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Proposed 2-Storey Mixed Use Building
437 Donald B. Munro Drive

Development Servicing Study and Stormwater Management Report

PROPOSED 2-STOREY MIXED USE BUILDING
437 DONALD B. MUNRO DRIVE

DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT

Prepared by:

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Kanata, Ontario
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May 31, 2019

Ref: R-2019-098
Novatech File No. 119023

NOVATECH
Engineers, Planners & Landscape Architects

May 31, 2019

City of Ottawa
Infrastructure Approvals Division
110 Laurier Street West, 4th Floor
Ottawa, ON
K1P 1J1

Attention: **Jenny Kluke**
Planner

Dear Sir:

Re: Development Servicing Study and Stormwater Management Report
437 Donald B. Munro Drive, Carp, ON
Our File No.: 119023

Please find enclosed the 'Development Servicing Study and Stormwater Management Report' for the proposed development of 437 Donald B. Munro Drive, in the Village of Carp. This report addresses the approach to site servicing and stormwater management for the subject property and is submitted in support of the Site Plan application.

Please contact the undersigned, should you have any questions or require additional information.

Yours truly,

NOVATECH

Mark Bissett, P. Eng.
Senior Project Engineer

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1.0 INTRODUCTION

Maple Leaf Homes is proposing to construct a mixed-use building in the Village of Carp. Novatech has been retained to complete the grading, servicing and stormwater management design for this project.

1.1 Purpose

This report outlines the servicing aspects of the proposed development with respect to water, sanitary and storm drainage and addresses the approach to stormwater management. This report is being submitted in support of the site plan application for the subject property.

1.2 Location and Site Description

The 0.165 hectares site is located at 437 Donald B. Munro Drive, Village of Carp, in the City of Ottawa. The property is bordered by existing commercial / residential buildings to the east and west, Donald B. Munro Drive to the north and an east-west railway corridor and Carp River to the south. The site is currently a vacant lot with some granular fill and some brush. The legal description of the property is designated as Lot 109 and Lot 114, Village of Carp, Geographic Township of West Carleton, City of Ottawa on Registered Plan 218. Refer to **Figure 1** – Existing Conditions.

Figure 1 – Existing Conditions

1.3 Pre-Consultation Information

A pre-consultation meeting was held with the City of Ottawa on June 18, 2018, at which time the client was advised of the general submission requirements. Refer to **Appendix A** for a summary of the correspondence with the City of Ottawa. Subsequent discussions were held with the City of Ottawa regarding the previously approved approach to site servicing and stormwater management.

1.4 Proposed Development

The proposed development will consist of a 2-storey mixed use building with associated parking lot and landscaped areas. Access to the subject site will be provided through a single lane driveway off Donald B. Munro Drive. Refer to **Figure 2** – Site Plan.

1.5 Reference Material

The following guidelines and supporting documents were prepared or reviewed as part of the design process:

- **City of Ottawa Water Distribution Guidelines** (OWDG)
  City of Ottawa, October 2012.
- **Revisions to OWDG** (ISTB-2010-01, ISTB-2014-02, ISTB-2018-02, & ISTB-2018-04)
  City of Ottawa, December 2010, May 2014, March 2018, and June 2018.
- **City of Ottawa Sewer Design Guidelines** (OSDG)
  City of Ottawa, October 2012.
- **Revisions to OSDG** (ISTB-2016-01, ISTB-2018-01, & ISTB-2018-03)
  City of Ottawa, September 2016 and March 2018.
- **Design Guidelines for Sewage Works and Drinking Water System** (MOE Guidelines)
  Ontario's Ministry of the Environment, 2008.
- **Stormwater Management Planning and Design Manual** (MOE SWM Guidelines)
  Ontario's Ministry of the Environment, 2003.

1.6 Geotechnical Investigation

A Geotechnical Investigation Report has been prepared by Paterson Group Inc. for the proposed project:

- **Geotechnical Investigation, Proposed Mixed-Use Building, 437 Donald B. Munro Drive, Ottawa, Ontario** (Report: PG4916-1)
  Paterson Group Inc., May 24, 2019.

The report identified the sub-surface conditions, construction recommendations and geotechnical inspection requirements. Surficial soils consisted of compact silty sand to sandy silt with occasional traces of clay and gravel. Groundwater was observed to be approximately 2.5 – 3 meters below the existing ground surface.

