.3	0.0	0.1
145	16.5	37.3	37.3	0.0	0.1
150	16.1	36.3	36.3	0.0	0.1
155	15.7	35.5	35.5	0.0	0.1
160	15.3	34.6	34.6	0.0	0.1
165	15.0	33.8	33.8	0.0	0.1

Project:	6333 Hurontario	**Date:**	**2020-06-18**
Project No.:	1164-5564	**Revised:**	**2022-11-10**
		Designed By:	**AS**
		Checked By:	**ADF**

MODIFIED RATIONAL METHOD CALCULATIONS - 10 YEAR STORM EVENT

Rainfall Intensity Equation:

Intensity
i(Td) = A / (T + B)^C

City of Mississauga IDF (10-Year)	
a=	1010
b=	4.60
c=	0.78

CONTROLLED AREA		**UNCONTROLLED AREA**	
Drainage Area ID =	201	Drainage Area ID =	202
Drainage Area =	1.00 ha	Drainage Area =	0.01 ha
Runoff Coefficient =	0.80	Runoff Coefficient =	0.25
Controlled Release Rate at MH1 =	**48.18 L/s**	**Target Site Release Rate =**	**55.52 L/s**
Long Term Groundwater Discharge =	**0.56 L/s**		
Max. Storage Volume Required =	169.30 m3	Controlled Release Rate at MH1 =	48.2 L/s
Storage Volume Provided =	195.61 m3	Uncontrolled Release Rate =	0.4 L/s
		Total Site Release Rate =	**48.60 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff} + Long Term Groundwater Discharge** (L/s)	**$Q_{Release}$** (L/s)	**Storage Volume Required** (m^3)	**Q_{Runoff}** (L/s)
15	99.2	221.3	48.2	155.8	0.4
20	83.1	185.4	48.2	164.7	0.4
25	71.9	160.6	48.2	168.6	0.3
30	63.7	142.2	48.2	169.3	0.3
35	57.3	128.1	48.2	167.8	0.2
40	52.2	116.8	48.2	164.7	0.2
45	48.1	107.5	48.2	160.3	0.2
50	44.6	99.8	48.2	154.9	0.2
55	41.7	93.3	48.2	148.8	0.2
60	39.1	87.6	48.2	142.0	0.2
65	36.9	82.7	48.2	134.6	0.2
70	35.0	78.4	48.2	126.8	0.1
75	33.2	74.5	48.2	118.6	0.1
80	31.7	71.1	48.2	110.0	0.1
85	30.3	68.0	48.2	101.1	0.1
90	29.0	65.2	48.2	92.0	0.1
95	27.9	62.7	48.2	82.6	0.1
100	26.9	60.3	48.2	73.0	0.1
105	25.9	58.2	48.2	63.1	0.1
110	25.0	56.2	48.2	53.1	0.1
115	24.2	54.4	48.2	43.0	0.1
120	23.4	52.7	48.2	32.7	0.1
125	22.7	51.1	48.2	22.2	0.1
130	22.1	49.7	48.2	11.6	0.1
135	21.4	48.3	48.2	0.9	0.1
140	20.9	47.0	47.0	0.0	0.1
145	20.3	45.8	45.8	0.0	0.1
150	19.8	44.6	44.6	0.0	0.1
155	19.3	43.6	43.6	0.0	0.1
160	18.9	42.5	42.5	0.0	0.1
165	18.4	41.6	41.6	0.0	0.1

Project:	6333 Hurontario	**Date:**	**2020-06-18**
Project No.:	1164-5564	**Revised:**	**2022-11-10**
		Designed By:	**AS**
		Checked By:	**ADF**

MODIFIED RATIONAL METHOD CALCULATIONS - 25 YEAR STORM EVENT

Rainfall Intensity Equation:

Intensity
i(Td) = A / (T + B)^C

City of Mississauga IDF (25-Year)	
a=	1160
b=	4.60
c=	0.78

CONTROLLED AREA		**UNCONTROLLED AREA**	
Drainage Area ID =	201	Drainage Area ID =	202
Drainage Area =	1.00 ha	Drainage Area =	0.01 ha
Runoff Coefficient =	0.88	Runoff Coefficient =	0.25
Controlled Release Rate at MH1 =	**54.00 L/s**	**Target Site Release Rate =**	**65.66 L/s**
Long Term Groundwater Discharge =	**0.56 L/s**		
Max. Storage Volume Required =	226.08 m3	Controlled Release Rate at MH1 =	54.0 L/s
Storage Volume Provided =	254.88 m3	Uncontrolled Release Rate =	0.5 L/s
		Total Site Release Rate =	**54.49 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff} + Long Term Groundwater Discharge** (L/s)	**$Q_{Release}$** (L/s)	**Storage Volume Required** (m^3)	**Q_{Runoff}** (L/s)
15	113.9	279.4	54.0	202.8	0.5
20	95.4	234.1	54.0	216.1	0.4
25	82.6	202.7	54.0	223.1	0.4
30	73.1	179.5	54.0	226.0	0.3
35	65.8	161.7	54.0	226.1	0.3
40	60.0	147.4	54.0	224.1	0.3
45	55.2	135.7	54.0	220.6	0.2
50	51.2	126.0	54.0	215.9	0.2
55	47.8	117.7	54.0	210.1	0.2
60	44.9	110.5	54.0	203.5	0.2
65	42.4	104.3	54.0	196.3	0.2
70	40.2	98.9	54.0	188.4	0.2
75	38.2	94.0	54.0	180.0	0.2
80	36.4	89.7	54.0	171.2	0.2
85	34.8	85.8	54.0	162.0	0.1
90	33.4	82.2	54.0	152.5	0.1
95	32.0	79.0	54.0	142.6	0.1
100	30.8	76.1	54.0	132.5	0.1
105	29.7	73.4	54.0	122.1	0.1
110	28.7	70.9	54.0	111.5	0.1
115	27.8	68.6	54.0	100.6	0.1
120	26.9	66.4	54.0	89.6	0.1
125	26.1	64.5	54.0	78.4	0.1
130	25.3	62.6	54.0	67.0	0.1
135	24.6	60.9	54.0	55.5	0.1
140	24.0	59.2	54.0	43.9	0.1
145	23.3	57.7	54.0	32.1	0.1
150	22.7	56.2	54.0	20.2	0.1
155	22.2	54.9	54.0	8.1	0.1
160	21.7	53.6	53.6	0.0	0.1
165	21.2	52.4	52.4	0.0	0.1

Project:	6333 Hurontario	**Date:**	**2020-06-18**
Project No.:	1164-5564	**Revised:**	**2022-11-10**
		Designed By:	**AS**
		Checked By:	**ADF**

MODIFIED RATIONAL METHOD CALCULATIONS - 50 YEAR STORM EVENT

Rainfall Intensity Equation:

Intensity
i(Td) = A / (T + B)^C

City of Mississauga IDF (50-Year)	
a=	1300
b=	4.70
c=	0.78

CONTROLLED AREA		**UNCONTROLLED AREA**	
Drainage Area ID =	201	Drainage Area ID =	202
Drainage Area =	1.00 ha	Drainage Area =	0.01 ha
Runoff Coefficient =	0.96	Runoff Coefficient =	0.25
Controlled Release Rate at MH1 =	**56.69 L/s**	**Target Site Release Rate =**	**73.23 L/s**
Long Term Groundwater Discharge =	**0.56 L/s**		
Max. Storage Volume Required =	295.36 m3	Controlled Release Rate at MH1 =	56.7 L/s
Storage Volume Provided =	299.34 m3	Uncontrolled Release Rate =	0.5 L/s
		Total Site Release Rate =	**57.23 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff} + Long Term Groundwater Discharge** (L/s)	**$Q_{Release}$** (L/s)	**Storage Volume Required** (m^3)	**Q_{Runoff}** (L/s)
15	127.1	340.1	56.7	255.1	0.5
20	106.6	285.2	56.7	274.2	0.5
25	92.3	247.1	56.7	285.6	0.4
30	81.7	218.9	56.7	292.0	0.3
35	73.6	197.1	56.7	294.9	0.3
40	67.1	179.8	56.7	295.4	0.3
45	61.8	165.5	56.7	293.9	0.3
50	57.3	153.6	56.7	290.9	0.2
55	53.5	143.6	56.7	286.6	0.2
60	50.3	134.9	56.7	281.4	0.2
65	47.4	127.3	56.7	275.3	0.2
70	45.0	120.6	56.7	268.5	0.2
75	42.7	114.7	56.7	261.0	0.2
80	40.8	109.4	56.7	253.1	0.2
85	39.0	104.6	56.7	244.6	0.2
90	37.4	100.3	56.7	235.7	0.2
95	35.9	96.4	56.7	226.4	0.2
100	34.5	92.8	56.7	216.8	0.1
105	33.3	89.5	56.7	206.9	0.1
110	32.2	86.5	56.7	196.6	0.1
115	31.1	83.7	56.7	186.2	0.1
120	30.1	81.1	56.7	175.5	0.1
125	29.2	78.6	56.7	164.6	0.1
130	28.4	76.4	56.7	153.4	0.1
135	27.6	74.2	56.7	142.1	0.1
140	26.8	72.2	56.7	130.6	0.1
145	26.1	70.4	56.7	119.0	0.1
150	25.5	68.6	56.7	107.2	0.1
155	24.9	66.9	56.7	95.3	0.1
160	24.3	65.4	56.7	83.2	0.1
165	23.7	63.9	56.7	71.0	0.1

Project:	6333 Hurontario	**Date:**	**2020-06-18**
Project No.:	1164-5564	**Revised:**	**2022-11-10**
		Designed By:	**AS**
		Checked By:	**ADF**

MODIFIED RATIONAL METHOD CALCULATIONS - 100 YEAR STORM EVENT

Rainfall Intensity Equation:

Intensity
i(Td) = A / (T + B)^C

City of Mississauga IDF (100-Year)	
a=	1450
b=	4.90
c=	0.78

CONTROLLED AREA		**UNCONTROLLED AREA**	
Drainage Area ID =	201	Drainage Area ID =	202
Drainage Area =	1.00 ha	Drainage Area =	0.01 ha
Runoff Coefficient =	1.00	Runoff Coefficient =	0.25
Controlled Release Rate at MH1 =	**61.71 L/s**	**Target Site Release Rate =**	**80.84 L/s**
Long Term Groundwater Discharge =	**0.56 L/s**		
Max. Storage Volume Required =	351.18 m3	Controlled Release Rate at MH1 =	61.7 L/s
Storage Volume Provided =	355.31 m3	Uncontrolled Release Rate =	0.6 L/s
		Total Site Release Rate =	**62.32 L/s**

Time (minutes)	**Rainfall Intensity** (mm/hr)	**Q_{Runoff} + Long Term Groundwater Discharge** (L/s)	**$Q_{Release}$** (L/s)	**Storage Volume Required** (m^3)	**Q_{Runoff}** (L/s)
15	140.7	392.0	61.7	297.2	0.6
20	118.1	329.2	61.7	321.0	0.5
25	102.4	285.5	61.7	335.6	0.4
30	90.8	253.1	61.7	344.5	0.4
35	81.8	228.1	61.7	349.3	0.3
40	74.6	208.0	61.7	351.2	0.3
45	68.7	191.6	61.7	350.8	0.3
50	63.8	177.9	61.7	348.6	0.3
55	59.6	166.3	61.7	345.0	0.3
60	56.0	156.2	61.7	340.2	0.2
65	52.8	147.5	61.7	334.4	0.2
70	50.0	139.8	61.7	327.8	0.2
75	47.6	132.9	61.7	320.4	0.2
80	45.4	126.8	61.7	312.4	0.2
85	43.4	121.3	61.7	303.8	0.2
90	41.6	116.3	61.7	294.7	0.2
95	40.0	111.7	61.7	285.2	0.2
100	38.5	107.6	61.7	275.3	0.2
105	37.1	103.8	61.7	265.0	0.2
110	35.8	100.3	61.7	254.4	0.2
115	34.7	97.0	61.7	243.5	0.1
120	33.6	94.0	61.7	232.3	0.1
125	32.6	91.2	61.7	220.8	0.1
130	31.6	88.5	61.7	209.1	0.1
135	30.7	86.1	61.7	197.2	0.1
140	29.9	83.8	61.7	185.1	0.1
145	29.1	81.6	61.7	172.8	0.1
150	28.4	79.5	61.7	160.4	0.1
155	27.7	77.6	61.7	147.7	0.1
160	27.0	75.8	61.7	135.0	0.1
165	26.4	74.0	61.7	122.0	0.1

CROZIER CONSULTING ENGINEERS

Project:	6333 Hurontario	**Date:**	**2020-06-18**
Project No.:	1164-5564	**Revised:**	**2022-11-10**
		Designed By:	
		Checked By:	**ADF**

MODIFIED RATIONAL METHOD CALCULATIONS - 100 YEAR STORM EVENT

Rainfall Intensity Equation:

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

City of Mississauga IDF (100-Year)	
a=	1450
b=	4.90
c=	0.78

CONTROLLED AREA

Drainage Area ID =	EXT-1
Drainage Area =	0.0351 ha
Runoff Coefficient =	0.25
LID Release Rate =	**0.15 L/s**
Max. Storage Volume Required =	**4.9 m3**

LID SIZING

Minimum Infiltration rate of MW102 (K from HydroG = 1.06 x10^{-7} m/s) =	25.37 mm/hr
L (m) =	7.00 m
W (m) =	3.00 m
H (m) =	0.60 m
Area of trench 1 (m^2)=	21.00 m2
Volume of trench 1 (m^3) =	12.60 m3
Release rate (L/s) =	0.15 L/s
Void ratio =	0.4
Volume Provided =	**5.04 m3**

Time (minutes)	Rainfall Intensity (mm/hr)	Q_{Runoff} (L/s)	$Q_{Release}$ (L/s)	Storage Volume Required (m^3)	
15	140.7	3.4	0.1	3.0	
20	118.1	2.9	0.1	3.3	
25	102.4	2.5	0.1	3.5	
30	90.8	2.2	0.1	3.7	
35	81.8	2.0	0.1	3.9	
40	74.6	1.8	0.1	4.0	
45	68.7	1.7	0.1	4.1	
50	63.8	1.6	0.1	4.2	
55	59.6	1.5	0.1	4.3	
60	56.0	1.4	0.1	4.4	
65	52.8	1.3	0.1	4.4	
70	50.0	1.2	0.1	4.5	
75	47.6	1.2	0.1	4.6	
80	45.4	1.1	0.1	4.6	
85	43.4	1.1	0.1	4.6	
90	41.6	1.0	0.1	4.7	
95	40.0	1.0	0.1	4.7	
100	38.5	0.9	0.1	4.7	
105	37.1	0.9	0.1	4.8	
110	35.8	0.9	0.1	4.8	
115	34.7	0.8	0.1	4.8	
120	33.6	0.8	0.1	4.8	
125	32.6	0.8	0.1	4.8	
130	31.6	0.8	0.1	4.9	
135	30.7	0.7	0.1	4.9	
140	29.9	0.7	0.1	4.9	
145	29.1	0.7	0.1	4.9	
150	28.4	0.7	0.1	4.9	
155	27.7	0.7	0.1	4.9	
160	27.0	0.7	0.1	4.9	
165	26.4	0.6	0.1	4.9	

CROZIER
CONSULTING ENGINEERS

Project: 6333 Hurontario
Project No.: 1164-5564
Designed By: AS
Checked By: ADF
Date: 2020-06-18
Date Updated: 2022-11-10

Orifice & Detention Tank Design

Orifice: $Q=CA(2gH)^{0.5}$	
Discharge Coef., Cd=	0.80
Orifice Diameter (mm) =	140
Area of Orifice (m^2) =	0.0154
Orifice (Side/Bottom) =	Side
Invert (m) =	195.74

Storage Requirements

Required Active Storage:	351.18	m^3
Required Dead Storage:	50.05	m^3

Tank Parameters and Dimensions

Outlet Invert:	195.74	masl
Bottom of Tank:	195.74	masl
Max Provided Active Storage:	355.31	m^3
Max Provided Dead Storage:	56.01	m^3

Active Stage Storage Discharge

Storm Event	Water Elev.	Depth	Design Head	Volume	Orifice Flow
	(m)	(m)	(m)	(m^3)	(Side) L/s
	195.74	0.00	0.00	0.00	0.00
	195.80	0.06	0.13	17.78	19.67
	195.85	0.11	0.18	32.60	23.14
	195.90	0.16	0.23	47.42	26.16
	195.95	0.21	0.28	62.24	28.86
	196.00	0.26	0.33	77.06	31.34
	196.05	0.31	0.38	91.88	33.63
2-year	**196.08**	**0.34**	**0.41**	**100.77**	**34.93**
	196.10	0.36	0.43	101.88	35.77
	196.15	0.41	0.48	106.69	37.79
	196.20	0.46	0.53	121.51	39.71
5-year	**196.25**	**0.51**	**0.58**	**136.33**	**41.54**
	196.30	0.56	0.63	151.15	43.30
	196.35	0.61	0.68	165.97	44.98
	196.40	0.66	0.73	180.79	46.61
10-year	**196.45**	**0.71**	**0.78**	**195.61**	**48.18**
	196.50	0.76	0.83	210.42	49.70
	196.55	0.81	0.88	225.24	51.17
	196.60	0.86	0.93	240.06	52.60
25-year	**196.65**	**0.91**	**0.98**	**254.88**	**54.00**
	196.70	0.96	1.03	284.52	55.36
50-year	**196.75**	**1.01**	**1.08**	**299.34**	**56.69**
	196.80	1.06	1.13	314.15	57.99
	196.85	1.11	1.18	328.97	59.26
	196.90	1.16	1.23	342.14	60.50
100-year	**196.95**	**1.21**	**1.28**	**355.31**	**61.71**
	197.00	1.26	1.33	368.48	62.91

Modified Rational Design Summary

Storm Event	Target Flow Rate (TRCA Unitflow Rate)	Post-Development Controlled Flow Rate	Volume Required	Volume Provided
	L/s	L/s	m^3	m^3
2	35.79	34.93	93.41	100.77
5	47.51	41.54	133.40	136.33
10	55.52	48.18	169.30	195.61
25	65.66	54.00	226.08	254.88
50	73.23	56.69	295.36	299.34
100	80.84	61.71	351.18	355.31