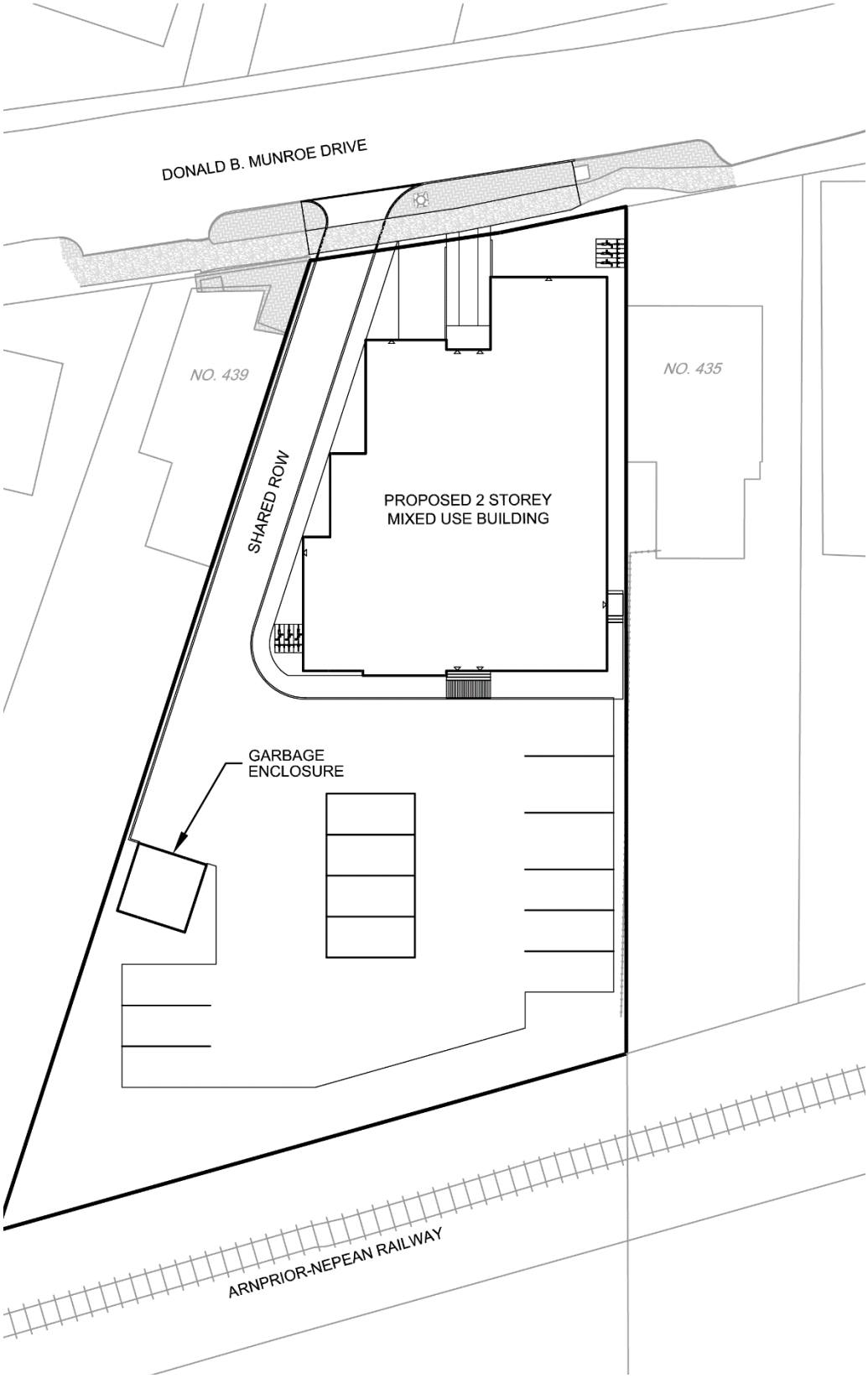

Figure 2 – Site Plan

2.0 SITE SERVICING

The objective of the site servicing design is to conform to the requirements of the City of Ottawa; to provide a suitable domestic water supply, proper sewage outlets and to ensure that appropriate fire protection is provided. The servicing criteria, expected sewage flows and water demands for the subject site have been established using the City of Ottawa municipal design guidelines for sewer and water distribution. Refer to the enclosed plans and to the subsequent sections of the report for further details.

The City of Ottawa Servicing Study Guidelines for Development Applications requires a Development Servicing Study Checklist to confirm that each applicable item is deemed complete and ready for review by City of Ottawa Infrastructure Approvals. A completed checklist is enclosed in **Appendix B** of the report.

2.1 Sanitary Sewage

The proposed development will be serviced by two (2) 200mm diameter sanitary service connections to the existing 300mm diameter sanitary sewer within Donald B. Munro Drive and will ultimately outlet to the Carp Pumping Station on Salisbury Street.

The following City of Ottawa design criteria were used to calculate the sanitary flows from the proposed development:

- 3 Bedroom Apartment: 3.1 people/unit
- Residential Flow Rate, Average Daily: 280 L/cap/day
- Commercial Flow Rate: 28,000 L/ha/day
- Residential Peaking Factor: Harmon Equation (min=2.0, max=4.0)
- Commercial Peaking Factor: 1.5
- Infiltration: 0.33 L/s/ha

Table 2.1 identifies the pre-development and post-development sanitary flows based on the design population, using the above design criteria.

Table 2.1: Sanitary Flows

Scenario	Residential Peak Flow (L/s)	Commercial Peak Flow (L/s)	Infiltration Peak Flow (L/s)	Total Flow (L/s)
Pre-Development	0.04 (3.4 ppl)	-	0.06 (0.165 ha)	0.10
Post-Development	0.08 (6.2 ppl)	0.08 (0.165 ha)	0.06 (0.165 ha)	0.21

The existing 300mm diameter sanitary sewer within Donald B. Munro Drive runs at 0.56% with a full flow conveyance capacity of 75.5 L/s. The increase of 0.11 L/s from pre to post development corresponds to 0.1% of the total capacity. The introduction of such a small flow into the existing system will not have a significant impact to the Carp sanitary system. Refer to sanitary design sheet provided in **Appendix C**.

2.2 Water

The proposed development will be serviced by two (2) 25mm diameter watermain service connections to the existing 300mm diameter watermain within Donald B. Munro Drive.

The watermain boundary condition below was obtained from the City of Ottawa and has been included in **Appendix C**:

Boundary Condition – Located at the service connection to the 300mm diameter watermain on Donald B. Munro Drive.
Minimum HGL = 150.0m
Maximum HGL = 160.0m
MaxDay + Fire Flow (60L/s) = 135.0m to 163.0m

2.2.1 Domestic Water Demand

The water demands for the proposed development were calculated using the City of Ottawa design criteria and are outlined below:

- Apartment Population: 3.1 ppl/unit
- Residential Demand: 350 L/c/d
- Commercial Demand: 28,000 L/gross ha/day
- Residential Maximum Day Demand: 2.5 x Average Day
- Residential Peak Hour Demand: 2.2 x Max Day
- Commercial Max Day Demand: 1.5 x Average Day
- Commercial Peak Hour Demand: 1.8 x Max Day

The following design criteria were taken from Section 4.2.2 – 'Watermain Pressure Demand Objectives' of the City of Ottawa Design guidelines for Water Distribution:

- Normal operating pressure are to range between 40psi and 80 psi under Max Day demands
- Minimum system pressures are to be 40 psi under peak hour demands
- Minimum system pressures are to be 20 psi under Max Day + Fire Flow demands.

Table 2.2 below identifies the domestic water demands for the proposed building based on the above design criteria.

Table 2.2: Water Demand Summary

Land Use	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Apartment	N/A	2	6.2	0.025	0.063	0.138
Commercial	0.17	N/A	N/A	0.055	0.083	0.149
Total	**0.17**	**2**	**6.2**	**0.080**	**0.145**	**0.287**

The boundary conditions provided by the City were converted to psi to confirm conformance with the above design criteria. A summary of the results are provided below:

- Minimum HGL (150.0m) = 150.0m – 95.45m (FF) = 54.55m = **77.6 psi**
- Maximum HGL (160.0m) = 160.0m – 95.45m (FF) = 64.55m = **91.8 psi**

As shown above the minimum HGL of 77.6 psi falls within the normal operating pressure range (50 psi to 80 psi). The maximum HGL of 91.8 psi is above 80 psi, therefore pressure reducing valves shall be installed on all services.