CROZIER CONSULTING ENGINEERS

PROJECT: 6333 Hurontario
PROJECT No.: 1164-5564

Created By: AS
Checked By: ADF

Date: 2020-06-18
Updated: 2022-11-10

WATER QUALITY CALCULATIONS

Catchment	Land Use	Area (m^2)	Treatment Process	Water Quality Target (%)	% of Total Development Area	TSS Removal Credit (%)	Total TSS Removal (%)
201	Pervious	1,459	Up-Flo Filter	80.0%	14.6%	80.0%	11.7%
	Impervious	8,490			84.8%		67.8%
202	Impervious	62	Landscape		0.6%	80.0%	0.5%
	TOTAL	**10,011**			**100.0%**	**-**	**80.0%**

CROZIER CONSULTING ENGINEERS

Project: 6333 Hurontario
Project No.: 1164-5564

Created By: AS
Checked By: ADF

Date: 2020-06-18
Updated: 2022-11-10

WATER BALANCE CALCULATIONS

Site Area =	10,010.53	m^2
Rainfall Depth =	5	mm
Required Retention Voume =	50.05	m^3

CROZIER CONSULTING ENGINEERS

6333 Hurontario Minor Storm System
10-YEAR & 100-YEAR STORM SEWER DESIGN SHEET

10 YEAR DESIGN STORM - CITY OF MISSISSAUGA
A= 1010 **B= 4.60** **C= 0.78**

100 YEAR DESIGN STORM - CITY OF MISSISSAUGA
A= 1450 **B= 4.9** **C= 0.78**

PROJECT: 6333 Hurontario
PROJECT No.: 1164-5564
DATE: October 1, 2022
Revised: November 10, 2022
Reviewed By: ADF

Adjustment Factor (f) for storms larger than a 10-Year Return Period f_{100}: **1.25**

INITIAL TIME OF CONCENTRATION (min) 15.00 CONCRETE 'n' 0.013 PVC 'n' 0.009 0.013

Catchment ID	Upstream MH	Downstream MH	AREA (A) (HA)	RUNOFF COEFF (C)	A x C	TIME OF CONC. (min)	I (10YR) (mm/hr)	I (100YR) (mm/hr)	Q (10YR) (m^3/sec)	Q (100YR) (m^3/sec)	SLOPE (%)	PIPE DIA. (mm)	PIPE AREA (m^2)	VEL. (m/sec)	LENGTH (m)	TIME OF FLOW (min)	CAPACITY (m^3/sec)	PERCENT CAPACITY - 10YR (%)	PERCENT CAPACITY - 100YR (%)
U/S of Orifice - Pipes Sized for 100YR Event																			
A1	CB1	MH1	0.11	0.66	0.07	15.00	99.17	140.69	**0.021**	**0.037**	0.50	300	0.07	1.40	53.0	0.63	**0.10**	21%	37%
A2	MH1	MH2	0.07	0.87	0.06	15.63	96.74	137.30	**0.037**	**0.065**	0.30	375	0.11	1.26	61.7	0.82	**0.14**	26%	47%
A3	MH2	CBMH1	0.12	0.72	0.09	16.45	93.79	133.17	**0.059**	**0.105**	0.20	450	0.16	0.80	31.6	0.66	**0.13**	46%	82%
A4	CBMH1	CBMH2	0.05	0.79	0.04	17.11	91.57	130.06	**0.070**	**0.124**	0.20	450	0.16	0.80	43.1	0.90	**0.13**	55%	97%
A5	CBMH2	MH3	0.09	0.76	0.07	18.00	88.73	126.08	**0.086**	**0.153**	0.20	525	0.22	0.89	30.9	0.58	**0.19**	45%	79%
	MH3	TANK				18.58	86.99	123.64	**0.086**	**0.153**	0.20	525	0.22	0.89	6.3	0.12	**0.19**	45%	79%
A7	PLUG	MH1R	0.44	0.90	0.39	15.00	99.17	140.69	**0.109**	**0.193**	2.00	300	0.07	2.79	1.5	0.01	**0.20**	55%	97%
	MH1R	TANK				15.01	99.13	140.64	**0.109**	**0.193**	2.00	300	0.07	2.79	4.0	0.02	**0.20**	55%	97%
D/S of Orifice - Pipes Sized for 10YR Event (REFER TO SSD FOR 10YR & 100 YR MAXIMUM ORIFICE DESIGN FLOWS)																			
A6	TANK	MH5	0.12	0.74	0.09		**ORIFICE TUBE**		**0.048**	**0.062**	0.40	140	0.02	0.75	1.8	0.04	**0.01**	416%	533%
	MH5	MH6							**0.048**	**0.062**	0.30	300	0.07	1.08	15.8	0.24	**0.08**	63%	81%
	MH6	MH7							**0.048**	**0.062**	0.30	300	0.07	1.08	45.9	0.71	**0.08**	63%	81%
	MH7	MH8							**0.048**	**0.062**	0.30	300	0.07	1.08	16.5	0.25	**0.08**	63%	81%

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.

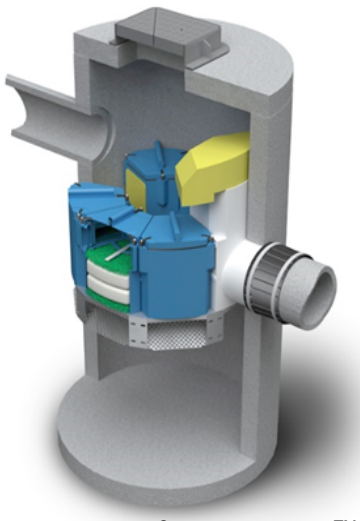


Figure 1: Up-Flo® Filter with CPZ™ Media

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.

Hydro Up-Flo® Filter
Net Annual Water Quality Worksheet

Hydro International

Project Name:	6333 Hurontario	**Report Date:**	2022.11.02
Street:	Hurontario	**City:**	Mississauga
Province:	Ontario	**Country:**	Canada
Designer:	Andrew Farina	**email:**	afarina@cfcrozier.ca

Paste

Treatment Parameters:

Site ID:		
Area:	1	ha
Percent Impervious:	85%	
Rational C value:	0.8	Calc. Cn
Rainfall Station:	Toronto Pearson Intl AP, ONT	MAP
Peak Storm Flow:	202	L/s
Peak Storm Flow Return:	-	yrs
Number of Filter Modules	11	

Installation Configuration:

Outlet Pipe Size:	300	mm	
Inlet Pipe 1 Size:	140	mm	
Inlet Pipe 2 Size:		mm	
Inlet Pipe 3 Size:		mm	
Rim Level:	198.550	m	
Outlet Pipe Invert:	195.470	m	*0*
Invert Pipe 1:	195.730	m	*0*
Invert Pipe 2:	-	m	*0*
Invert Pipe 3:	-	m	*0*

Intensity*	Fraction of Annual Distribution*	Filter Removal Efficiency	Weighted Net Annuall Efficiency
(mm/hr)	(%)	(%)	(%)
0.50	0.2%	92.2%	0.2%
1.00	15.0%	91.3%	13.7%
1.50	17.3%	90.3%	15.6%
2.00	14.5%	89.3%	13.0%
2.50	3.1%	88.3%	2.7%
3.00	2.6%	87.4%	2.2%
3.50	6.2%	86.4%	5.3%
4.00	4.6%	85.4%	4.0%
4.50	1.6%	84.4%	1.4%
5.00	4.9%	83.5%	4.1%
6.00	4.1%	81.5%	3.3%
7.00	4.4%	79.6%	3.5%
8.00	3.2%	77.6%	2.5%
9.00	2.2%	75.7%	1.6%
10.00	2.4%	73.7%	1.7%
20.00	9.4%	54.2%	5.1%
30.00	2.4%	34.7%	0.8%
40.00	0.9%	15.2%	0.1%
50.00	0.5%	0.0%	0.0%
100.00	0.4%	0.0%	0.0%
150.00	0.0%	0.0%	0.0%
		Net Annual Treatment	81.0%
		Total Net Annual Removal Efficiency:	**81.0%**
		Total Runoff Volume Treated:	**90.1%**

1. Rainfall Data: 1960:2013, HLY03, Toronto Pearson Intl AP , ON, 6158733.

2. Based on NJDEP test protocols post 2015 independently verified.

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:

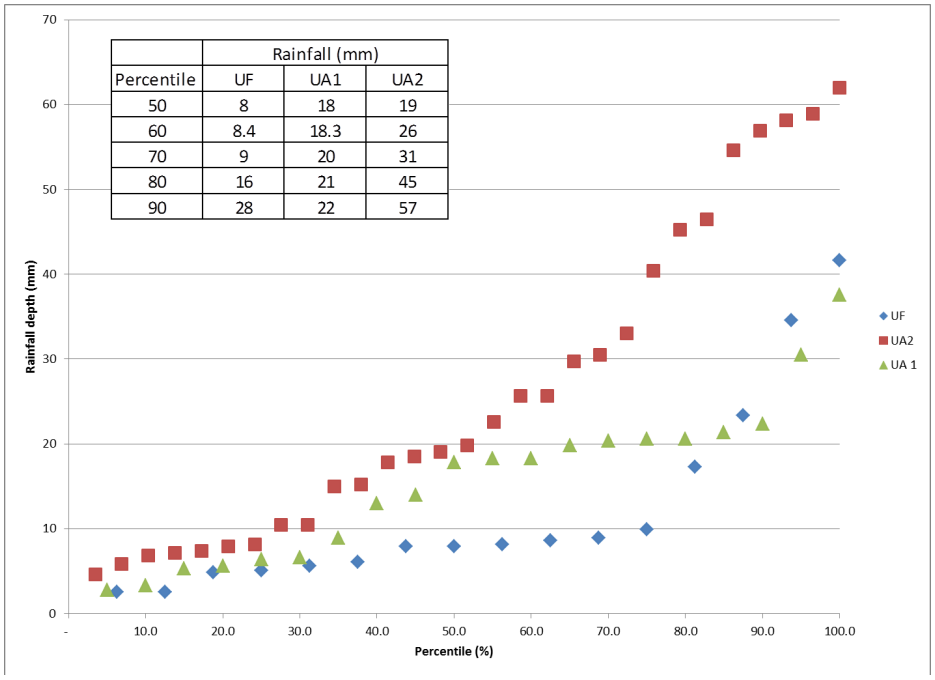
- TSS – ASTM D2540
- SSC – ASTM D3977-97(2013) Standard Test Methods for Determining Sediment Concentration in Water Samples
- PSD – ASTM D422 – 63 Standard Test Method for Particle-Size Analysis of Soils and ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- PSD – ASTM 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

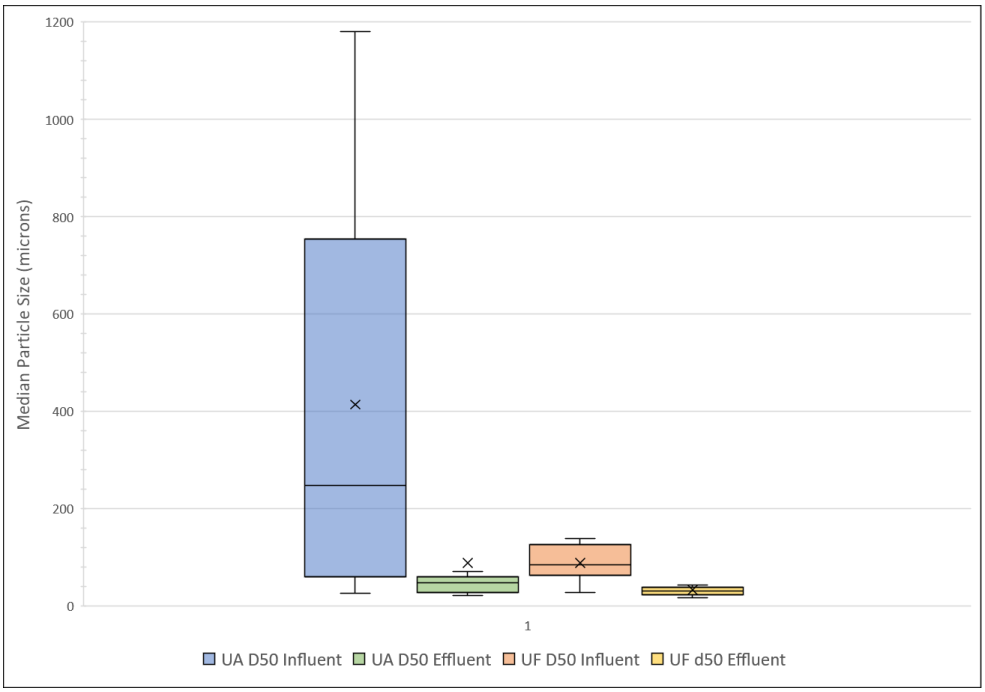
For UF monitoring, a total of 16 storm events, with varying rainfall intensity and runoff volume from event to event, were monitored. The cumulative rainfall depth was 7.66 inches (195 mm) and the cumulative influent runoff volume was 20,022 gallons (7.65 m^3). The entire volume was treated by the Up-Flo® 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.

"NJCAT Technology Verification Up-Flo® Filter", January 2015.

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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:
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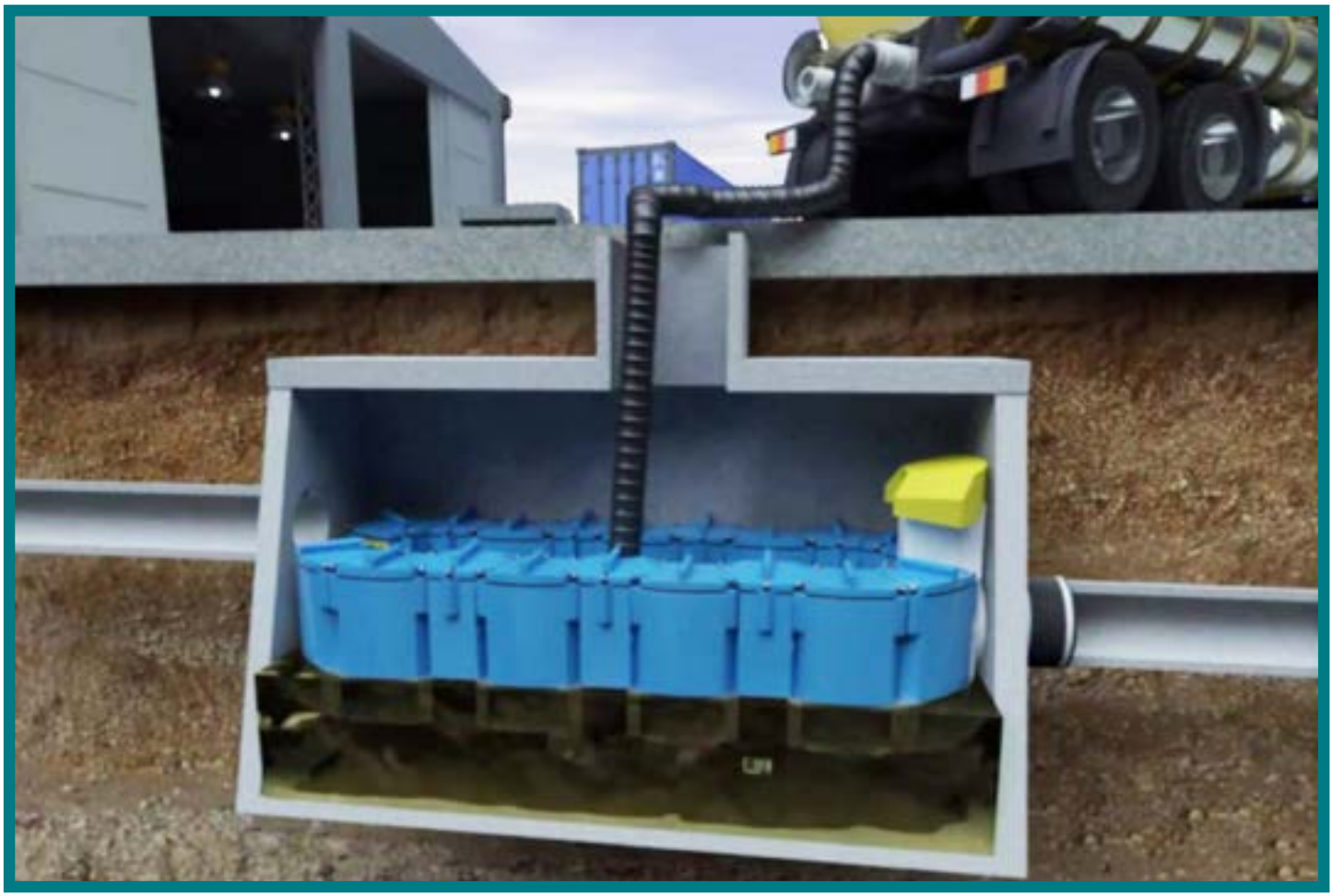
Signed for Hydro International: *Original signed by:* *Phillip Taylor* Phillip Taylor Technical Product Manager, Americas Stormwater	Signed for VerifiGlobal: *Original signed by:* *Thomas Bruun* Thomas Bruun, Managing Director *Original signed by:* *John Neate* John Neate, Managing Director

Hydro International®



Operation and Maintenance Manual

Stormwater Solutions

Up-Flo® Filter

Filtration System for Stormwater Treatment

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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.

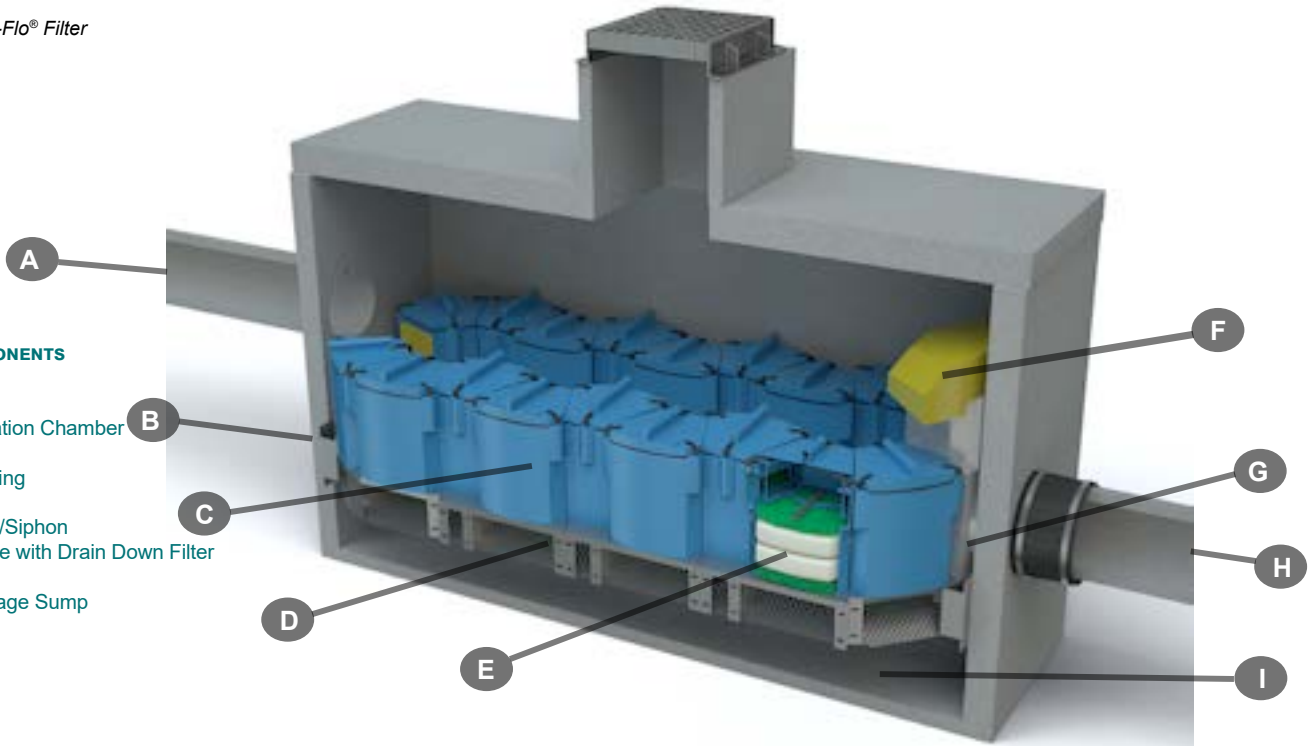
Office hours Monday thru Friday 8:00 A.M. to 5:00 P.M. EST
Toll free: 1-888-382-7808
Phone: 207-756-6200
Fax: 207-756-6212
Email: services@hydro-int.com

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.

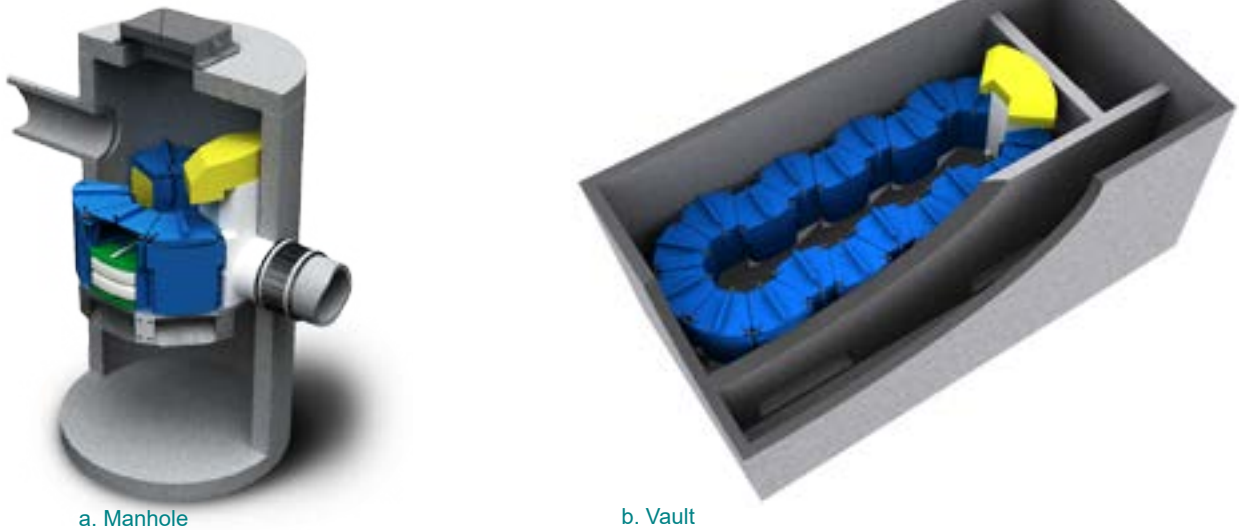
Fig.1 *The Up-Flo® Filter*



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.*

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.

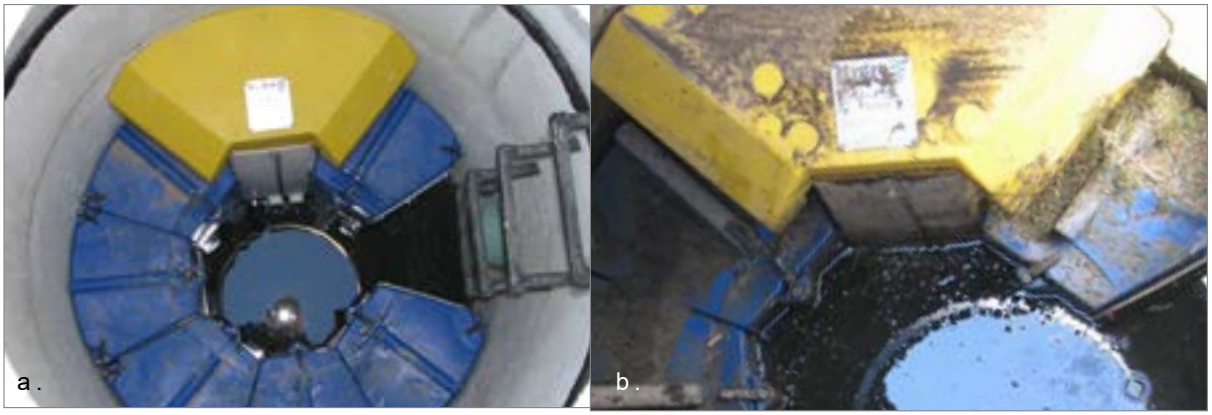


Fig.3 a) The water level in a properly functioning Up-Flo® Filter will drain down to the base of the Filter Modules. b) When the Drain Down Filter becomes clogged, the base of the Filter Modules will be submerged in standing water. Note, above right, that the Drain Down Filter is submerged in standing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

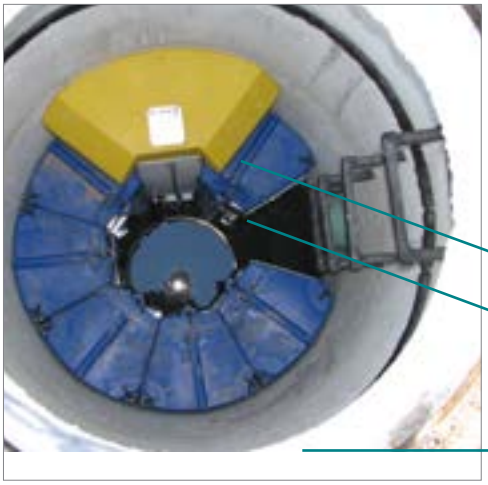


Fig.6 Inspection view of the Up-Flo® Filter.

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.

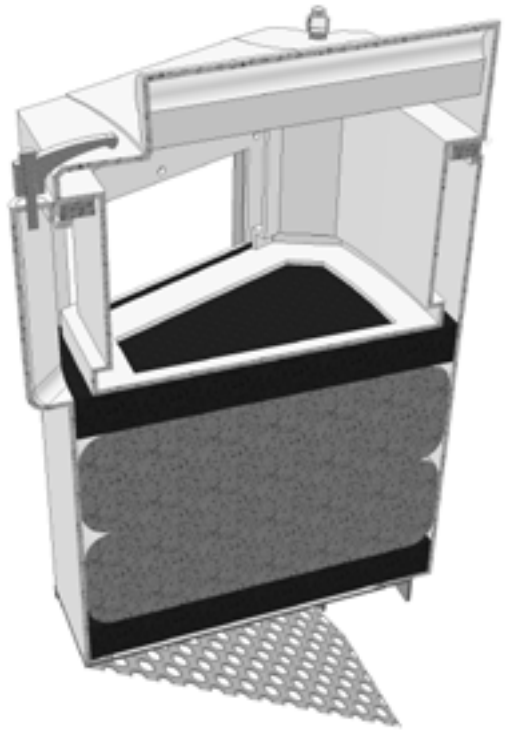


Fig.8 Cutaway view of the Filter Module

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

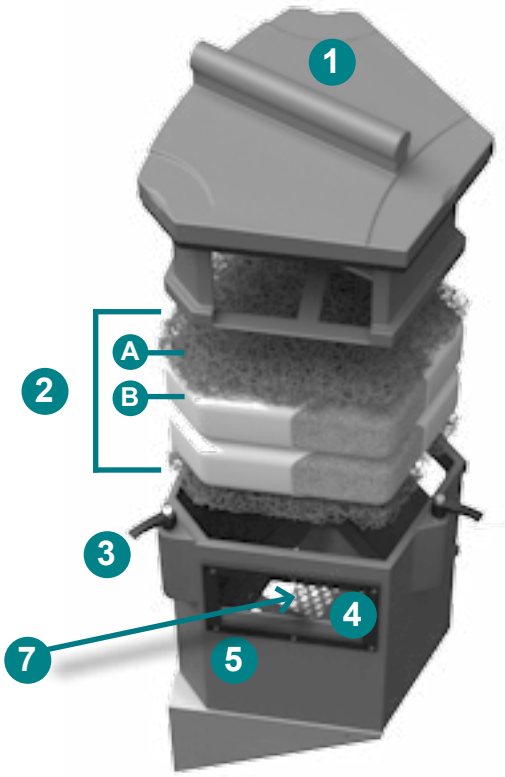


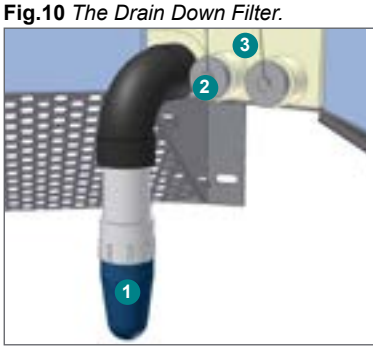
Fig.9 The Filter Module houses the Media Restraint and the Media Pack.

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) _____

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

Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

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

www.hydro-int.com

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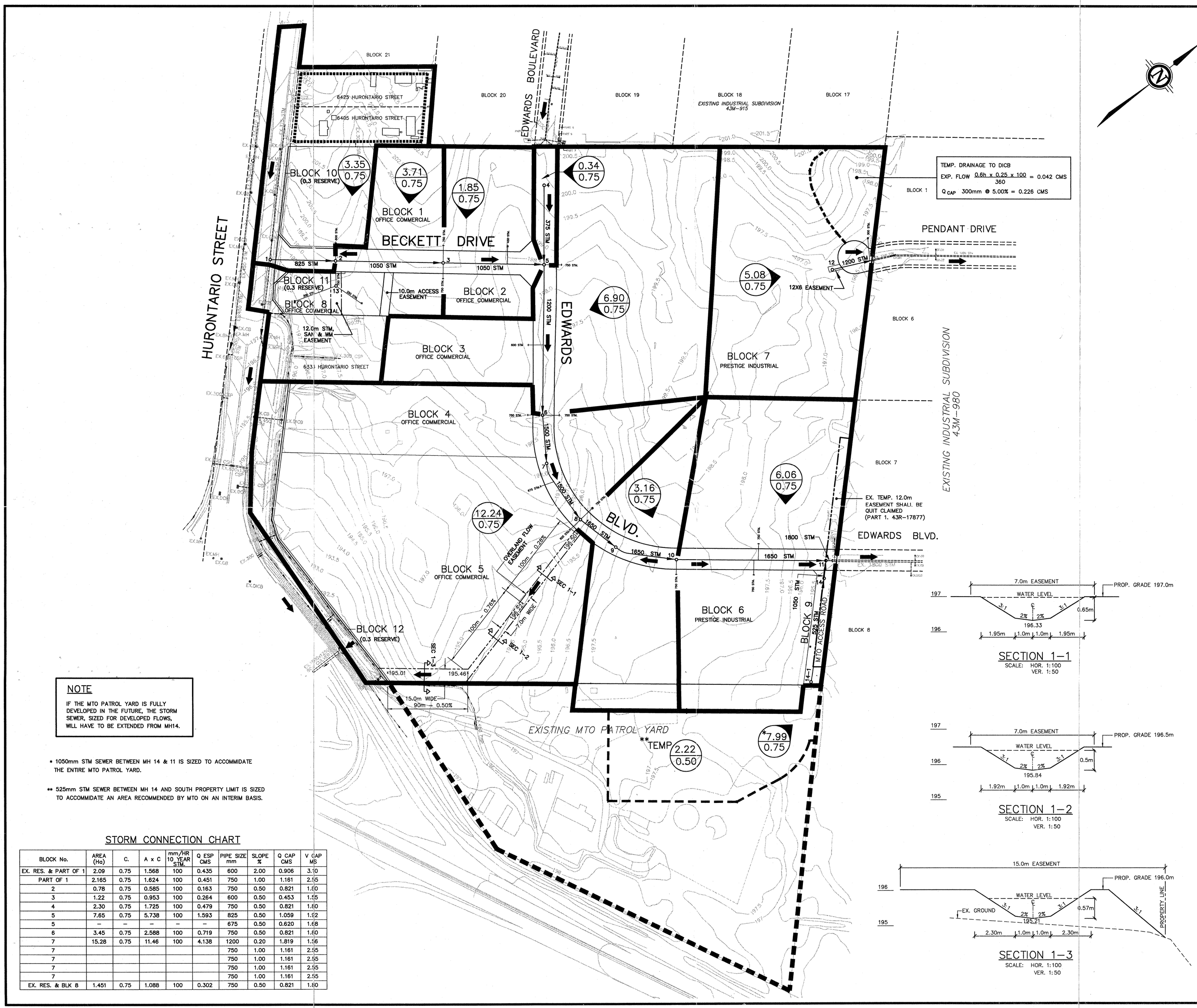


7.0m EASEMENT
PROP. GRADE 197.0m
WATER LEVEL
3:1 2% 2% 3:1
0.65m
196.33
1.95m 1.0m 1.0m 1.95m

SECTION 1-1
SCALE: HOR. 1:100
VER. 1:50

7.0m EASEMENT
PROP. GRADE 196.5m
WATER LEVEL
3:1 2% 2% 3:1
0.5m
195.84
1.92m 1.0m 1.0m 1.92m

SECTION 1-2
SCALE: HOR. 1:100
VER. 1:50

15.0m EASEMENT
PROP. GRADE 196.0m
WATER LEVEL
EX. GROUND
3:1 2% 2% 3:1
0.57m
195.21
PROPERTY LINE
2.30m 1.0m 1.0m 2.30m

SECTION 1-3
SCALE: HOR. 1:100
VER. 1:50

NOTE

IF THE MTO PATROL YARD IS FULLY DEVELOPED IN THE FUTURE, THE STORM SEWER, SIZED FOR DEVELOPED FLOWS, WILL HAVE TO BE EXTENDED FROM MH14.

* 1050mm STM SEWER BETWEEN MH 14 & 11 IS SIZED TO ACCOMMIDATE THE ENTIRE MTO PATROL YARD.

** 525mm STM SEWER BETWEEN MH 14 AND SOUTH PROPERTY LIMIT IS SIZED TO ACCOMMIDATE AN AREA RECOMMENDED BY MTO ON AN INTERIM BASIS.

STORM CONNECTION CHART

BLOCK No.	AREA (Ha)	C.	A x C	mm/HR 10 YEAR STM.	Q ESP CMS	PIPE SIZE mm	SLOPE %	Q CAP CMS	V CAP MS
EX. RES. & PART OF 1	2.09	0.75	1.568	100	0.435	600	2.00	0.906	3.10
PART OF 1	2.165	0.75	1.624	100	0.451	750	1.00	1.161	2.55
2	0.78	0.75	0.585	100	0.163	750	0.50	0.821	1.80
3	1.22	0.75	0.953	100	0.264	600	0.50	0.453	1.55
4	2.30	0.75	1.725	100	0.479	750	0.50	0.821	1.80
5	7.65	0.75	5.738	100	1.593	825	0.50	1.059	1.92
5	–	–	–	–	–	675	0.50	0.620	1.68
6	3.45	0.75	2.588	100	0.719	750	0.50	0.821	1.80
7	15.28	0.75	11.46	100	4.138	1200	0.20	1.819	1.56
7						750	1.00	1.161	2.55
7						750	1.00	1.161	2.55
7						750	1.00	1.161	2.55
7						750	1.00	1.161	2.55
EX. RES. & BLK 8	1.451	0.75	1.088	100	0.302	750	0.50	0.821	1.80

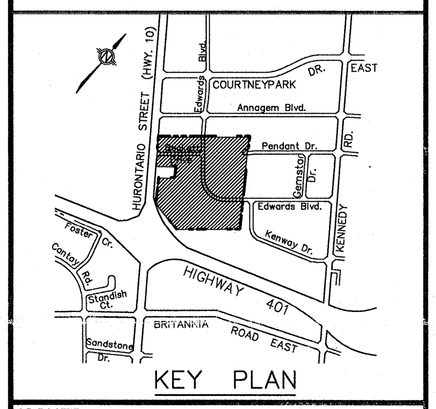
DATE	REVISIONS	INIT.

BENCH MARK (CITY OF MISSISSAUGA)
B.M. NO. 221 ELEV. 202.730m
221: ON THE W. FACE, .60m N. OF THE S. CORNER OF A RED BRICK HOUSE, No. 6405, ON THE E. SIDE OF HURONTARIO ST. (HWY #10), 1250m N. OF BRITANNIA RD. E.

FOR GENERAL NOTES SEE DWG. N1

LEGEND

- DRAINAGE AREA (HECTARES)
- RUN-OFF COEFFICIENT
- DRAINAGE AREA BOUNDARY
- OVERLAND FLOW ROUTE



KEY PLAN

ISSUES

yr. m. d.	