2.2.2 Water Supply for Fire-Fighting

The proposed building is located within 75m of two existing class AA (blue top) hydrants on Donald B. Munro Drive, with one 58m to the west and the other 37m to the east. As directed by the City, the fire flow was calculated in accordance with the Ontario Building Code and was calculated as 60 L/s.

The minimum and maximum fire flow boundary conditions of 135.0m and 163.0m provided by the City were converted to psi and are listed below:

- MaxDay + Fire Flow (60 L/s) Minimum (135.0m) = 135m – 95.45m = 39.55m = **56.2 psi**
- MaxDay + Fire Flow (60 Ls) Maximum (163.0m) = 163m – 95.45m = 67.55m = **96.0 psi**

As summarized above, since the minimum system pressure during the Maximum Day + Fire condition is above the minimum required 20 psi the proposed development can be adequately serviced for both domestic use and firefighting conditions.

3.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

The storm outlet for the site is the existing ditch along the railway to the south of the site. Under existing conditions uncontrolled drainage sheet flows towards this railway ditch. There is an existing 900mm dia. CSP culvert within a drainage easement immediately west of the property. No modifications are proposed to the existing 900mm dia. CSP culvert.

The site is tributary to the Carp River; under the jurisdiction of the Mississippi Valley Conservation Authority (MVCA). As such, the stormwater management criteria from the Carp River Subwatershed Study (Robinson Consultants, December 2004) apply.

3.1 Stormwater Management Criteria and Objectives

The following stormwater management criteria was established during the pre-consultation process:

- Control post-development peak flows to pre-development rates for all storm events up-to and including the 100-year storm event.
- Ensure that no surface ponding will occur on the paved surfaces (i.e. private drive aisles or parking lots) during the 2-year storm event.
- Maximum 100-year ponding depths cannot exceed 350mm and there is to be no major system flows offsite during 100-year events.
- Annual Infiltration target of 73 mm/year; as per the Carp River Subwatershed Study (Robinson Consultants, December 2004).
- Provide an enhanced level of water quality treatment corresponding to 80% long-term TSS removal.

3.1.1 Allowable Release Rates

Under existing conditions, the site has a runoff coefficient of 0.38 (approximately 25% impervious). This represents a single-family home with a gravel driveway, with the remainder of the site grass lawn as shown below in **Figure 3** – Pre-Development Drainage Area Plan. The allowable release rates below represent the pre-development peak flow, using the Rational Method, for the 2, 5, and 100-year storm events.

Allowable Release Rates

2-year:	13.2 L/s
5-year:	17.9 L/s
100-year:	35.8 L/s

Refer to **Appendix D** for pre-development catchment parameters and peak flow calculations.

3.2 Post-Development Conditions

Stormwater runoff from the uncontrolled rooftop and parking area will be directed towards a single catchbasin. The catchbasin will discharge into an on-site storm sewer system.

The on-site storm sewer system will operate as described below:

- Storm runoff for a 2-year storm event will be stored underground (i.e. no surface ponding).
    - Underground storage will be provided using 16x Stormtech SC-310 arch-type storage chambers covered in clearstone (**Appendix E**).
    - The Stormtech Chambers will have a 300mm clearstone base, set below the invert of the outlet pipe, to promote infiltration.
- Storm runoff for larger storm events (>2-year storm) will be stored on the parking lot surface to a maximum ponding depth of 0.27m during the 100-year event.
- Peak flows from the parking lot will be controlled using an inlet control device (ICD) installed in the outlet pipe of CB1.
    - The inlet control device will consist of a Tempest LMF ICD (**Appendix F**).
- Controlled peak flows will discharge into a water quality treatment unit.
    - The water quality treatment unit will be a CDS Model PMSU2015_4 sized to provide at least 80% long-term TSS removal (**Appendix G**).

Runoff from the areas around the perimeter of the site will sheet flow uncontrolled. These areas have been accounted for in the overall allowable release rate for the site.

3.3 Hydrologic and Hydraulic Modelling (PCSWMM)

The performance of the proposed storm drainage system was evaluated using the PCSWMM hydrologic / hydraulic model. The PCSWMM model simulates the storage and routing of flows through the proposed storm drainage network. The results of the analysis were used to:

- Calculate subcatchment peak flows and runoff volumes
- Calculate the required underground storage and surface ponding depths
- Size the proposed ICD

The design storms used in the hydrologic analysis model include the 3-hour Chicago distribution and the 12-hour SCS Type II distribution for return periods of 1:2 years, 1:5 years and 1:100 years. IDF data was taken from the *City of Ottawa Sewer Design Guidelines* (OSDG) dated October 2012. The 3-hour Chicago storm distribution was found to generate the highest peak flows and the model results from this distribution are documented in the following tables. The model was also 'stress tested' using a 100-year 3-hour Chicago storm that is increased by 20% in total rainfall and intensity.

The PCSWMM model schematic and 2-year & 100-year output files are provided in **Appendix H**. A copy of the PCSWMM model is provided on the enclosed CD.

3.3.1 Model Parameters

The proposed site has been divided into five (5) sub-catchment areas representing post-development conditions. Areas were delineated based on the proposed grading design. The sub-catchment areas and parameters used in the model are summarized in **Table 3.1**.

Table 3.1: Post-Development Subcatchment Parameters

Area ID	Drainage Area (ha)	Runoff Coefficient	Percent Imperviousness (%)	Flow Length (m)	Equivalent Width (m)	Slope (%)
Uncontrolled Subcatchments						
1	0.024	0.30	14.3	4	60	5
2	0.008	0.79	84.3	3	27	2
3	0.003	0.50	42.9	2	15	2
Controlled Subcatchments						
4	0.090	0.90	100.0	10	90	2
5	0.040	0.90	100.0 (zero impervious)	8	50	1.5
TOTAL	**0.165**	**0.80**	**85.7**	**-**	**-**	**-**

Refer the enclosed Storm Drainage Area Plan (119023-STM) for details.