SUBMISSIONS

1st.	✓ Date JAN/98	Interim	✓ Date
2nd.	✓ Date MAR./98	Final	✓ Date JULY/98
Pre-Serv.	✓ Date JUNE/98		

REGISTERED PROFESSIONAL ENGINEER C-F. CHU 98-07-21 PROVINCE OF ONTARIO

DESIGNED
CHK'D
APPROVED

Winter Associates
Consulting Engineers, Architects, Planners and Landscape Architects
200 Matheson Boulevard West, Mississauga, Ontario L5R 3L7
Tel. (905) 890 0110 Fax: (905) 890 0319

CANTAY HOLDINGS INC.

HEARTLAND

PHASE 6

CITY AND REGION FILE NO. 21T - 87081

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

STORM DESIGN AREAS

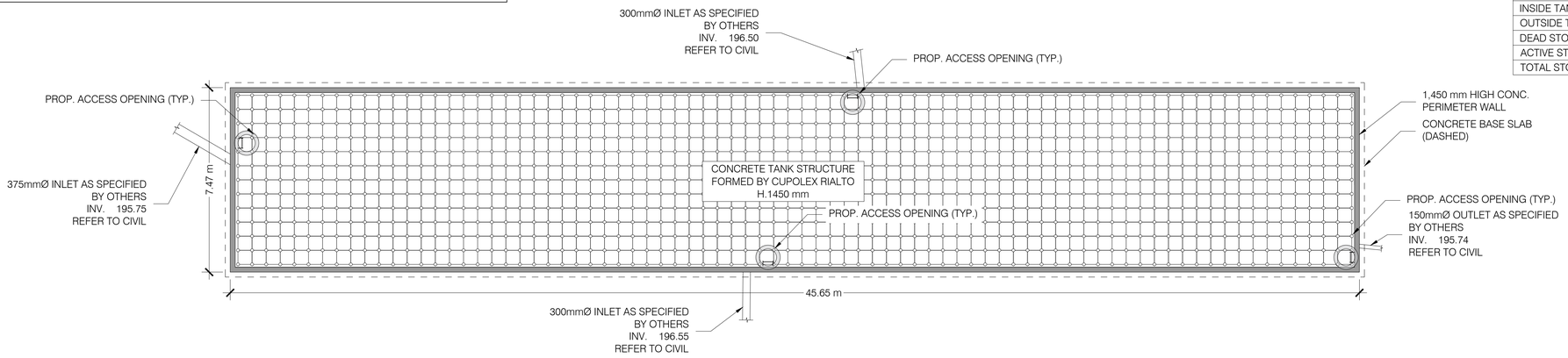
METRIC SCALE 1:2000	AREA Z-43	REWAL 9405X1
DRAWN GR	CHK'D CFC	DWG.NO. D1
DATE DEC./97	SHEET 1 OF 1	

D 1

Etobicoke #23

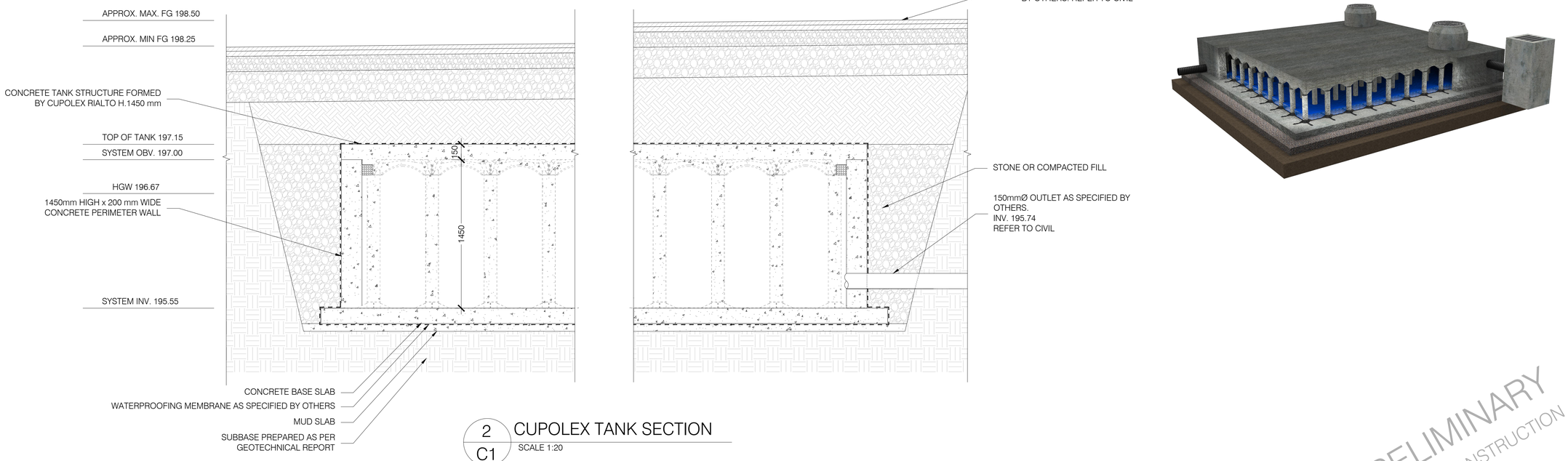
CONTRACTOR TO CONTACT CUPOLEX ENGINEERING SOLUTIONS INC. FOR ENGINEER STAMPED DESIGN DRAWINGS. UNDERGROUND CONCRETE TANK STRUCTURE CAN BE DESIGNED TO SUPPORT ANY LOADING. CIVIL ENGINEER TO SPECIFY LOADING CRITERIA

TANK PROPERTIES	
MAX. FG.	198.50
MIN. FG.	198.25
TOP OF TANK	197.15
SYSTEM OBVERT	197.00
SYSTEM INVERT	195.55
SYSTEM DEPTH	1,450 mm
INSIDE TANK PERIMETER	105 m
OUTSIDE TANK PERIMETER	106 m
INSIDE TANK AREA	320 m^2
OUTSIDE TANK AREA	341 m^2
DEAD STORAGE	56.3m^3
ACTIVE STORAGE	368.5 m^3
TOTAL STORAGE	424.8 m^3



1 / C1 CUPOLEX FORMING PLAN

SCALE 1:100



2 / C1 CUPOLEX TANK SECTION

SCALE 1:20

PRELIMINARY
NOT FOR CONSTRUCTION

CUPOLEX®
ENGINEERING SOLUTIONS INC.
55 Administration Rd, Unit 6
Vaughan, ON, Canada L4K 4G9
1-905-669-8190
info@cupolex.ca
www.cupolex.ca

6333 HURONTARIO STREET
MISSISSAUGA, ON

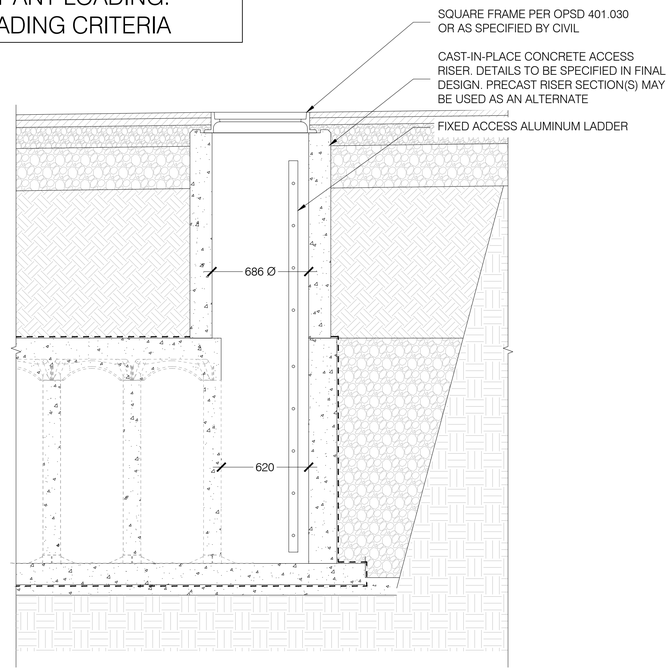
NO.	DATE	DESCRIPTION	DRW.	CHK.
1	19/10/22	CONCEPTUAL DESIGN	IM	AD

DATE: 19 October, 2022
DRAWN BY: IM
CHECKED BY: AD
SCALE: As Noted
PROJECT No.: 22-59708

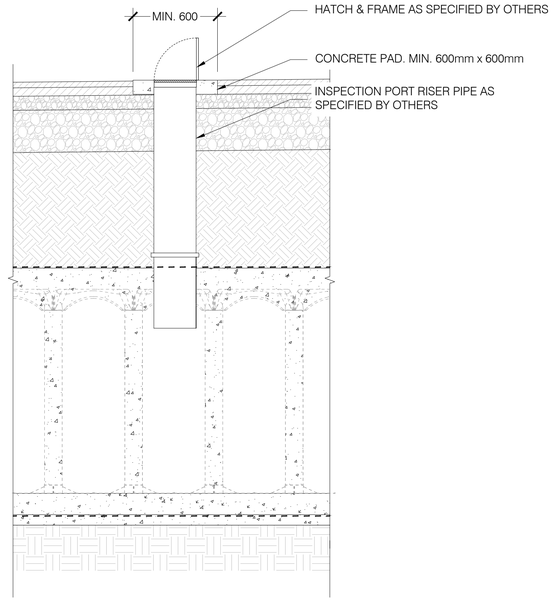
CUPOLEX TANK FORMING PLAN & SECTION

C1

CONTRACTOR TO CONTACT CUPOLEX ENGINEERING SOLUTIONS INC. FOR ENGINEER STAMPED DESIGN DRAWINGS. UNDERGROUND CONCRETE TANK STRUCTURE CAN BE DESIGNED TO SUPPORT ANY LOADING. CIVIL ENGINEER TO SPECIFY LOADING CRITERIA



1/C2 TYPICAL ACCESS OPENING
SCALE 1:20



2/C2 TYPICAL INSPECTION PORT
SCALE 1:20

PRELIMINARY
NOT FOR CONSTRUCTION

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ENGINEERING SOLUTIONS INC.
55 Administration Rd, Unit 6
Vaughan, ON, Canada L4K 4G9
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6333 HURONTARIO STREET
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NO.	DATE	DESCRIPTION	DRW.	CHK.
1	19/10/22	CONCEPTUAL DESIGN	IM	AD

DATE: 19 October, 2022
DRAWN BY: IM
CHECKED BY: AD
SCALE: 1:20
PROJECT No.: 22-59708

CUPOLEX TANK SECTIONS

C2

MHBC
PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

KITCHENER
WOODBRIDGE
LONDON
KINGSTON
BARRIE
BURLINGTON

Irrigation Requirements

General Information: All measures are in Metric

Refer to the 'Water Efficiency' section of the LEED Canada-NC 1.0 Document.

Using the chart below please note:
Species Factor (Ks), Plant water needs is determined as follows:
North and East of the site will be shaded so enter the 'Low'
South and West of the site will be sunny so enter the 'High or Avg' based on building/other shade
Density Factor (Kd), Plant grouping spacing is determined as follows: Sparsely planted enter 'Low'
Densely Planted enter 'High'
Microclimate Factor (Kmc), Plant grouping exposure to wind, heat, reflected light: NE are shaded so enter 'Low'
SW are hot and gets the summer wind so enter 'Ave or High'

Kl=KsxKdxKmc
Etl= KlxETo (for Toronto and region)
IE can either be Rotor or Spray Heads
TPWA (L)=Area (sqm) x (Etl/IE)

May

Landscape Type	Area M^2	Species Factor Ks	Density Factor Kd	Microclimate Kmc	Kl	ETl	IE Spray (.450) Rotors (.550)	TPWA (LITERS)
Shrubs/Perennials	200	0.5	1	1.3	0.65	66.04	0.389	33,954
Trees	450	0.5	1	1.4	0.70	71.12	0.389	82,272
Mixed	230	0.5	1.3	1.4	0.91	92.46	0.389	54,666
Turfgrass	1450	0.7	1	1.2	0.84	85.34	0.389	318,120
							Subtotal [L]	489,012

Water Required [L] from Design Case for May: 489,012

June

Landscape Type	Area M^2	Species Factor Ks	Density Factor Kd	Microclimate Kmc	Kl	ETl	IE Spray (.450) Rotors (.550)	TPWA (LITERS)
Shrubs/Perennials	200	0.5	1	1.3	0.65	81.19	0.389	41,740
Trees	450	0.5	1	1.4	0.70	87.43	0.389	101,140
Mixed	230	0.5	1.3	1.4	0.91	113.66	0.389	67,202
Turfgrass	1450	0.7	1	1.2	0.84	104.92	0.389	391,075
							Subtotal [L]	601,158

Water Required [L] from Design Case for June: 601,158

July

Landscape Type	Area M^2	Species Factor Ks	Density Factor Kd	Microclimate Kmc	Kl	ETl	IE Spray (.450) Rotors (.550)	TPWA (LITERS)
Shrubs/Perennials	200	0.5	1	1.3	0.65	89.83	0.389	46,185
Trees	450	0.5	1	1.4	0.70	96.74	0.389	111,910
Mixed	230	0.5	1.3	1.4	0.91	125.76	0.389	74,358
Turfgrass	1450	0.7	1	1.2	0.84	116.09	0.389	432,719
							Subtotal [L]	665,172

Water Required [L] from Design Case for July: 665,172

August

Landscape Type	Area M^2	Species Factor Ks	Density Factor Kd	Microclimate Kmc	Kl	ETl	IE Spray (.450) Rotors (.550)	TPWA (LITERS)
Shrubs/Perennials	200	0.5	1	1.3	0.65	71.76	0.389	36,895
Trees	450	0.5	1	1.4	0.70	77.28	0.389	89,398
Mixed	230	0.5	1.3	1.4	0.91	100.46	0.389	59,400
Turfgrass	1450	0.7	1	1.2	0.84	92.74	0.389	345,674
							Subtotal [L]	531,367

Water Required [L] from Design Case for August: 531,367

September

Landscape Type	Area M^2	Species Factor Ks	Density Factor Kd	Microclimate Kmc	Kl	ETl	IE Spray (.450) Rotors (.550)	TPWA (LITERS)
Shrubs/Perennials	200	0.5	1	1.3	0.65	46.54	0.389	23,928
Trees	450	0.5	1	1.4	0.70	96.74	0.389	111,910
Mixed	230	0.5	1.3	1.4	0.91	125.76	0.389	74,358
Turfgrass	1450	0.7	1	1.2	0.84	116.09	0.389	432,719
							Subtotal [L]	642,915

Water Required [L] from Design Case for September: 642,915

Total Water Required [L] from Design Case for Growing Season:	**2,929,624**
Average Daily Water Use [L] (60 Days)	**19,148**
72 Hour Requirement (m3)	**15**

MHBC
PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

KITCHENER
WOODBRIDGE
LONDON
KINGSTON
BARRIE
BURLINGTON

October 20, 2022

Site Water Balance / Rainwater Re-Use
6333 Hurontario St.
MHBC File: 16257 AG

This letter is to confirm that there is adequate demand for the required 57 cubic meters of rainwater re-use within a 72 hour period on site through irrigation of the planting areas. Rainfall runoff will be collected and stored in the storage tank. The water stored in the tank will be distributed by pumping to the irrigation system to softscape areas.

As requested, please find attached and below irrigation calculations.

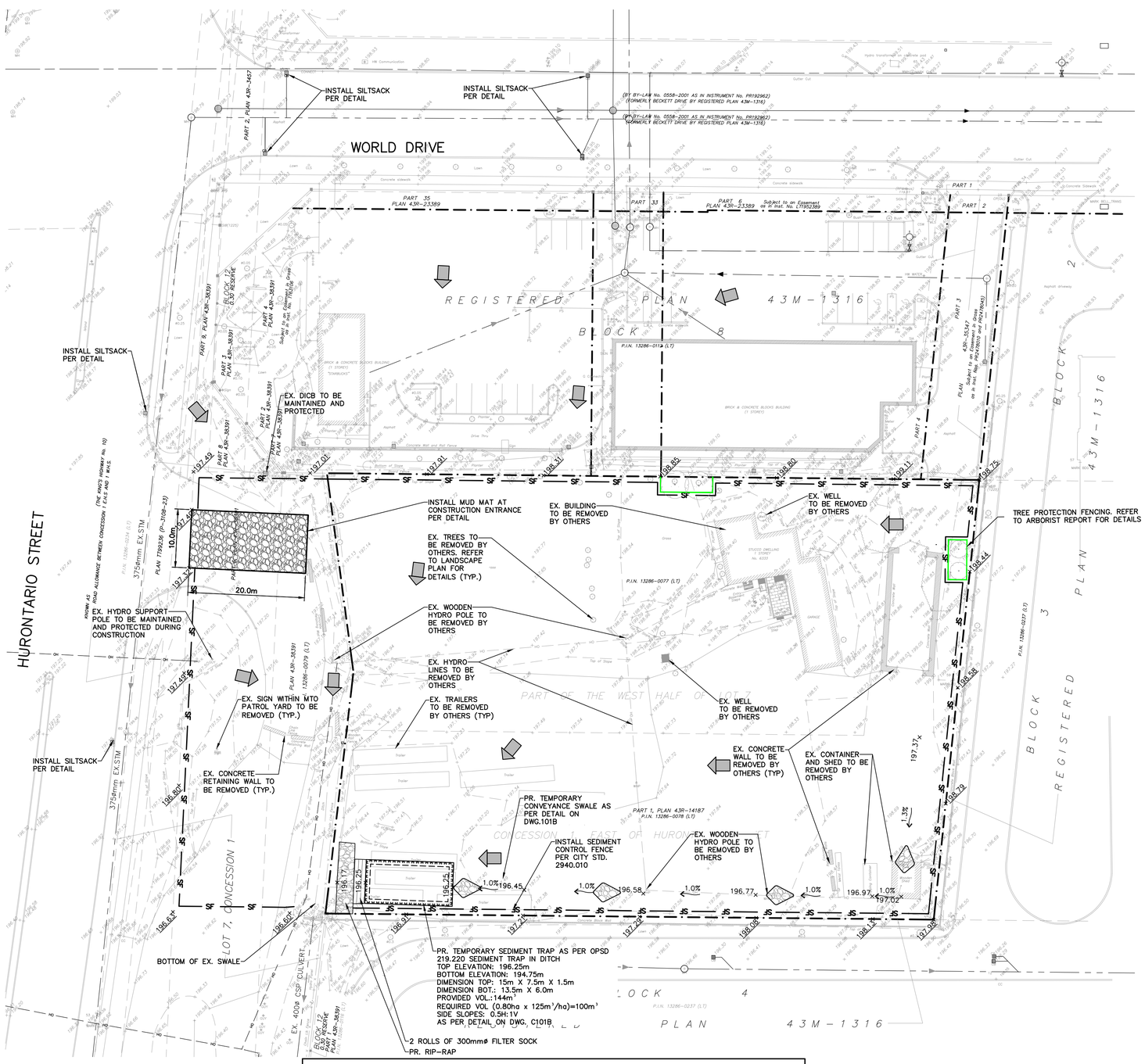
Average Water Requirements = 2,929 m³
Average Daily Use = 19 m³
Average 72 Hour Water Use = 57 m³

Please direct any questions to the undersigned.

Best Regards,
MHBC Planning, Urban Design & Landscape Architecture

Greg Costa BLA, OALA, CSLA
Partner

DRAWINGS



DESIGN DETAILS OF EROSION AND SEDIMENT CONTROL MEASURES (STAGE 1)

1. INSTALL MUD MAT
2. INSTALL TREE HOARDING AS INDICATED ON LANDSCAPE PLANS.
3. INSTALL SEDIMENT CONTROL FENCE
4. INSTALL TEMPORARY SEDIMENT TRAP
5. INSTALL CONVEYANCE SWALES C/W ROCK CHECK DAMS

SEE DRAWING C101A FOR ALL EROSION AND SEDIMENT CONTROL NOTES AND DETAILS.

NOTES:

1. ALL EXISTING DOMESTIC WELLS AND SANITARY SEPTIC SYSTEMS TO BE DECOMMISSIONED AND DISPOSED OFFSITE.

INSTALLATION & MAINTENANCE CONSIDERATIONS FOR TEMP. SEDIMENT TRAP

1. SEDIMENT TRAP MUST BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION ACTIVITIES EXCEPT FOR TOPSOIL STRIPPING AND GRADING OPERATIONS ASSOCIATED WITH THE CONSTRUCTION OF THE SEDIMENT TRAP
2. PROPER COMPACTION CONTROL MUST BE USED WHEN CONSTRUCTING THE EMBANKMENT TO ENSURE ITS STABILITY
3. THE EMERGENCY SPILLWAY INSTALLATION IS CRITICAL TO PREVENTING FAILURE OF THE STRUCTURE DURING HIGH FLOWS AND ALL SPECIFICATIONS PROVIDED BY THE DESIGNER MUST BE FOLLOWED.
5. SEDIMENT ACCUMULATION IN THE TRAP MUST BE MEASURED A MINIMUM OF ONCE EVERY SIX (6) MONTHS. THE BASIN WILL REQUIRE CLEANING WHEN SEDIMENT ACCUMULATION REACHES 50% OF THE DESIGN CAPACITY.
6. SEDIMENT TRAP EMBANKMENTS, AND SPILLWAY SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAINFALL AND SIGNIFICANT SNOWMELT EVENTS.

NOTES

8. AT-SOURCE AND CONVEYANCE ESC MEASURES MUST BE USED IN ADDITION TO THE SEDIMENT TRAP

INSTALLATION & MAINTENANCE CONSIDERATIONS FOR TEMP. SEDIMENT TRAP

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NOTES

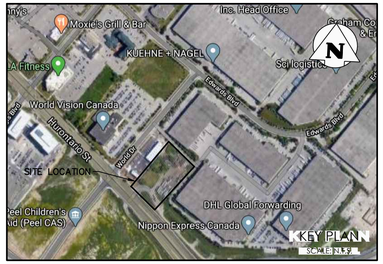
8. AT-SOURCE AND CONVEYANCE ESC MEASURES MUST BE USED IN ADDITION TO THE SEDIMENT TRAP

EROSION & SEDIMENT CONTROLS (ESC) MANAGEMENT STRATEGY

THE EROSION AND SEDIMENT CONTROLS SHALL BE A MULTI BARRIER APPROACH TO PREVENT EROSION DURING CONSTRUCTION TO DEAL WITH SEDIMENT TRANSPORT AT SOURCE AND TO MINIMIZE SEDIMENT TRANSPORT FROM LEAVING THE SITE. THE MITIGATION MEASURES OUTLINED BELOW SHALL BE MAINTAINED BY THE CONTRACTOR THROUGH REGULAR INSPECTIONS, MONITORING AND MAINTENANCE UNTIL THE SOIL HAS BEEN STABILIZED. THE CONTRACTOR SHALL KEEP A COPY OF THE ESC PLANS AND THE TORONTO AND REGION CONSERVATION AUTHORITY, EROSION AND SEDIMENT CONTROL GUIDELINE, DECEMBER 2006, ON SITE AT ALL TIMES

GENERAL NOTES

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION.
2. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED / AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, INCLUDING SEDIMENT, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. TRCA ENFORCEMENT OFFICER SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES ARE TO BE KEPT ON SITE AND USED AS NECESSARY.
3. AN ENVIRONMENTAL MONITOR WILL ATTEND THE SITE TO INSPECT ALL NEW CONTROLS, AS WELL AS ON A WEEKLY BASIS, OR FOLLOWING RAIN/SNOWMELT EVENT, TO MONITOR ALL WORKS, AND IN PARTICULAR WORKS RELATED TO EROSION AND SEDIMENT CONTROLS. SHOULD CONCERNS ARISE ON SITE THE ENVIRONMENTAL MONITOR WILL CONTACT THE TRCA ENFORCEMENT OFFICER AS WELL AS THE CONTRACTOR. WEEKLY INSPECTION REPORTS ARE TO BE PROVIDED TO THE TOWN AND TRCA..
4. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE WILL BE CONDUCTED A MINIMUM OF 30M FROM THE WATER.
5. AT THE TOWN'S DISCRETION, PRE-GRADE AREAS TO BE STABILIZED BY HYDRO SEEDING C/W APPLICATION OF STRAW MULCH PER OPSS 804 TO A DEPTH OF 25mm TO 50mm TO THE SATISFACTION OF TOWN STAFF.



LEGEND

- PROPERTY LINE
- EXISTING DITCH
- EXISTING HYDRO POLE
- EXISTING FENCE
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- MUD-MAT; SEE DETAIL
- SILT FENCE; SEE DETAIL
- PR. ROCK CHECK DAM PER OPSD 219.210
- TEMPORARY CONVEYANCE SWALE (DETAIL 'A')
- TREE PROTECTION FENCING

EXISTING UTILITIES AND SERVICES

CONTRACTOR SHALL NOTE THAT THE CONSTRUCTION ZONE HAS NUMEROUS EXISTING UNDERGROUND UTILITIES AND SERVICES, SOME OF WHICH ARE TO BE ABANDONED OR REMOVED, AND OTHERS WHICH ARE TO BE PROTECTED AND MAINTAINED IN SERVICE.

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL RETAIN THE SERVICES OF A COMPANY, WHICH SPECIALIZES IN SUBSURFACE UTILITY ENGINEERING FOR THE PURPOSES OF LOCATING, MARKING AND SURVEYING ALL UNDERGROUND UTILITIES AND SERVICES. ALL CURRENT METHODS SHALL BE USED FOR THESE LOCATIONS INCLUDING ELECTRONIC METHODS, VACUUM EXCAVATIONS, SURVEYING MANHOLES AND CHAMBERS ETC.

THE UTILITIES AND SERVICES SHALL BE SURVEYED AND TIED INTO THE PROJECT COORDINATE SYSTEM. A COPY OF THE SURVEY SHALL BE PROVIDED TO THE ENGINEER FOR RECORD PURPOSES.

ANY CONFLICT WITH THE PROPOSED WORKS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LOCATIONS FOR PROTECTION AND TEMPORARY RELOCATION OF UNDERGROUND UTILITIES AND SERVICES AS REQUIRED FOR THE COMPLETE INSTALLATION OF THE PROPOSED WORKS.

EROSION & SEDIMENT CONTROL NOTES:

1. EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. EROSION & SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
3. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm OF 50mm STONE COVER DURING CONSTRUCTION.
4. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
5. MUD MAT, SILT FENCE, AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.

ALL DISTURBED AREAS TO BE RESTORED TO THE SATISFACTION OF THE CITY OF MISSISSAUGA AND REGION OF PEEL.

ALL REMOVED MATERIALS TO BE DISPOSED OF OFF-SITE.

THE REMOVAL/RELOCATION OF OF ELECTRICAL AND COMMUNICATION DUCTS, CABLES, ELECTRICAL POLES, LIGHT STANDARDS, GAS PIPES AND OTHER EX. UTILITIES TO BE COMPLETED PER ELECTRICAL DESIGN AND UTILITIES COMPANIES DESIGN.

NOTE:
ALL DISTURBED AREAS WITHIN MUNICIPAL RIGHT-OF-WAYS ARE TO BE REINSTATED TO EXISTING CONDITIONS OR BETTER

NOT FOR CONSTRUCTION

Stamp

Stamp
LICENSED PROFESSIONAL ENGINEER
A. D. FARINA
100523860
NOV/09/2022
PROVINCE OF ONTARIO

No.	ISSUE / REVISION	YYYY/MMM/DD
1	ISSUED FOR SECOND SUBMISSION (ZBA & SPA)	2022/NOV/09
0	ISSUED FOR FIRST SUBMISSION	2020/OCT/30

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE CITY OF MISSISSAUGA BENCHMARK No. 1015.
TABLET SET HORIZONTALLY AT BASE OF A 0.75m DIAMETER CONCRETE TRAFFIC POLE AT THE NORTHEAST CORNER OF CORTNEYPARK DRIVE EAST AND HURONTARIO STREET.

PUBLISHED ELEVATION = 200.113 METERS

BEARING NOTE:

BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE EASTERLY LIMIT OF HURONTARIO STREET AS SHOWN ON PLAN 43R-38391,HAVING A BEARING OF N43°44'10"W.

SURVEY NOTES:

SURVEY COMPLETED BY COMPANY SPEIGHT, VAN NOSTRAND AND GIBSON LIMITED (2020/JUL/13)

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

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GLOBAL ARCHITECT INC.
DRAWING No.: A-101, REV.3 (2022/NOV/03)
PROJECT No.: 22-08

DRAWING NOTES:

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

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

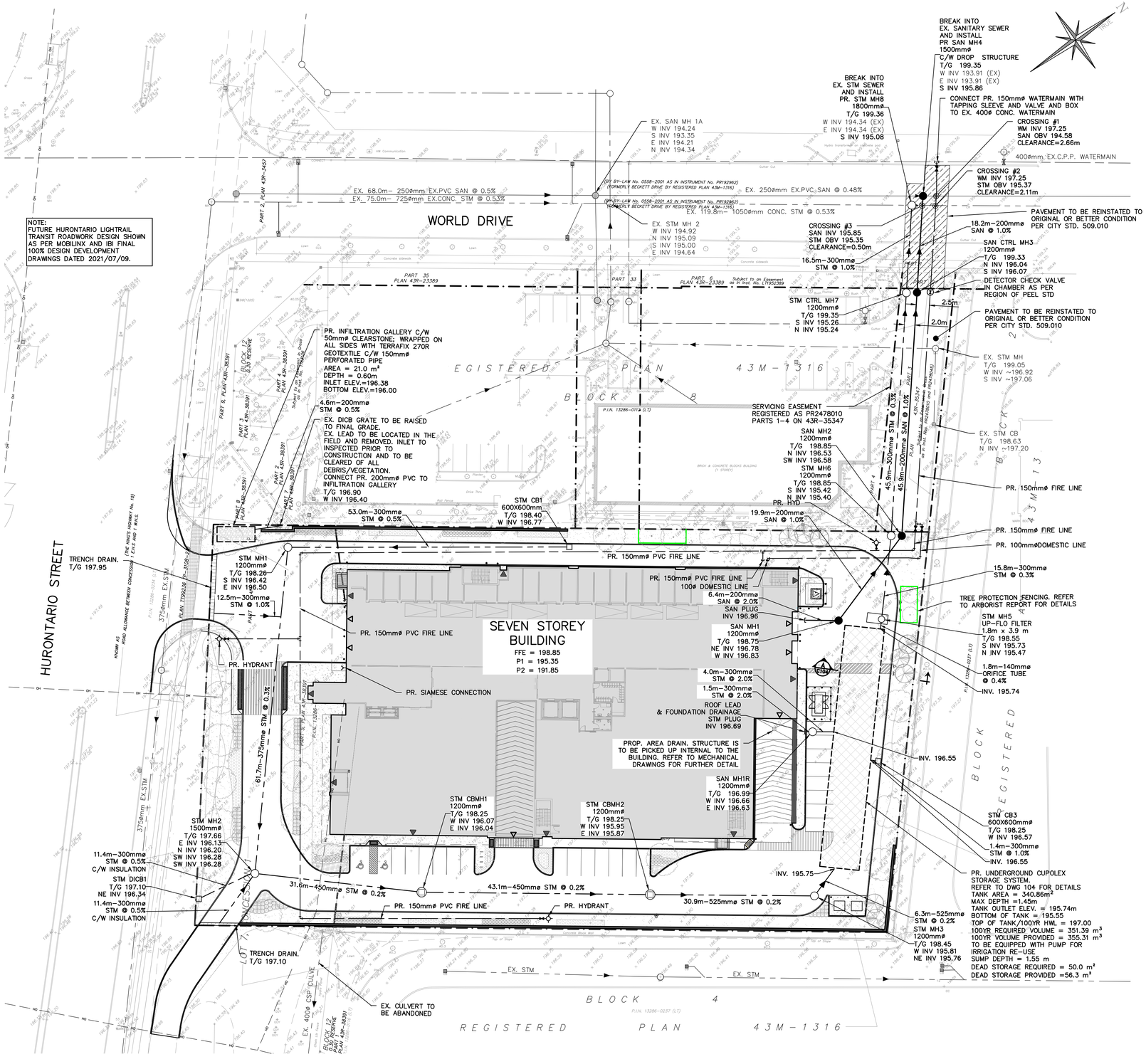
ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

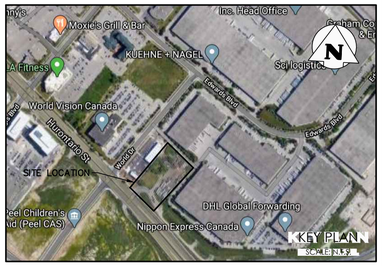
Project
DYMON GROUP OF COMPANIES
6333 HURONTARIO STREET
CITY OF MISSISSAUGA

Drawing
REMOVALS PLAN
EROSION & SEDIMENT CONTROL PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
D.B.	D.B.		1644-5564
Check	Check	Scale	Dwg.
A.D.F.	A.D.F.	1: 400	C 101





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 ELECTRICAL TRANSFORMER
- BUILDING ENTRANCE (PERSONNEL DOOR)
- BUILDING ENTRANCE (OVERHEAD DOOR)
- TREE PROTECTION FENCING

REGION OF PEEL NOTES:

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAIN AND/OR WATER SERVICE MATERIALS 100mmø AND LARGER MUST BE PVC DR-18 CONSTRUCTED AS PER AWWA C900-16. SIZE 50mmø AND SMALLER MUST BE COPPER TYPE 'K' ASTM 888-49 STD. DWG 1-7-1.
3. WATERMAINS AND/OR SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7m WITH A MINIMUM HORIZONTAL SPACING OF 1.2m FROM THEMSELVES AND ALL OTHER SERVICES.
4. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC., MUST BE PROVIDED WITH AT LEAST A 50mmø OUTLET ON 100mmø AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPES TO ALLOW WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100mmø MINIMUM ON A HYDRANT.
5. ALL CURB STOPS TO BE 3.0m OFF THE FACE OF THE BUILDING UNLESS NOTED OTHERWISE.
6. HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1 DIMENSION 'A' (0.7m) & 'B' (0.9m) AND TO HAVE PUMPER NOZZLE.
7. WATERMAINS TO BE INSTALLED TO GRADES SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAINS MUST HAVE A VERTICAL CLEARANCE OF 0.3m OVER AND 0.5m UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
9. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR ASSIGNED, OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.
11. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
12. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND/OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK, WHETHER SHOWN ON THE PLANS OR NOT, AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
13. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HRS WRITTEN NOTICE TO UTILITIES PRIOR TO CROSSING SUCH UTILITIES, FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.
14. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS-CONNECTION CONTROL DEVICE, CONSISTENT WITH THE DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARDS 1-7-7 OR 1-7-8.
15. ALL WATER METER MUST BE INSTALLED IN HEATED AND ACCESSIBLE SPACE

WATERMAIN NOTES:

1. MECHANICAL ENGINEER SHALL ENSURE DESIGN OF INTERNAL WATERMAIN LOADING & LOOPING WITHIN U/G PARKING STRUCTURE.
2. CONTRACTOR TO COORDINATE THE EXACT LOCATION OF WATER CONNECTION TO THE INTERNAL WATER SYSTEM PER MECHANICAL DESIGN.
3. PROPOSED WATER METER AND BACKFLOW PREVENTER TO BE INSTALLED INSIDE OF MECHANICAL ROOM PER MECHANICAL DESIGN AND SPECIFICATIONS AND IN ACCORDANCE WITH REGION STANDARDS.

ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAYS ARE TO BE REINSTATED TO EXISTING CONDITIONS OR BETTER.

ALL SANITARY SEWER LATERALS ARE TO AVE MINIMUM COVER OF 2.50M AT THE PROPERTY LINE.

ALL SANITARY SEWER TEST FITTINGS ARE TO BE LOCATED AS PER REGIONAL STANDARD 2-4-4.

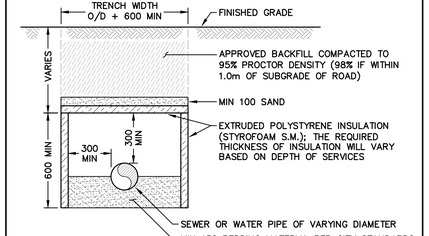
PROPOSED WATER METER TO BE INSTALLED IN A HEATED AND ACCESSIBLE SPACE.

NOTE:
I HAVE REVIEWED THE PLANS FOR THE CONSTRUCTION OF ONE 7-STOREY COMMERCIAL BUILDING LOCATED AT 6333 HURONTARIO STREET AND HAVE PREPARED THIS PLAN TO INDICATE THE COMPATIBILITY OF THE PROPOSAL TO EXISTING ADJACENT PROPERTIES AND MUNICIPAL SERVICES. IT IS MY BELIEF THAT ADHERENCE TO THE PROPOSED GRADES AS SHOWN WILL PRODUCE ADEQUATE SURFACE DRAINAGE AND PROPER FACILITY OF THE MUNICIPAL SERVICES WITHOUT ANY DETRIMENTAL EFFECT TO THE EXISTING DRAINAGE PATTERNS OR ADJACENT PROPERTIES.