3.3.2 Model Results

Storm runoff from the rooftop and parking lot will be captured by the proposed on-site storm sewer system and will be attenuated by the ICD installed in the outlet pipe of CB1. Runoff will be temporarily stored within the underground Stormtech Chambers and on the surface (parking lot). Minor system peak flows will be controlled on-site to the allowable release rates, prior to discharging into the railway ditch.

Peak Flows

A comparison of post-development peak flows to the allowable (pre-development) release rate is summarized in **Table 3.2**.

Table 3.2: Summary of Peak Flows

Return Period ->	Peak Flow (L/s) *3-hour Chicago Storm*			
	2-year	**5-year**	**100-year**	**100-year (+20%)**
Pre-Development Conditions				
Allowable Release Rate	13.2	17.9	35.8	-
Post-Development Conditions				
Minor System	8.3	10.5	17.2	17.8
Major System	0.0	0.0	0.0	61.0
Uncontrolled Runoff	2.6	6.7	14.3	17.6
TOTAL	**10.9**	**17.2**	**31.5**	**96.4**

As indicated above, the proposed storm drainage system will provide adequate underground storage for the 2-year storm event and surface storage for the 5-year and 100-year design events, without exceeding the allowable release rates.

Ponding Depths (CB01)

The maximum static ponding depth at CB01 is 0.27m (93.85m). CB01 has an invert elevation of 92.33m and T/G elevation of 93.58m (1.25m CB depth). The ponding depths (elevation) at CB01 for each return period is shown below:

Return Period	*Ponding Depth (Elevation)*
2-year	0.00 m (92.77 m)
5-year	0.00 m (92.99 m)
100-year	0.25 m (93.83 m)
100-year (+20%)	0.30 m (93.88 m)

Surface ponding depths will not touch the building envelope or lowest openings during the 100-year (+20%) 'stress test' event (finished floor (FF) elevation = 95.45; top of slab). There is no surface ponding during the 2-year and 5-year storm events. Surface ponding during the 100-year storm event is contained on-site.

3.4 Stormwater Infiltration

By implementing infiltration BMPs as part of the storm drainage design, the impacts of development on the hydrologic cycle can be considerably reduced. Infiltration of clean runoff will have additional benefits for stormwater management.

The proposed stormwater management strategy includes the installation of arch-type infiltration chambers (Stormtech SC-310 or approved equivalent) to meet the infiltration targets identified in the Carp River Subwatershed Study (Robinson Consultants, December 2004).

3.4.1 Infiltration Target

The annual infiltration target is dependent on the existing soil conditions on the site (silty sand). Silty sand has a low groundwater recharge capability. As such, the annual infiltration target is to provide 73 mm/year or 120.5 m^3/year based on a site area of 0.165 ha.

3.4.2 Percolation Rate and Groundwater Depths

The native soils are silty sand to sandy silt with low to moderate permeability. A typical percolation rate for the silty sand is estimated to be 20 mm/hr. This value has been divided by 2 to account for clogging (10 mm/hr). The average groundwater depths in Boreholes 14-1, 14-2 and 14-3 is approximately 2.4 m or greater.

3.4.3 Infiltration System

To meet the infiltration target, arch-type infiltration chambers (Stormtech SC-310 or approved equivalent) will be constructed below the parking lot. The chambers will store and infiltrate stormwater runoff from the rooftop and parking lot. The chambers will be covered with clearstone with a 300mm base. The 300mm base provides 4.8 m^3 of storage for infiltration, based on an assumed 40% void ratio. The available storage will be sufficient to retain and infiltrate first 3.7 mm of rainfall / direct runoff from the contributing drainage areas.

No subdrain is proposed for the infiltration chambers. The ICD will be set at same invert as the bottom of the chambers. This provides the 300mm clearstone base for infiltration. Refer to the detail on the General Plan of Services (Drawing 119023-GP).

The drawdown time for the 300mm clearstone base for infiltration is approximately 12 hours. This is due to the low / moderate permeability of the surrounding silty sand soils (10 mm/hr) – refer to **Table 3.3**; calculations provided in **Appendix D**. This should be sufficient to fully drain the infiltration trenches each day.

Table 3.3: Infiltration Rate through Soil and Retention Time

STM Areas (Drainage Area)	Estimated Percolation Rate	Storage Volume for Infiltration	Bottom Area	Infiltration Rate through Soil[1]	Retention Time[2]
4 & 5 (0.130 ha)	10 mm/hr	4.8 m^3	40.4 m^2	0.11 L/s	12.0 hours

[1]Infiltration rate = percolation rate x bottom area of trench (assumes no infiltration through the sides)
[2]Retention time = storage volume of clearstone below stormtech chambers / infiltration rate through soil
Sample calculations provided in **Appendix D.*

Annual Rainfall and Volume Captured

Based on thirty (30) years of climate data (1971-2000) from the Ottawa CDA Environment Canada Weather Station (STA ID: 6105976), the average annual precipitation in Ottawa is 914 mm (rain + snow). The average annual rainfall is 733 mm, and the annual rainfall between May and October is 515 mm. Refer to the Climate Normals provided in **Appendix D**.

The drainage area to the Stormtech Chambers is 0.130 ha. The storage provided for infiltration (3.6 m^3) equates to an infiltration depth of 3.7 mm over the 0.130 ha area. Based on the 30 years of daily rainfall data, infiltrating the first 3.7 mm of rainfall equates to 37% of the annual rainfall (515 mm) being infiltrated. This corresponds to infiltrating 192.8 mm/year or 250.7 m^3/year. This exceeds the Carp River Subwatershed Study target of 73 mm/year or 120.5 m^3/year. Refer to calculations provided in **Appendix D**.

3.5 Water Quality Treatment

The subject site is located within the jurisdiction of the Mississippi Valley Conservation Authority (MVCA) and is tributary to the Carp River. An 'Enhanced' Level of Protection, equivalent to a long-term average removal of 80% Total Suspended Solids (TSS), with at least 90% of the total rainfall being captured and treated, is required.

To achieve this level of quality control protection, a new oil-grit separator unit (CDS Model PMSU2015_4) will be installed upstream the outlet. Stormwater runoff collected by the on-site storm sewer system (0.133 ha tributary area) will be directed through the proposed treatment unit. The contributing area includes the proposed paved parking lot as well as a small grass strip on the northeast side of the building.