WATER REUSE NOTE:
WATER REUSE CHAMBER TO BE FITTED WITH PUMP FOR LANDSCAPE IRRIGATION.

INSULATION FOR SHALLOW SERVICES

SCALE: N.T.S.



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. 50mm OF INSULATION IS REQUIRED FOR EVERY 600mm OF COVER DEFICIENCY.

NOT FOR CONSTRUCTION

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1	ISSUED FOR SECOND SUBMISSION (ZBA & SPA)	2022/NOV/09
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ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE CITY OF MISSISSAUGA BENCHMARK No. 1015.
TABLET SET HORIZONTALLY AT BASE OF A 0.75m DIAMETER CONCRETE TRAFFIC POLE AT THE NORTHEAST CORNER OF CORTNEYPARK DRIVE EAST AND HURONTARIO STREET.

PUBLISHED ELEVATION = 200.113 METERS

BEARING NOTE:

BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE EASTERLY LIMIT OF HURONTARIO STREET AS SHOWN ON PLAN 43R-38391,HAVING A BEARING OF N43°44'10"W.

SURVEY NOTES:

SURVEY COMPLETED BY COMPANY SPEIGHT, VAN NOSTRAND AND GIBSON LIMITED (2020/JUL/13)

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

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GLOBAL ARCHITECT INC.
DRAWING No.: A-101, REV.3 (2022/NOV/03)
PROJECT No.: 22-08

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Project
DYMON GROUP OF COMPANIES
6333 HURONTARIO STREET
CITY OF MISSISSAUGA

Drawing
SITE SERVICING PLAN

Stamp

Stamp
LICENSED PROFESSIONAL ENGINEER
A. D. FARINA
100523860
NOV/09/2022
PROVINCE OF ONTARIO

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	D.B.	Design	D.B.	Project No.	1644-5564
Check	A.D.F.	Check	A.D.F.	Scale	1:400
				Dwg.	C 102

NOTE:
FUTURE HURONTARIO LIGHTRAIL TRANSIT ROADWORK DESIGN SHOWN AS PER MOBILINX AND IBI FINAL 100% DESIGN DEVELOPMENT DRAWINGS DATED 2021/07/09.

EX. DICB GRATE TO BE TO BE RAISED TO FINISHED GROUND. AREA TO BE GRADED TO MINIMIZE PONDING AND PROVIDE SAFE OVERLAND FLOW PATH TOWARD HURONTARIO RIGHT-OF-WAY
T/G 196.90
T/G 196.62

PROPOSED TRENCH DRAIN
T/G 197.95

HURONTARIO STREET

WORLD DRIVE

(BY BY-LAW No. 0558-2001 AS IN INSTRUMENT No. PR192962) (FORMERLY BECKETT DRIVE BY REGISTERED PLAN 43M-1316)

STM MH4
T/G 199.35

STM MH8
T/G 199.37

HYDRO SERVICING EASEMENT

SERVICING EASEMENT

SERVICING EASEMENT

STM CTRL MH7
T/G 199.35

STM CTRL MH3
T/G 199.33

REGISTERED PLAN 43M-1316

BLOCK 8

PROPOSED RETAINING WALL
TOTAL LENGTH=55.0m
MAXIMUM HEIGHT=1.3m

44.0m ENTRANCE
PER OPSD 350.010

STM MH1
T/G 198.26

STM CB1
T/G 198.40

SEVEN STOREY BUILDING
FFE = 198.85
P1 = 195.35
P2 = 191.85

SAN MH2
T/G 198.85

STM MH6
T/G 198.85

TREE PROTECTION FENCING. REFER TO ARBORIST REPORT FOR DETAILS

STM MH5
T/G 198.55

SAN MH1
T/G 198.75

UNDERGROUND ENTRANCE. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS

AREA DRAIN
T/G 197.63

LOADING RAMP. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS

EXTENT OF BUILDING ABOVE

STM CB3
T/G 198.25

PONDING
ELEV. 198.45

PONDING
ELEV. 198.50

STM MH2
T/G 197.66

STM CBMH1
T/G 198.25

STM CBMH2
T/G 198.25

STM MH3
T/G 198.45

STM DICB1
T/G 197.10

PROPOSED RETAINING WALL
TOTAL LENGTH = 136.5m
MAXIMUM HEIGHT = 2.4m
C/W GUARD RAIL ALONG WALL WHERE HEIGHT EXCEED 0.60m

PROPOSED TRENCH DRAIN
T/G 197.10

EX. CULVERT TO BE ABANDONED

BLOCK 4

REGISTERED PLAN 43M-1316

BLOCK 3 REGISTERED PLAN 43M-1316

10 0m 10 20 30
SCALE: 1:400

REFER TO GEOTECHINCAL REPORT FOR PAVEMENT STRUCTURE MAKEUP REQUIREMENTS.

ALL RETAINING WALLS GREATER THAN 0.6m IN HEIGHT TO BE DESIGNED AND APPROVED BY A STRUCTURAL ENGINEER.

ALL RETAINING WALLS GREATER THAN 0.6m IN HEIGHT REQUIRE RAILING OR FENCE, TO BE DESIGNED BY OTHERS.

CONTRACTOR TO REINSTATE THE BOULEVARD TO EXISTING CONDITION OR BETTER.

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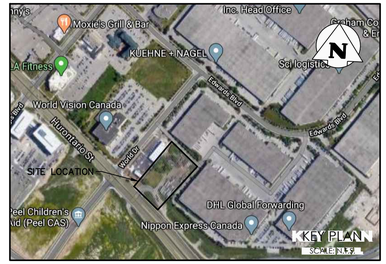
NOT FOR CONSTRUCTION

Stamp

Stamp

A. D. FARINA
100523860
NOV/09/2022
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO



LEGEND

- PROPERTY LINE
- EXISTING DITCH
- EXISTING FENCE
- x215.00 EXISTING GRADE
- x215.00 PROPOSED GRADE
- x215.00 PROPOSED GRADE (TO MATCH EXISTING)
- x215.00 F FUTURE GRADE (TO MATCH)
- x215.00 FBC FUTURE GRADE BOTTOM OF CURB
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- BUILDING ENTRANCE (PERSONNEL DOOR)
- BUILDING ENTRANCE (OVERHEAD DOOR)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE (FIRE DEPT.) CONNECTION
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- PROPOSED SINGLE CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- TREE PROTECTION FENCING

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SURVEY COMPLETED BY COMPANY SPEIGHT, VAN NOSTRAND AND GIBSON LIMITED (2020/JUL/13)

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PROJECT No.: 22-08

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Project

DYMON GROUP OF COMPANIES
6333 HURONTARIO STREET
CITY OF MISSISSAUGA

Drawing

SITE GRADING PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	D.B.	Design	D.B.	Project No.	1644-5564
Check	A.D.F.	Check	A.D.F.	Scale	1:400
				Dwg.	C 103

CONSTRUCTION NOTES:

1.0 GENERAL CONSTRUCTION

1.1 ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH CURRENT CITY OF MISSISSAUGA STANDARDS, REGION OF PEEL STANDARDS, OPSD & OPSS. WHERE CONFLICT OCCURS, CITY OF MISSISSAUGA STANDARDS TO GOVERN FOR STORMWATER, ROADWORKS & INTERNAL GRADING; REGION OF PEEL STANDARDS TO GOVERN FOR SANITARY & WATERMAIN INSTALLATION.
1.2 ALL TOPSOIL & EARTH EXCAVATION TO BE STOCK PILED ON-SITE OR REMOVED TO AN APPROVED SITE AS DIRECTED BY ENGINEER.
1.3 THE DEVELOPER'S CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED LAYOUT OF THE WORK. THE DEVELOPER'S ENGINEER WILL CONFIRM ALL BENCH MARK ELEVATIONS AND HORIZONTAL ALIGNMENT FOR THE DEVELOPER'S CONTRACTOR.
1.4 ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY O.L.S. AT DEVELOPER'S CONTRACTOR'S EXPENSE IF REMOVED DURING CONSTRUCTION.
1.5 THE DEVELOPER'S CONTRACTOR IS RESPONSIBLE TO NOTIFY ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK & CO-ORDINATE CONSTRUCTION ACCORDINGLY.
1.6 THE LOCATION AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES ARE TO BE VERIFIED IN THE FIELD BY THE DEVELOPER'S CONTRACTOR. THE DEVELOPER'S CONTRACTOR SHALL BE RESPONSIBLE FOR THE RESTORATION OF EXISTING UTILITIES DISTURBED DURING CONSTRUCTION.
1.7 ALL AREAS BEYOND THE SITE PLAN AND APPROVED DEVELOPMENT & SERVICING LIMITS WHICH ARE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE DEVELOPER'S EXPENSE.
1.8 ALL CONSTRUCTION SIGNING MUST CONFORM TO THE M.T.O. MANUAL OF "UNIFORM TRAFFIC CONTROL DEVICES".
1.9 ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
1.10 ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE DEVELOPER'S CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
1.11 ROAD AND BOULEVARD RESTORATION AS PER CITY OF MISSISSAUGA ROAD CUT PERMIT, DETAIL 2220.030.

2.0 OPEN CUT INSTALLATION & RESTORATION PER CITY OF MISSISSAUGA STANDARD NO. 2220.030

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

3.0 DRIVEWAYS

3.1 GRANULAR 'A' & 'B' BASE TO BE COMPACTED TO 98% OF THE MATERIAL'S RESPECTIVE SPMDD OR AS APPROVED BY GEOTECHNICAL ENGINEER.
3.2 THE TOP 1.0m OF THE SUB-BASE SHALL BE COMPACTED TO A MINIMUM OF 98% OF STANDARD PROCTOR DENSITY WITHIN 2% OF OPTIMUM MOISTURE CONTENT.
3.3 SUBGRADE TO BE PROOF ROLLED & CERTIFIED BY GEOTECHNICAL ENGINEER PRIOR TO PLACING GRANULAR MATERIAL.
3.4 DRIVEWAYS & PARKING LOT TO BE CONSTRUCTED AS PER RECOMMENDATIONS OF GEOTECHNICAL ENGINEER.
3.5 ALL GRANULAR AND ASPHALT MATERIAL PLACEMENT TO BE IN ACCORDANCE WITH OPSS 314 & OPSS 310.
3.6 ALL GRANULAR CONNECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF MISSISSAUGA STANDARD 2220.050.
3.7 ALL CONCRETE SIDEWALKS TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF MISSISSAUGA STANDARD 2240.010.
3.8 ALL PEDESTRIAN SIDEWALK ENTRANCES AT INTERSECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 350.010.

4.0 SANITARY SERVICES

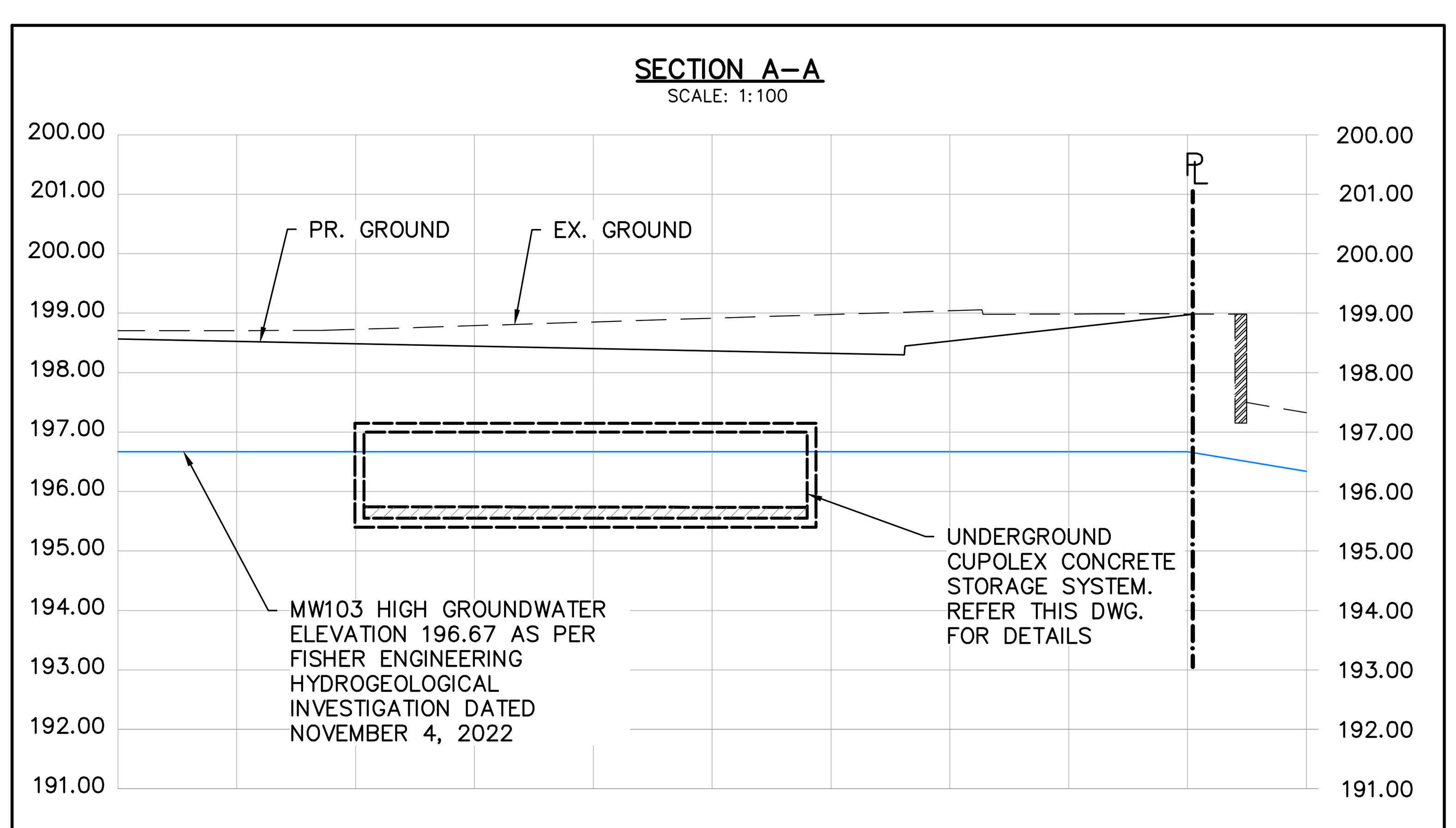
4.1 BEDDING AND EMBEDMENT TO REGION OF PEEL STANDARD 2-3-1, CLASS 'B' BEDDING.
4.2 TRENCH BACKFILL TO SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
4.3 BEDDING & EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
4.4 CLEAR STONE WRAPPED WITH FILTER FABRIC CAN BE SUBSTITUTED FOR EMBEDMENT MATERIAL IF APPROVED BY THE GEOTECHNICAL ENGINEER.
4.5 SANITARY SERVICE - SDR 28 PVC WITH MINIMUM PIPE STIFFNESS OF 320kPa - MANUFACTURED TO C.S.A. STANDARD B182.2 (J.R.S./A.S.T.M. SPECIFICATION D 3034) WITH RUBBER GASKETTED BELL AND SPIGOT JOINTS. SANITARY SERVICE TO BE INSTALLED PER CITY OF MISSISSAUGA STANDARD DWG 2115.050.
4.6 SERVICE CONNECTIONS TO REGION OF PEEL 2-4-2 AND 2-4-3.

6.0 STORM SERVICES

6.1 BEDDING & EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMDD.
6.2 BEDDING & EMBEDMENT TO OPSD 802.010 (FLEXIBLE PIPE) GRANULAR 'A' EMBEDMENT.
6.3 SUMP PUMP SYSTEM TO BE INSTALLED PER OBC PART 7 AND DISCHARGED ABOVE GRADE TO GRASS.