Echelon Environmental and Contech Stormwater Solutions Inc. have modeled and analyzed the tributary area to provide a CDS unit capable of meeting the TSS removal requirements. The model parameters for the TSS removal were based on historical rainfall data for Ottawa. It was determined that a CDS Model PMSU2015_4 will exceed the target removal rate, providing a net annual 89.6% TSS removal.

The CDS Model PMSU2015_4 unit has a treatment capacity of approximately 20 L/s, a sediment storage capacity of 0.84m^3; an oil storage capacity of 232 L; a total holding capacity of 1.6 m^3; and will treat a net annual volume of approximately 99.0% for the tributary area.

Maintenance and Monitoring of the Storm Sewer and Stormwater Management Systems

It is recommended that the client implement a maintenance and monitoring program for both the on-site storm sewers and the stormwater management systems: The storm drainage system, including the Stormtech Chambers, should be inspected routinely (at least annually); the ICD should be inspected to ensure it is fitted securely and free of debris; and the oil-grit separator should be inspected at regular intervals and maintained when necessary to ensure optimal performance. Refer to **Appendix G** for the CDS unit design parameters, sizing analysis, operation, design, performance and maintenance summary parameters as well as the annual TSS removal efficiency data.

4.0 SITE GRADING

The elevation of the existing site varies from approximately 95.32m at the northwest corner of the property down to approximately 92.32m at the southeast property corner. Stormwater runoff from the site currently sheet drains uncontrolled, flowing in a south-easterly direction towards the existing ditch along the south property line before outletting to the Carp River. Refer to drawing 119023-ESC for existing conditions.

The finished floor elevation of the proposed building will be set at an elevation of 95.45m, providing positive drainage away from the building in all directions. The grades along the perimeter of the site will be maintained. Refer to the enclosed Grading Plan for details.

4.1 Major System Overflow Route

In the case of a major rainfall event exceeding the design storms provided for, the stormwater located within the parking lot will overflow towards the existing ditch along the south property line that outlets to the Carp River through a 600mm diameter culvert. The major system overflow route is shown on the enclosed Grading and Drainage Plan (119023-GR).

5.0 EROSION AND SEDIMENT CONTROL

To mitigate erosion and to prevent sediment from entering the storm drainage system, temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987). Details are provided on the Grading and Erosion and Sediment Control Plan (Drawing C-200). This includes the following measures:

- Filter bags / catchbasin inserts (sediment sacks) will be placed under the grates of nearby catchbasins and manholes and they will remain in place until vegetation has been established and construction is completed.
- Silt fencing will be placed per OPSS 577 and OPSD 219.110 along the surrounding construction limits.
- Mud mats will be installed at the site entrances.
- Street sweeping, and cleaning will be performed, as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site.
- On-site dewatering is to be directed to a sediment trap and/or gravel splash pad and discharged safely to an approved outlet as directed by the engineer.

The temporary erosion and sediment control measures will be implemented prior to construction and will remain in place during all phases of construction. Regular inspection and maintenance of the erosion control measures will be undertaken.

6.0 CONCLUSIONS

This report has been prepared in support of a site plan application for the proposed development located at 437 Donald B. Munro Drive. The conclusions are as follows:

- The proposed development will consist of a 2-storey mixed use building with associated parking lot.
- The proposed building will be serviced by connecting sanitary and water services to the existing municipal watermain and sanitary sewer within Donald B. Munro Drive.
- The proposed on-site SWM system will attenuate the peak flows to pre-development release rates for the 2, 5, and 100-year storm events.
- There is no surface ponding during the 2-year and 5-year storm events. All stormwater will be stored within the underground SC-310 Stormtech Chambers.
- The maximum surface ponding depth during the 100-year design event will be approximately 0.25m with no major system flows off-site.
- Major overland flow from the site greater than the 100-year event will be directed to the existing ditch along the south property line that outlets to the Carp River.
- Regular inspection and maintenance of the storm sewer system, including the Stormtech Chambers, inlet control device, and water quality treatment unit is recommended to ensure that the storm drainage system is clean and operational.
- Temporary erosion and sediment control measures are to be provided during construction.

7.0 CLOSURE

It is recommended that the proposed servicing and stormwater management design for the proposed development at 437 Donald B. Monroe Drive be approved for implementation.

NOVATECH

Prepared by:

Lucas Wilson, P.Eng.
Project Coordinator

Conrad Stang, M.A.Sc., P.Eng.
Project Manager, Water Resources

Reviewed by:

Mark Bisett, P. Eng.
Senior Project Manager

APPENDIX A

Correspondence

Lucas Wilson

From: Brian Saumure <brian@mapleleafcustomhomes.ca>
Sent: Tuesday, February 19, 2019 10:21 AM
To: Mark Bissett
Subject: FW: Pre-consult follow up - 437 Donald B. Munro

Hi Mark,
Do you have time to meet and discuss the requirements for this project?
Thanks,
Brian

From: Jessica D'Aoust <jessica@lloydphillips.com>
Sent: February-13-19 3:58 PM
To: Brian Saumure <brian@mapleleafcustomhomes.ca>
Subject: Re: Pre-consult follow up - 437 Donald B. Munro

Hi Brian,

Thanks for your patience on me looking into this. I reviewed the pre-con notes again for Donald B Munro to determine the rationale for the studies you had concerns about. Here's some more context based on the City's notes:

- Roadway modification: This isn't required upfront, but rather is flagged as a potential condition of approval. Therefore, it's not something that needs to be done right now in order to submit the application - I will confirm with Jenny what would trigger this plan as being a condition.
- Environmental Impact Statement: I'll be reaching out to Jenny to discuss if there's any possibility of doing an EIS screening as opposed to the full report would be possible, based on the notes below. I'll get back to you as soon as I hear back. Here's the City's notes for reference:
    - The subject property is adjacent to O1 zoned area south of the railway. This area is also designated as floodplain area.
    - South of the tracks is identified as Natural Heritage overlay and the subject property is adjacent to natural heritage system on Schedule L3 of the OP (within 120 m)
    - Schedule K of the OP identified unstable slopes associated with the Carp River and is a Wellhead Protection Area.
    - The subject property is within the regulation limit of the Mississippi Valley Conservation Authority.
    - There is a watercourse along the south end of the property along the lot line
    - **An Environmental Impact Statement that includes impacts to species at risk will be required, as the subject property has potentially significant wildlife habitat for Endangered and Threatened species as per OP policy 4.7.4. There are chimney swift (threatened species) observations on either side of the property (within 120 m) and in the vicinity. The property's proximity to the natural system overlay also triggers the requirement for an EIS.**
    - The address lies within the Wellhead Protection Area for the Carp well; specifically the WHPA-C with vulnerability scores of 6 and 8. There are applicable Source Protection policies in this area for certain activities, specifically non-residential activities since future non-residential storage and handling of certain chemicals is prohibited in this area (see Policy DNAPL-2-LB-S57 in the Mississippi-Rideau Source Protection Plan). The storage and handling of certain chemicals is prohibited (I can provide more information) and a source protection screening will be required for a complete application
- Slope stability: The City is just looking for a geotechnical investigation based on the following comments:
    - Please note that the area may contain sensitive marine clays. Please note that Atterberg limits and consolidation testing and discussion thereof will be required in the report if soil with characteristics in the realm of sensitive marine clay is found.
    - Grade raise restrictions will need rationale
    - The geotechnical consultant will need to provide full copies of any published and peer reviewed papers relied on to determine results and conclusion
    - Earthquake analysis is now required to be provided in the report
    - Any retaining walls that invoke the requirements of the "Slope Stability Guidelines for Development Applications in the City of Ottawa", 1st Edition, December 2004, prepared by Golder Associates, shall be discussed in a slope stability report and show the required factor of safety.

Have decisions been made for consultants for the other required plans/studies?

Thanks,

Jessica D'Aoust, M.PI
Planner | **Lloyd Phillips & Associates Ltd.**
T 613 236 5373 x 3 **F** 613 236 5776 **E** jessica@lloydphillips.com
1827 Woodward Dr., Suite 109, Ottawa, ON Canada K2C 0P9 • http://www.lloydphillips.com

On Feb 7, 2019, at 9:57 AM, Jessica D'Aoust <jessica@lloydphillips.com> wrote:

Hi Brian,

All good points. I will give the planner a call today to discuss the rationale/see if there's any flexibility.

Thanks

Jessica

On Thu, Feb 7, 2019 at 9:02 AM Brian Saumure <brian@mapleleafcustomhomes.ca> wrote:

> Hi Jessica,
>
> Is there a possibility to push back on any of these studies?
>
> -Roadway modification? Not changing anything
>
> -Endangered species? The site is currently a parking lot
>
> -Slope stability? Its flat
>
> Just seems some of this is wasted money. Is there any allowance for common sense😊
>
> ---
>
> **From:** Jessica D'Aoust <jessica@lloydphillips.com>
> **Sent:** February-05-19 4:23 PM
> **To:** Brian Saumure <brian@mapleleafcustomhomes.ca>
> **Subject:** RE: Pre-consult follow up - 437 Donald B. Munro
>
> Hi Brian,

To proceed with the Site Plan application for Donald B Munro, the following plans and studies will need to be prepared:

Engineering:

- Site Servicing Plan
- Grading and Draining Plan
- Stormwater Management Report
- Roadway Modification Design Plan
- Site Servicing Study
- Erosion and Sediment Control Plan
- Noise / Vibration Study
- Geotechnical Study

Planning / Design:

- Site Plan
- Architectural Elevations
- Landscape Plan
- Survey Plan
- Planning Rationale and Design Brief

Environmental:

- Environmental Impact Statement

Have you confirmed the project team for this project?

Thanks very much,

Jessica

(t): 613.236.5373 x 3

From: Brian Saumure <brian@mapleleafcustomhomes.ca>
Sent: Tuesday, February 5, 2019 12:08 PM
To: Barrett L. Wagar <barrett@lloydphillips.com>
Cc: 'Jessica D'Aoust' <jessica@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Jessica,

Can you forward the updated summary of what is needed to proceed?
Thanks,

Brian

From: Barrett L. Wagar <barrett@lloydphillips.com>
Sent: January-21-19 3:51 PM
To: Brian Saumure <brian@mapleleafcustomhomes.ca>
Cc: 'Jessica D'Aoust' <jessica@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Brian,

No additional pre-consultation is required. Just need to commission the consultant team to proceed with their required submission material.

Jessica will pass along a brief summary of the items needed.

Best regards,

Barrett

From: Brian Saumure <brian@mapleleafcustomhomes.ca>
Sent: Monday, January 21, 2019 3:36 PM
To: Barrett L. Wagar <barrett@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Barrett,

Is there another consultation required or scheduled with the city?
Just want to move this forward.

Thanks,

Brian

From: Barrett L. Wagar <barrett@lloydphillips.com>
Sent: January-11-19 3:06 PM
To: Brian Saumure <brian@mapleleafcustomhomes.ca>; 'Steve Ardington' <steve@ardington.ca>
Cc: Lloyd Phillips <lloyd@lloydphillips.com>
Subject: FW: Pre-consult follow up - 437 Donald B. Munro

Hi Brian,

Please see the below positive comments from the Urban Designer that was in attendance at the pre-con.

Do you have consultants in mind for the required submission material?

Barrett

From: Young, Mark <Mark.Young@ottawa.ca>
Sent: Friday, January 11, 2019 1:21 PM
To: 'Barrett L. Wagar' <barrett@lloydphillips.com>; Kluke, Jenny <jennifer.kluke@ottawa.ca>
Cc: Turkington, Seana <Seana.Turkington@ottawa.ca>; 'Lloyd Phillips' <lloyd@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Barrett,

I understand that this site may be re-assigned to another Planner for comment.

From an Urban Design perspective the proposal appears to meet the intent of the CDP. I am very pleased with the look and feel of the proposal. The only thing I might question is the segregation of the central building entrances with fencing and what appears to be hedging.

Thanks Mark

From: Barrett L. Wagar <barrett@lloydphillips.com>
Sent: January 10, 2019 2:49 PM
To: Kluke, Jenny <jennifer.kluke@ottawa.ca>; Young, Mark <Mark.Young@ottawa.ca>
Cc: Turkington, Seana <Seana.Turkington@ottawa.ca>; 'Lloyd Phillips' <lloyd@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Jenny and Mark,

Happy New Year to you both!

We've arrived at a concept plan and some rough renderings for 437 Donald B. Munro, and would appreciate any preliminary comments you could provide before we proceed in having the consultant team prepare the required submission material for the Site Plan Control application.

The intent remains the same, with the building containing two ground floor and two second floor uses, for a total of four units. The drive aisle will be a wide single lane intended for two-way traffic (requiring an MV as discussed previously), and there will be ROWs/easements in place to allow for shared vehicle access, parking, and for the front walkway, since a severance will also be proposed with any required MVs (this explains the six different parts).

Best regards,

Barrett

From: Kluke, Jenny <jennifer.kluke@ottawa.ca>
Sent: Wednesday, October 31, 2018 11:55 AM
To: 'Barrett L. Wagar' <barrett@lloydphillips.com>
Cc: Turkington, Seana <Seana.Turkington@ottawa.ca>; Lloyd Phillips <lloyd@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Barrett,

Yes, Seana is the C of A planner.

Regards,

Jenny

From: Barrett L. Wagar <barrett@lloydphillips.com>
Sent: Wednesday, October 31, 2018 11:43 AM
To: Kluke, Jenny <jennifer.kluke@ottawa.ca>
Cc: Turkington, Seana <Seana.Turkington@ottawa.ca>; Lloyd Phillips <lloyd@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Jenny,

Thank you for looking into this and providing comment. For clarity, would Seana be our Committee Planner for the file?

Best regards,

Barrett

From: Kluke, Jenny <jennifer.kluke@ottawa.ca>
Sent: Wednesday, October 31, 2018 11:32 AM
To: 'Barrett L. Wagar' <barrett@lloydphillips.com>
Cc: Turkington, Seana <Seana.Turkington@ottawa.ca>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Barrett,

The single traffic lane is for one-way flow into or out of the parking lot, so relief will be needed if it is intended to be used for two-way traffic flows. I don't anticipate the Department having concerns with that variance considering the size of the development and the policies within the CDP that seek to keep driveways to a single lane. If you would like to discuss this variance further, please contact Seana Turkington (cc'd).

Regards,

Jenny

Jenny Kluke MCIP, RPP

Planner

Development Review – Central Branch

Planning, Infrastructure and Economic Development Department

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West, Ottawa, ON K1P 1J1

<image001.gif>613.580.2424 ext./poste 27184

E-mail: jenny.kluke@ottawa.ca

ottawa.ca/planning / ottawa.ca/urbanisme

From: Barrett L. Wagar <barrett@lloydphillips.com>
Sent: Tuesday, October 30, 2018 5:24 PM
To: Kluke, Jenny <jennifer.kluke@ottawa.ca>
Cc: Lloyd Phillips <lloyd@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Jenny,

Hope all is well. I have a question I was hoping you could assist with for 437 Donald B. Munro, and I suspect it may require comment from Amira and Mark Young.

The attached concept shows a single driveway for the site leading to a small shared parking lot in the rear, as desired by the CDP.

The intent is to have a single-lane driveway with two-way flows, since a full 6.7 metre two-lane driveway would be excessive in this case, and would go against the design principles in the CDP.

Given the proposed uses (two residential units above, and two retail/office uses below), it is not anticipated that a two-way single-lane driveway would result in any adverse traffic issues, especially when considering the throat length of the driveway connecting the ROW to the parking lot is basically limited to the rather insignificant depth of the building, so instances of incoming and outgoing vehicle conflicts would be rare and easily mitigated.

My question is whether the wording of the By-law allows for single traffic lane driveways to be used for two-way flows as described above?

Section 107(1)(a)(i) *states that a driveway providing access to a parking lot or parking garage must have a minimum width of three metres for a single traffic lane.*

The wording seems unclear whether a “single traffic lane” is allowed to permit two-way flows or not.

If two-way flows are permitted for single traffic lanes, then this will allow us to avoid an MV, otherwise, we would need to request an MV to permit somewhere along the lines of 4 metres in width whereas 6.7 metres would be required.

Thanks Jenny,

Barrett

Barrett L. Wagar, MCIP, RPP, M.PI

Planner

LLOYD PHILLIPS & ASSOCIATES LTD.

T 613 236 5373 x 4 **F** 613 236 5776 **E** barrett@lloydphillips.com

1827 Woodward Dr., Suite 109, Ottawa, Ontario, Canada, K2C 0P9 • http://www.lloydphillips.com

From: Kluke, Jennifer <jennifer.kluke@ottawa.ca>
Sent: Tuesday, July 17, 2018 4:26 PM
To: Barrett Wagar <barrett@lloydphillips.com>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Thanks, Barrett!

From: Barrett Wagar <barrett@lloydphillips.com>
Sent: Tuesday, July 17, 2018 4:12 PM
To: Kluke, Jennifer <jennifer.kluke@ottawa.ca>
Subject: RE: Pre-consult follow up - 437 Donald B. Munro

Hi Jenny,

I nudged our client this morning to address the pre-consult fee and he advised he will take care of it this week (he was on vacation).

In good faith I will wait until payment has been received before distributing the material.

Thanks,

Barrett

From: Kluke, Jennifer <jennifer.kluke@ottawa.ca>
Sent: Tuesday, July 17, 2018 3:50 PM
To: Barrett Wagar <barrett@lloydphillips.com>
Subject: Pre-consult follow up - 437 Donald B. Munro

Hi Barrett,

We still have not received payment for the pre-consult fee, but further to our meeting on June 18, 2018 regarding the proposal to construct a mixed-use building at 437 Donald B. Munro, below is a summary of what was discussed.

Planning & Design Considerations

Official Plan

The property is within the Villages designation in the Official Plan (Section 3.7.1). The proposed development conforms to the OP policies for Villages.

Carp Community Design Plan

The property is within the Carp Community Design Plan area and designated as part of the Village Core. You will need to demonstrate how the development fits and is compatible with the existing features of the core of the village. Attached is a copy of the Carp Community Design Plan for your reference.

Zoning By-law

The property is currently zoned VM – Village Mixed-Use Zone, which permits the proposed uses.

Design Considerations

- The design of the site will need to conform with the Carp Community Design Plan
- The scale of the proposed development makes sense
- Breaking up the building into two separate parts makes it more attractive and fits well with the existing fabric of the village core

- When designing the building, take cues from the character of the village. Building materials should reflect the character of other buildings in the core.
- The CDP requires that 50% of the first floor façade facing the public street be comprised of windows or active entrances
- The CDP encourages single driveways leading to shared parking at the rear of the property. The Zoning By-law requires the driveway leading to the parking lot to be 6.7 metres wide. You may wish to seek a minor variance to permit a reduced driveway width.