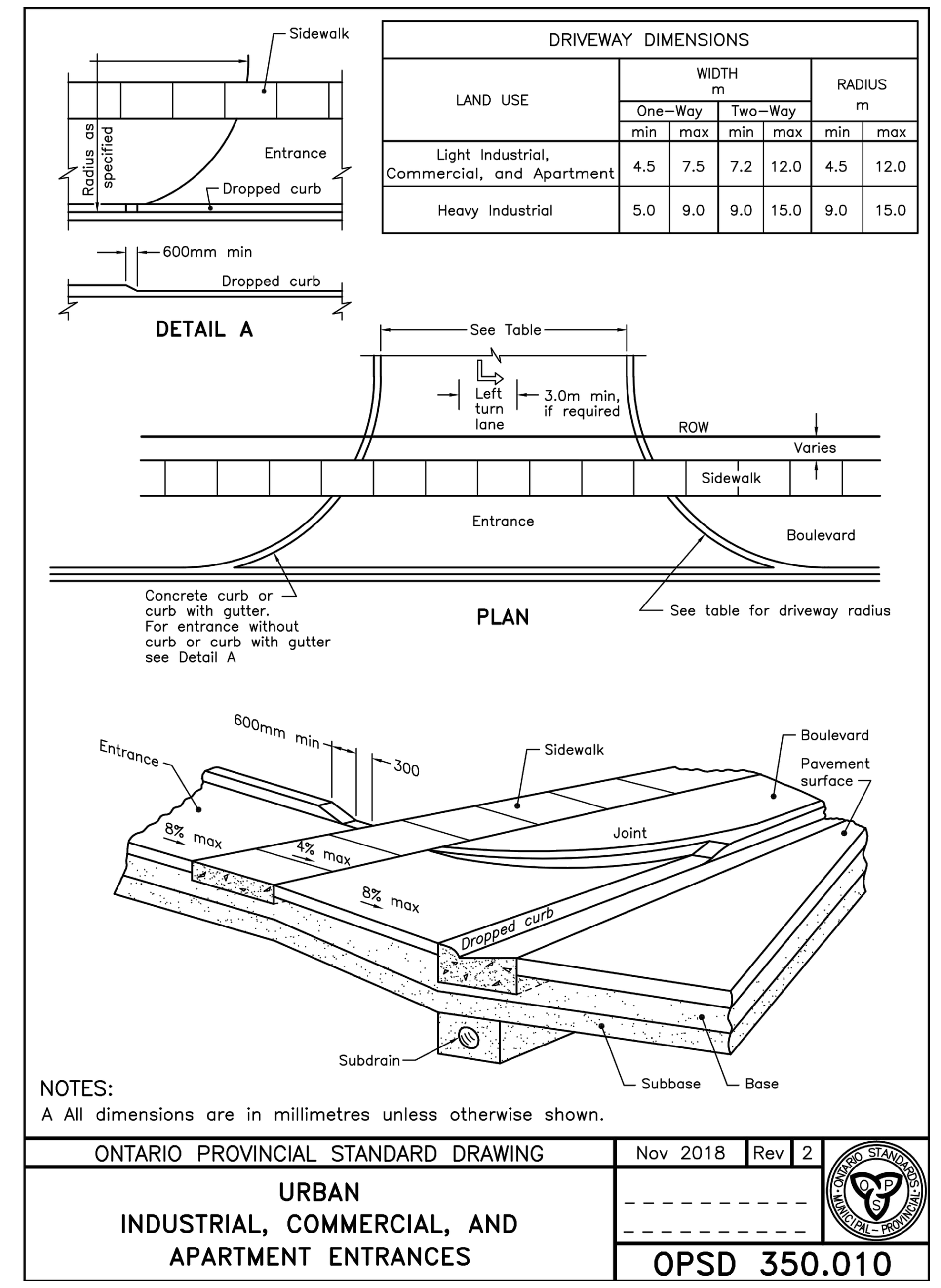
ADDITIONAL NOTES:

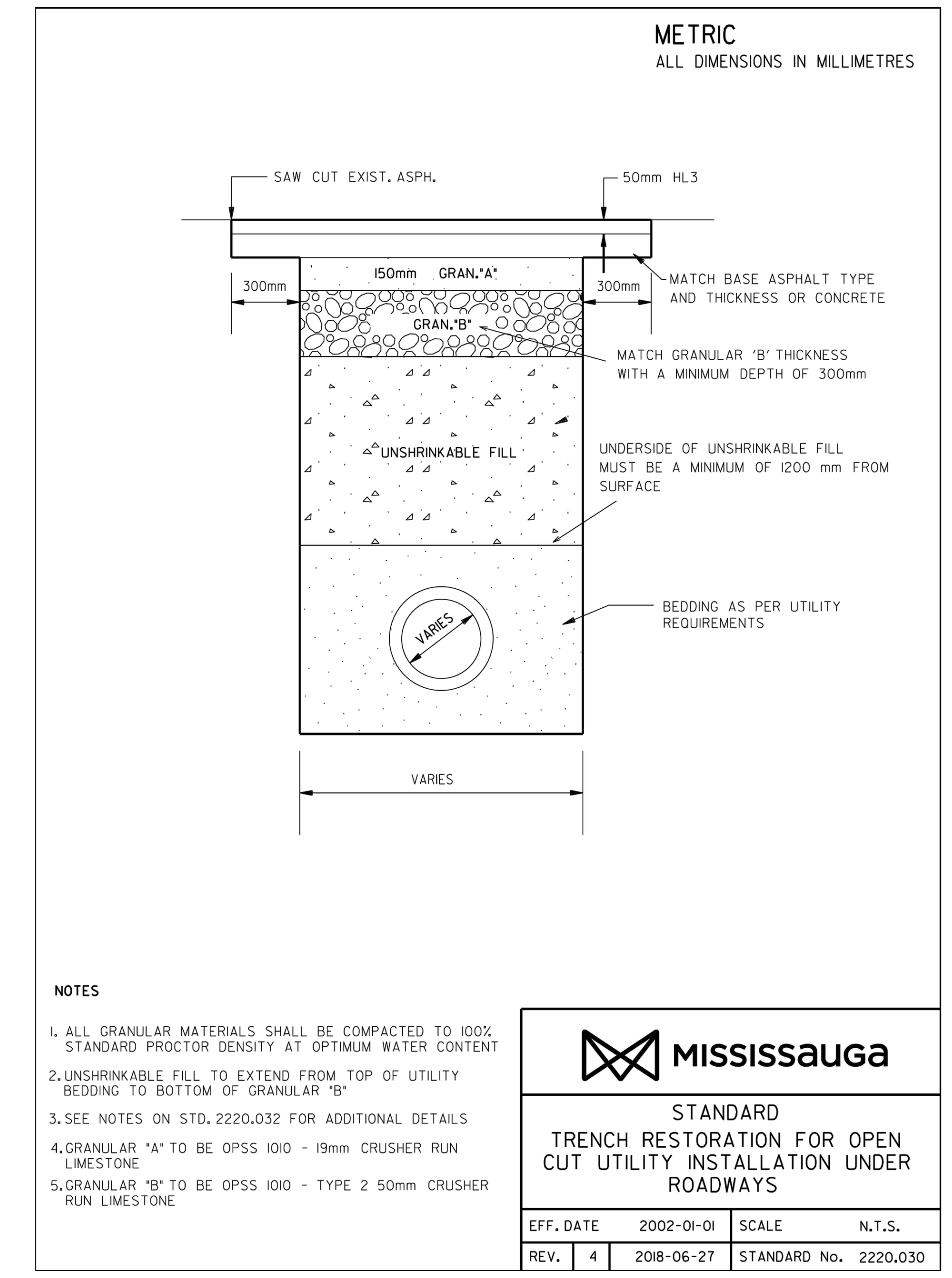
1.1. ALL SURFACE DRAINAGE WILL BE SELF-CONTAINED, COLLECTED AND DISCHARGED AT A LOCATION TO BE APPROVED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.
1.2. THE PORTIONS OF THE DRIVEWAY WITHIN THE MUNICIPAL BOULEVARD WILL BE PAVED BY THE APPLICANT.
1.3. AT THE ENTRANCES TO THE SITE, THE MUNICIPAL CURB AND SIDEWALK WILL BE CONTINUOUS THROUGH THE DRIVEWAY AND A CURB DEPRESSION WILL BE PROVIDED FOR EACH ENTRANCE.
1.4. ALL PROPOSED CURBING WITHIN THE MUNICIPAL BOULEVARD AREA FOR THE SITE IS TO SUIT AS FOLLOWS: A) FOR ALL SINGLE FAMILY RESIDENTIAL PROPERTIES INCLUDING ON STREET TOWNHOUSES, ALL CURBING IS TO STOP AT THE PROPERTY LIMIT OR THE BACK OF THE MUNICIPAL SIDEWALK, WHICHEVER IS APPLICABLE, OR, B) FOR ALL OTHER PROPOSALS INCLUDING INDUSTRIAL, COMMERCIAL AND CONDOMINIUM DEVELOPMENTS, ALL ENTRANCES TO THE SITE ARE TO BE IN ACCORDANCE WITH O.P.S.D. 350.010.
1.5. ALL EXCESS EXCAVATED MATERIAL WILL BE REMOVED FROM THE SITE.
1.6. THE EXISTING DRAINAGE PATTERN WILL BE MAINTAINED EXCEPT WHERE NOTED.
1.7. THE APPLICANT WILL BE REQUIRED TO CONTACT ALL UTILITY COMPANIES TO OBTAIN ALL REQUIRED LOCATED PRIOR TO THE INSTALLATION OF BOARDING WITHIN THE [...CUT OFF...] NECESSITATED BY THE SITE PLAN.
1.8. PRIOR TO CONSTRUCTION TAKING PLACE, ALL REQUIRED HOARDING IN ACCORDANCE WITH THE ONTARIO OCCUPATIONAL HEALTH & SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS MUST BE ERECTED AND THEN MAINTAINED THROUGHOUT ALL PHASES OF CONSTRUCTION.
1.9. SHOULD ANY WORKS BE REQUIRED WITHIN THE MUNICIPAL RIGHT OF WAY, A ROAD OCCUPANCY PERMIT WILL BE REQUIRED. PUCC APPROVAL WILL BE REQUIRED." FOR FURTHER INFORMATION, PLEASE CONTACT THE PUCC/PERMIT TECHNOLOGIST, LOCATED AT 3185 MAVIS ROAD.
1.10. WORKS IN THE MUNICIPAL RIGHT-OF-WAY BEING PERFORMED BY THE CITY'S CONTRACTOR WILL REQUIRE 4 TO 6 WEEKS' NOTICE PRIOR TO COMMENCEMENT OF CONSTRUCTION AFTER ALL DRAWINGS HAVE BEEN APPROVED AND SECURITIES HAVE BEEN RECEIVED. THE APPLICANT IS TO INDICATE IN THEIR SUBMISSION PACKAGE FOR THE RIGHT-OF-WAY WORKS THE IDEAL TIMING FOR THESE WORKS TO BE CONSTRUCTED.
1.11. ALL DAMAGED OR DISTURBED AREAS WITHIN THE MUNICIPAL RIGHT-OF-WAY ARE TO BE REINSTATED AT THE APPLICANT'S EXPENSE. * ALL LANDSCAPING AND GRADING WITHIN CLOSE PROXIMITY TO THE PROPOSED ACCESS POINTS IS TO BE DESIGNED TO ENSURE THAT ADEQUATE SIGHT DISTANCES ARE AVAILABLE FOR ALL APPROACHING AND EXITING MOTORISTS AND PEDESTRIANS. * THE PORTION OF THE DRIVEWAY WITHIN THE MUNICIPAL BOULEVARD IS TO BE PAVED BY THE APPLICANT. * DRIVEWAY ACCESSES SHALL MAINTAIN A 1.5 M SETBACK FROM ABOVEGROUND FEATURES SUCH AS UTILITIES AND TREES. ANY ABOVE GROUND UTILITIES LOCATED WITHIN 1.5 M OF A PROPOSED ACCESS ARE TO BE RELOCATED AT THE APPLICANT'S EXPENSE.

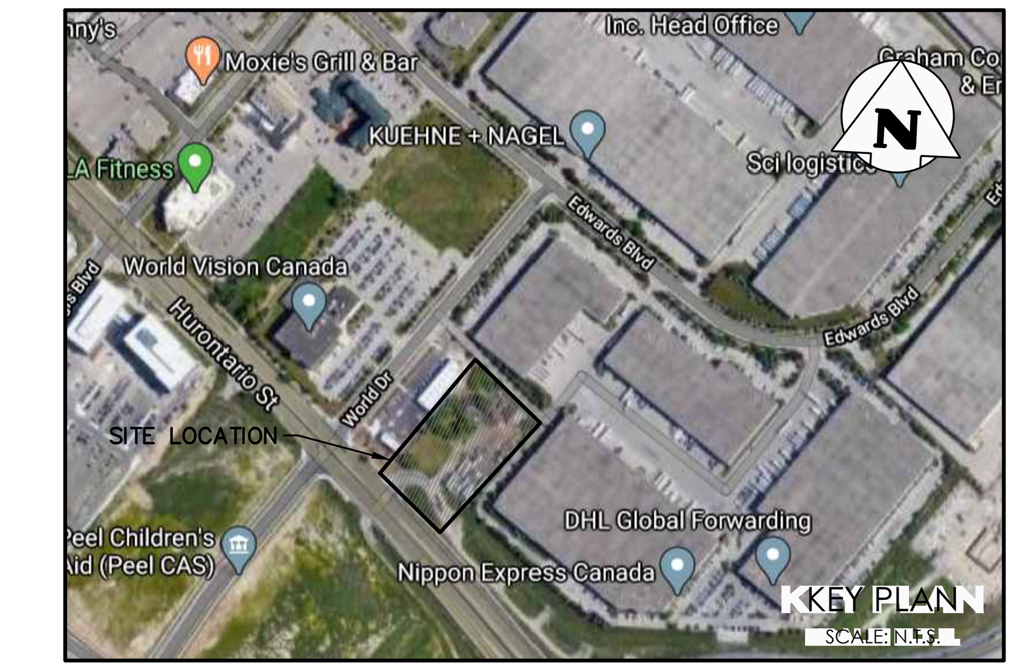


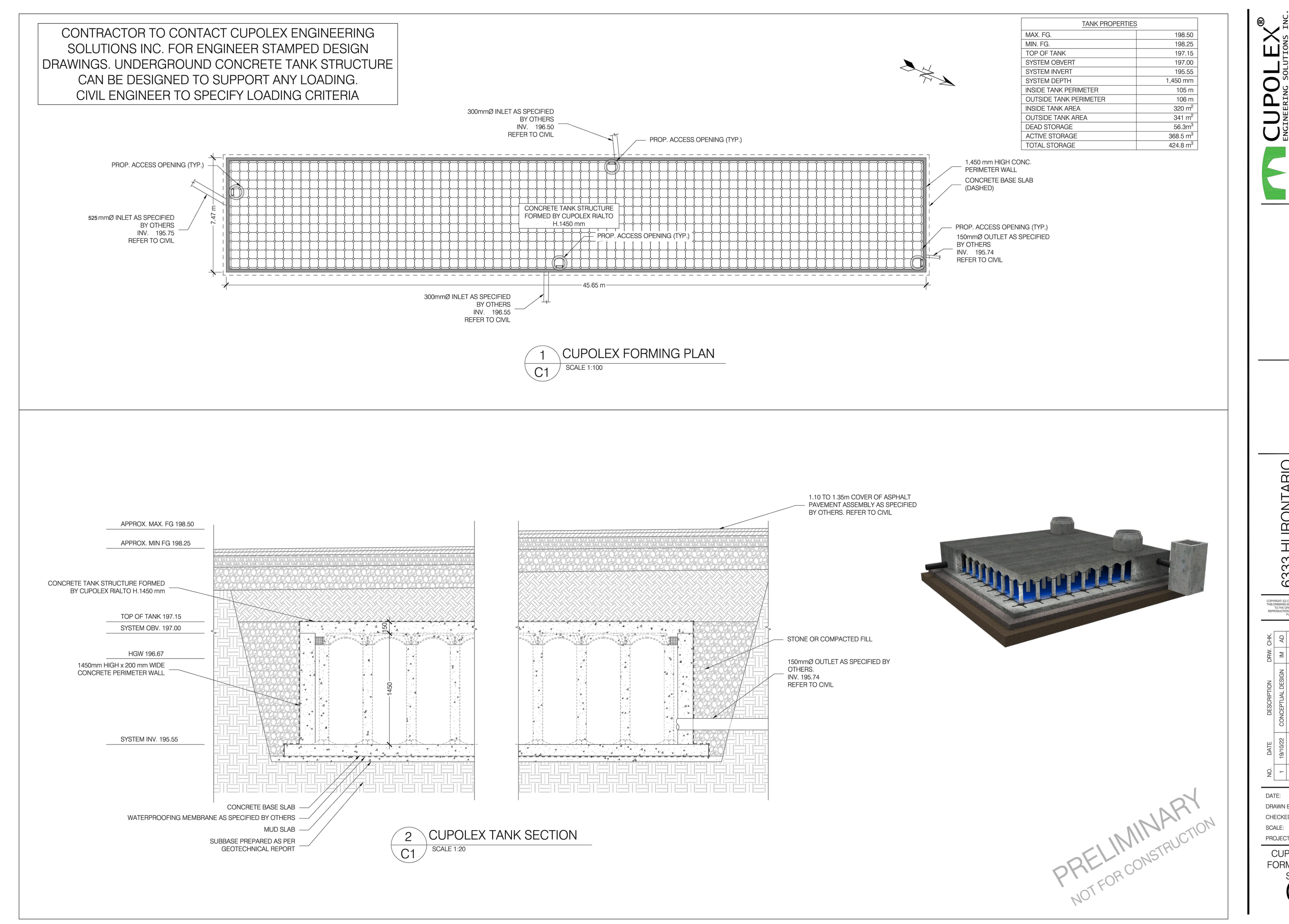
DRIVEWAY DIMENSIONS

LAND USE	WIDTH m One-Way min	One-Way max	Two-Way min	Two-Way max	RADIUS m min	RADIUS m max
Light Industrial, Commercial, and Apartment	4.5	7.5	7.2	12.0	4.5	12.0
Heavy Industrial	5.0	9.0	9.0	15.0	9.0	15.0









CONTRACTOR TO CONTACT CUPOLEX ENGINEERING SOLUTIONS INC. FOR ENGINEER STAMPED DESIGN DRAWINGS. UNDERGROUND CONCRETE TANK STRUCTURE CAN BE DESIGNED TO SUPPORT ANY LOADING. CIVIL ENGINEER TO SPECIFY LOADING CRITERIA
1 CUPOLEX FORMING PLAN C1
2 CUPOLEX TANK SECTION C1
CUPOLEX
6333 HURONTARIO STREET MISSISSAUGA, ON
PRELIMINARY NOT FOR CONSTRUCTION
C1

NOT FOR CONSTRUCTION

Stamp: A. D. FARINA 100523860 NOV/09/2022 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

No.	ISSUE / REVISION	YYYY/MMM/DD
1	ISSUED FOR SECOND SUBMISSION (ZBA & SPA)	2022/NOV/09
0	ISSUED FOR FIRST SUBMISSION	2020/OCT/30

ELEVATION NOTE:

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TABLET SET HORIZONTALLY AT BASE OF A 0.75m DIAMETER CONCRETE TRAFFIC POLE AT THE NORTHEAST CORNER OF CORTNEYPARK DRIVE EAST AND HURONTARIO STREET.

PUBLISHED ELEVATION = 200.113 METERS

BEARING NOTE:

BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE EASTERLY LIMIT OF HURONTARIO STREET AS SHOWN ON PLAN 43R-38391,HAVING A BEARING OF N43°44'10"W.

SURVEY NOTES:

SURVEY COMPLETED BY COMPANY SPEIGHT, VAN NOSTRAND AND GIBSON LIMITED (2020/JUL/13)

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

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GLOBAL ARCHITECT INC.
DRAWING No.: A-101, REV.3 (2022/NOV/03)
PROJECT No.: 22-08

DRAWING NOTES:

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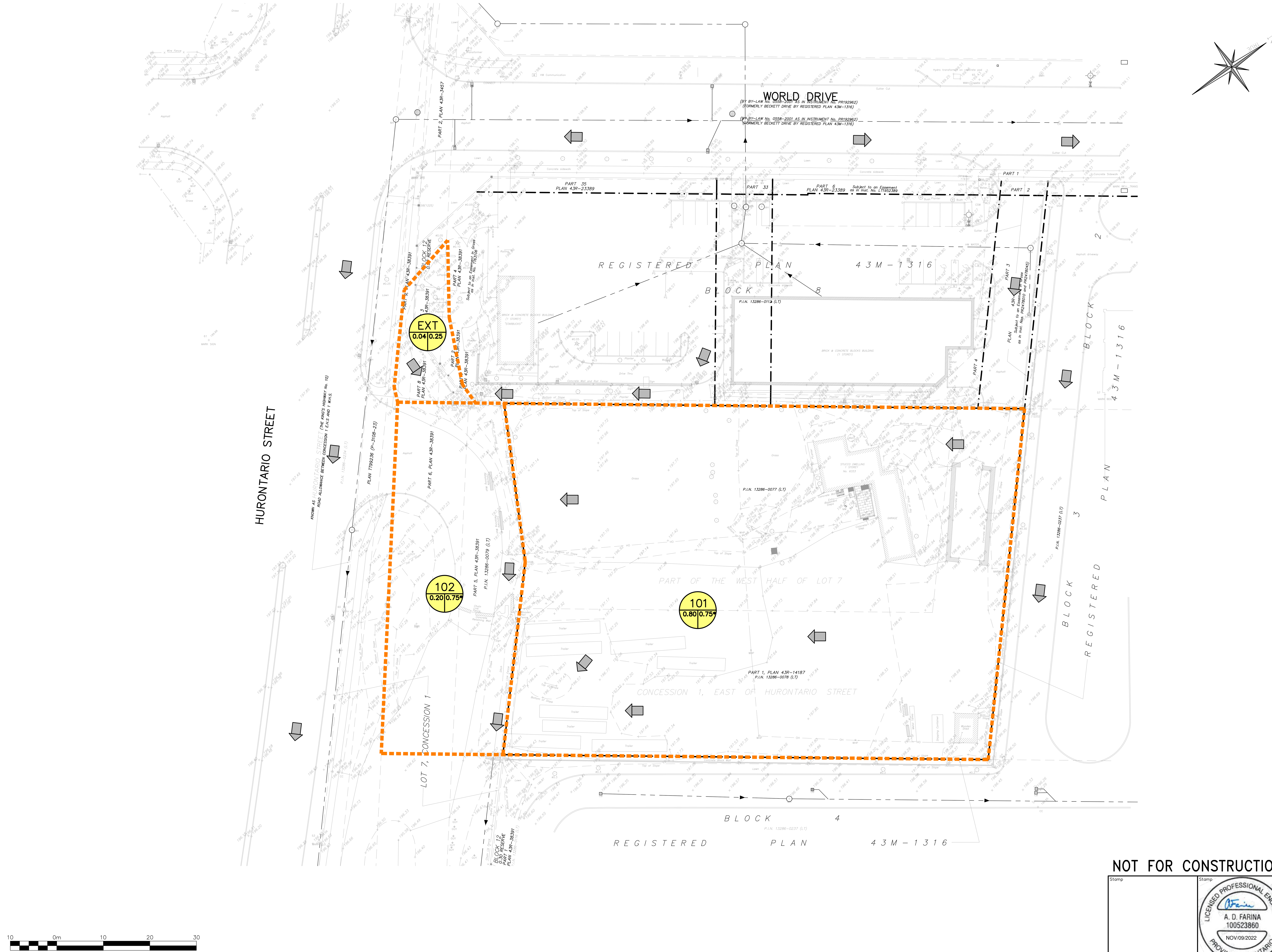
Project: DYMON GROUP OF COMPANIES
6333 HURONTARIO STREET
CITY OF MISSISSAUGA

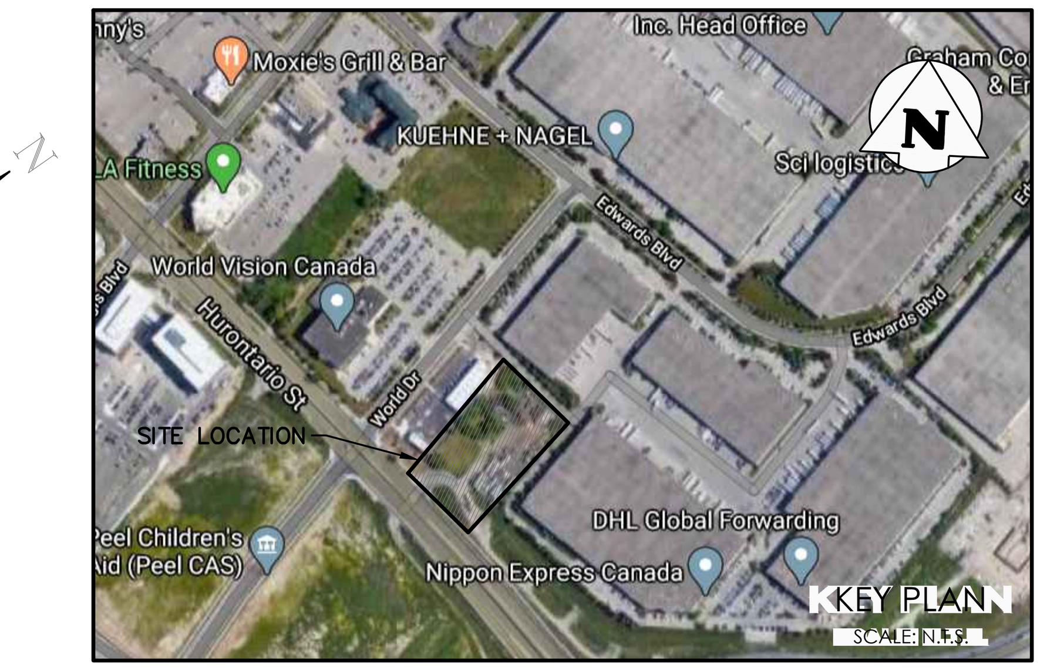
Drawing: NOTES AND STANDARD DETAILS

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
D.B.	D.B.	1644–5564	
Check A.D.F.	Check A.D.F.	Scale	Dwg. C 104

FIGURES





LEGEND

- PROPERTY LINE
- EXISTING DITCH
- × 215.00 EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- ID / A | RC: CATCHMENT I.D.; AREA (ha) | RUNOFF COEFFICIENT

*PRE-DEVELOPMENT RUNOFF COEFFICIENT IS AS PER THE DRAINAGE AREA PLAN PREPARED BY WINTER ASSOCIATES DATED JULY 1998. CITY AND REGION FILE NO. 21T-87081

No.	ISSUE / REVISION	YYYY/MMM/DD
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DRAWING No.: A-101, REV.3 (2022/NOV/03)
PROJECT No.: 22-08

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Project

DYMON GROUP OF COMPANIES
6333 HURONTARIO STREET
CITY OF MISSISSAUGA

Drawing

PRE-DEVELOPMENT DRAINAGE PLAN

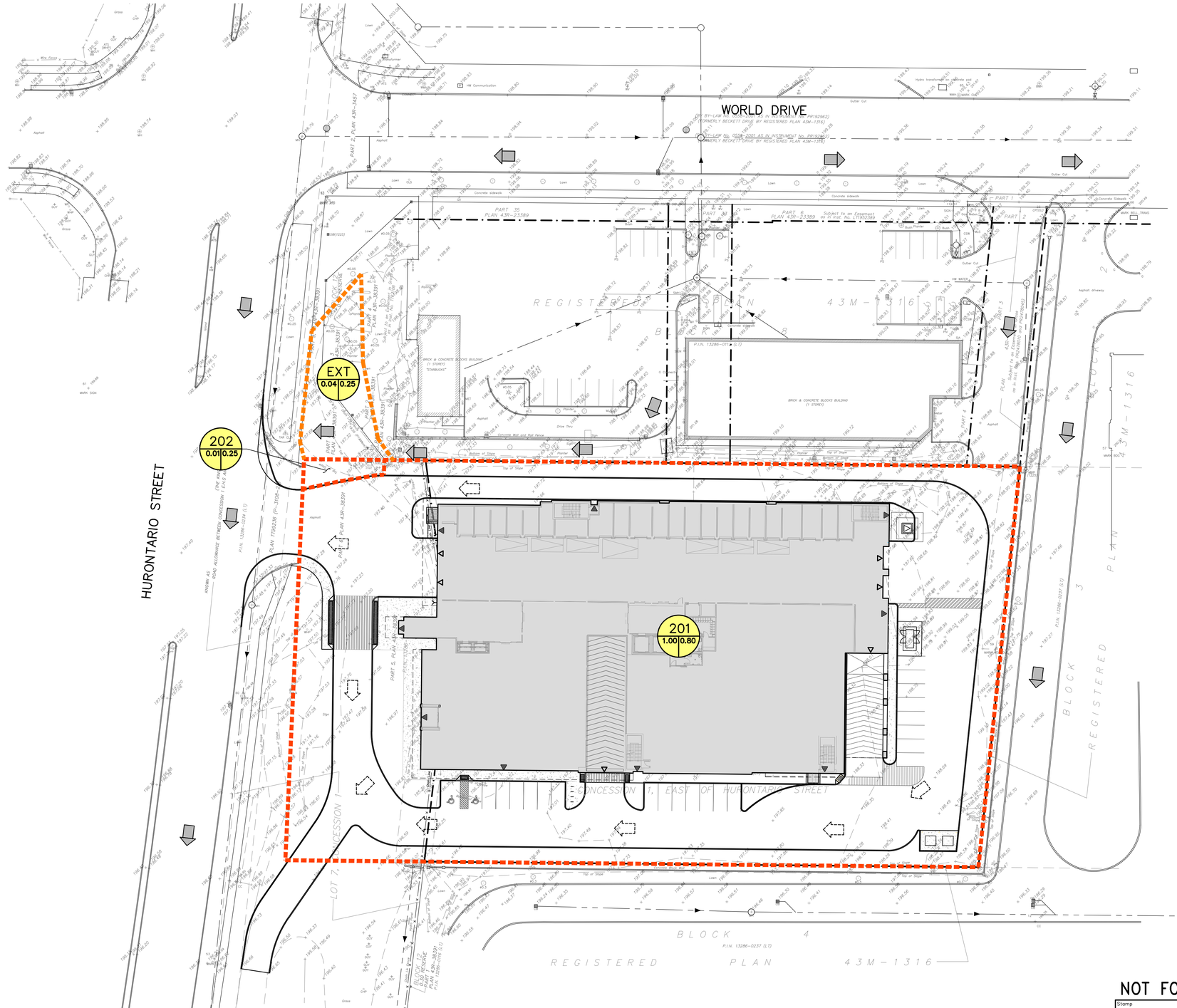
NOT FOR CONSTRUCTION

Stamp

Stamp: LICENSED PROFESSIONAL ENGINEER — A. D. FARINA 100523860 — NOV/09/2022 — PROVINCE OF ONTARIO

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	D.B.	Design	D.B.	Project No.	1644–5564
Check	A.D.F.	Check	A.D.F.	Scale 1:400	Dwg. FIG 1



LEGEND

- PROPERTY LINE
- EXISTING DITCH
- EXISTING GRADE
- PROPOSED OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- ID / A|RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT

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DRAWING No.: A-101, REV.3 (2022/NOV/03)
PROJECT No.: 22-08

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Project

DYMON GROUP OF COMPANIES
6333 HURONTARIO STREET
CITY OF MISSISSAUGA

Drawing

POST-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

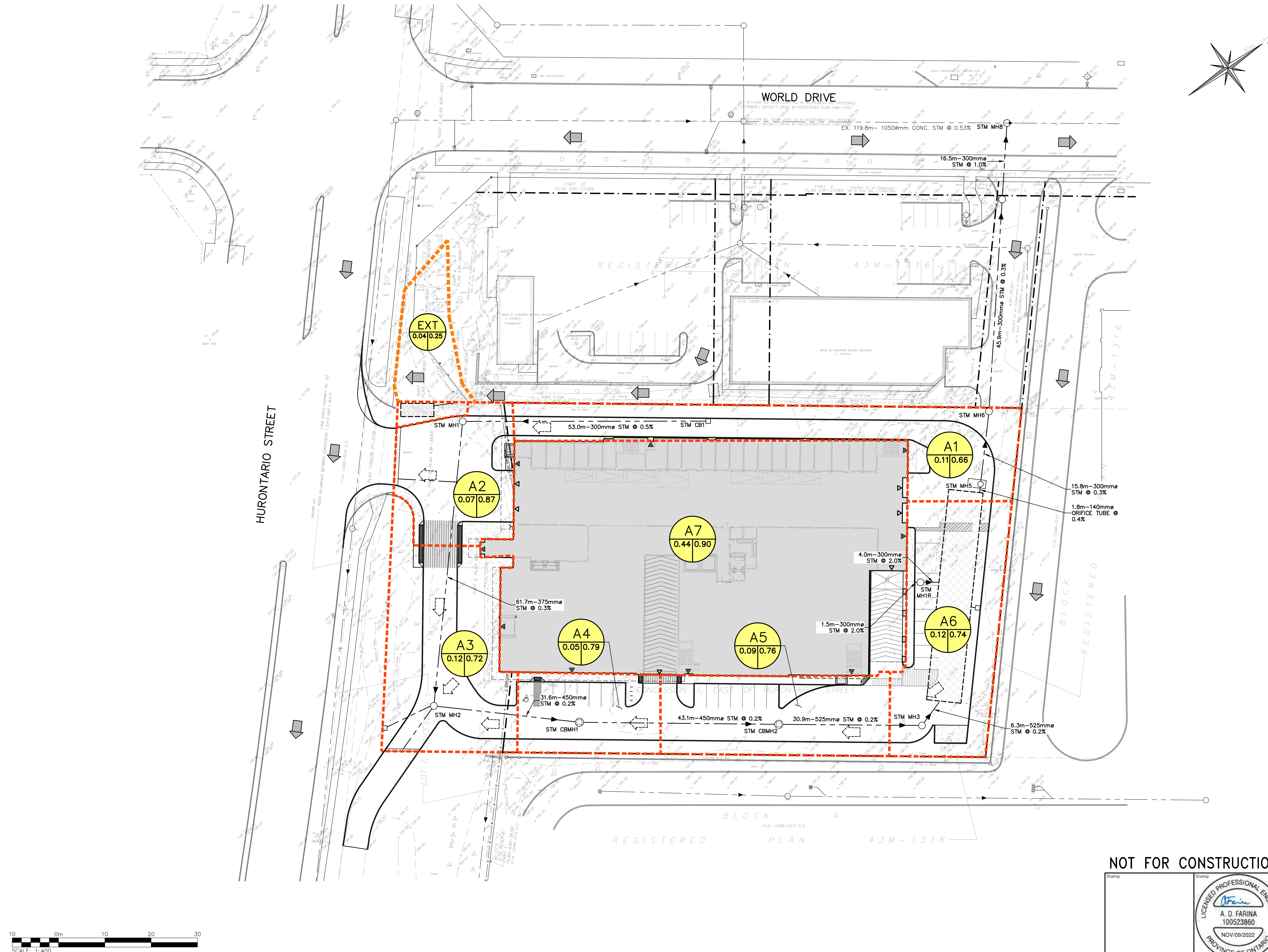
Stamp

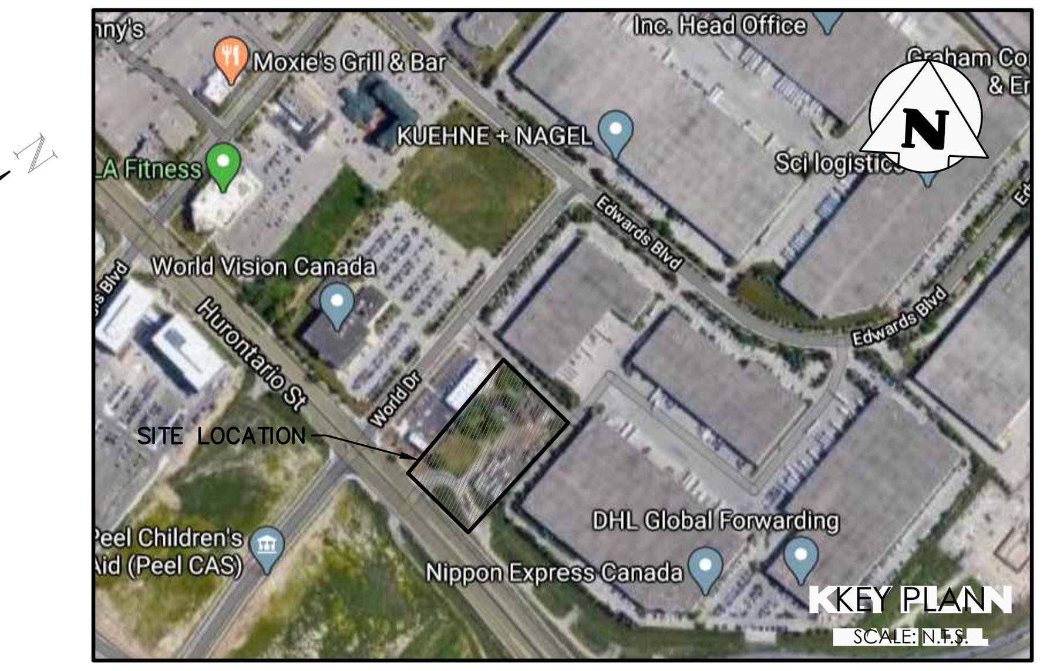
Stamp: LICENSED PROFESSIONAL ENGINEER — A. D. FARINA — 100523860 — OCT/31/2022 — PROVINCE OF ONTARIO

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
D.B.	D.B.	1644-5564	
Check	Check	Scale	Dwg.
A.D.F.	A.D.F.	1:400	FIG 2

10 0m 10 20 30
SCALE: 1:400





LEGEND

- PROPERTY LINE
- EXISTING GRADE
- PROPOSED OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- INTERNAL STORM AREA DRAINAGE
- ID / A | RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT

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Project

DYMON GROUP OF COMPANIES
6333 HURONTARIO STREET
CITY OF MISSISSAUGA

Drawing

INTERNAL POST–DEVELOPMENT DRAINAGE AREA PLAN

NOT FOR CONSTRUCTION

Stamp

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CROZIER CONSULTING ENGINEERS
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WWW.CFCROZIER.CA

Drawn	Design	Project No.	
D.B.	D.B.	1644–5564	
Check: A.D.F.	Check: A.D.F.	Scale: 1:400	Dwg.: FIG 3