It is understood that the proposed building may be severed in the future, which will require consent and minor variance applications through the Committee of Adjustment. The consent application will include the severance of the property, as well as a right-of-way easement for accessing the parking at the rear.

We will not require an Archaeological Resource Assessment as part of this application.

Engineering Considerations

Water/Sanitary/Storm Servicing:

Water servicing

Municipal water pipes are adjacent / near the proposed development; a 305 mm dia water pipe exists in Donald B. Munro.

Sanitary Sewers

Municipal sanitary pipes are adjacent / near the proposed development; a 300 mm dia sanitary sewer exists in Donald B. Munro.

Storm Sewers

Municipal storm pipes are adjacent / near the proposed development; a 300 mm dia storm sewer exists in Donald B. Munro.

Roads:

Please refer to the City of Ottawa Private Approach By-Law 2003-447

Exterior Site Lighting:

- Any exterior lighting proposed for the site is required by the City of Ottawa to be certified by a qualified engineer conforming the design complies with the following criteria:
- It must be designed using only fixtures that meet the criteria for Full-Cut-Off (Sharp cut-off) Classification, as recognized by the illuminating Engineering Society of North America (IESNA or IES).
- It must result in minimal light spillage onto adjacent properties. As a guide, 0.5 foot-candle is normally the maximum allowable spillage.
- The location of the fixtures, fixture types (make, model, and part number) and the mounting heights must be provided.

Snow Storage:

Any portion of the subject property which is intended to be used for permanent, or temporary, snow storage shall be as shown on the approved site plan and grading plan. Snow storage shall not interfere with approved grading and drainage patterns or servicing. Snow storage areas shall be setback from the property lines, foundations, fencing or landscaping a minimum of 1.5m. Snow storage areas shall not occupy driveways, aisles, required parking spaces or any portion of a road allowance.

Permits and Approvals:

- All development application should be considered for an approval by the MOECC.
- Consultant determines if an approval for sewage works under Section 53 of OWRA is required. Consultant determines what type of application is required and the City's project manager confirms.
- If the consultant is not clear if an ECA is required they will work with the City to determine what is required. If between the City and the consultant it is still unclear or there is a difference of opinion only then will they approach the MOECC.
- The project will be either transfer review under the standard works, transfer review under the additional works, direct submission, or exempt as per O. Reg. 525/98.
- Pre-consultation is not required if applying for standard works (schedule A of the Agreement) under Transfer Review.
- Mandatory pre-consultation is required if applying for additional works (schedule A of the Agreement) under Transfer Review.
- Pre-consultation with local District office of MOECC is recommended for direct submission.
- Consultant completes an MOECC request form for a pre-consultation. Sends request to moeccottawasewage@ontario.ca.

Responsibility rests with the applicant, or agent, for obtaining all external agency approvals.

The address shall be in good standing with all approval agencies, for example the MVCA and the City's By-Law office, prior to approval. City staff require copies of confirmation correspondence from all approval agencies, where necessary, that a form of assent is given.

No construction shall occur until after a commence work notification is given.

Mississippi Valley Conservation Authority

Contact Information:

Niall Oddie - Planner

noddie@mvc.on.ca

www.mvca.ca

Site Plan Submission Requirements for engineering:

Site Servicing Plan*

Grading and Drainage Area Plan*

Erosion and Sediment Control Plan*

All identified required plans are to be submitted on standard A1 size sheets as per City of Ottawa Servicing and Grading Plan Requirements.

Report Submission Requirements:

- Site Servicing Report
    - Discussion will be required by the consultant of the servicing capacity of the connecting systems and anticipated performance.
    - Boundary conditions will need to be requested including a list of the demand values and a full discussion of the fire demand.
        - Calculations for the FUS value (Required flow, Coefficient related to the type of the construction and other required calculations)

- A plan indicating approximate location of the water service connection.
- Water Card

- Storm Water Management Report
  - The consultant should determine a stormwater management regime for the application and, generally, maintain post-development flows to pre-development levels by way of providing storage to offset increased impervious areas.
  - Any existing stormwater runoff from adjacent site(s) that crosses the property must be accommodated by the proposed stormwater management design.
  - Stormwater quality control is required for the site. Consultation with the Mississippi Valley Conservation Authority (MVCA) is required to determine the level of stormwater quality control required for the site.
  - All stormwater management (SWM) determinations shall have supporting rationale.

- Geotechnical Investigation Study
  - Please note that the area may contain sensitive marine clays. Please note that Atterberg limits and consolidation testing and discussion thereof will be required in the report if soil with characteristics in the realm of sensitive marine clay is found.
  - Grade raise restrictions will need rationale.
  - The geotechnical consultant will need to provide full copies of any published and peer reviewed papers relied on to determine results and conclusions
  - Earthquake analysis is now required to be provided in the report.
  - Any retaining walls that invoke the requirements of the “Slope Stability Guidelines for Development Applications in the City of Ottawa”, 1st Edition, December 2004, prepared by Golder Associates, shall be discussed in a slope stability report and show the required factor of safety.

- A Site Lighting Memorandum and plan will be required for registration.

Transportation Considerations

Noise

- Property is backing onto a CNR rail line and if a sensitive use (residential) is being proposed then a Noise and Vibration Brief is required (Official Plan policy 4.8.7)

- The setback and mitigation should be in conformity with the Zoning By-law.

- Notice on Title may be required.

- Refer to the Environmental Noise Control Guidelines for further description:

https://documents.ottawa.ca/sites/documents.ottawa.ca/files/documents/enviro_noise_guide_en.pdf

Transportation/ Site Plan

- Donald B. Munro Drive is a collector road with a right-of-way protection of 16m between Falldown Lane and Langstaff Road, i.e. 8m from the existing centreline of the road
- Please consult with the owner and operator of the CNR railway line to obtain information on the requirements for new developments
- Ensure that the appropriate setback (distance between the building and railway ROW), and mitigation measures are incorporated into the development.
- Site development should be consistent with intent of the CDP for the Village of Carp
- As discussed at the pre-consultation meeting, pedestrian and cyclist requirements should be addressed

Environmental Considerations

- The subject property is adjacent to O1 zoned area south of the railway. This area is also designated as floodplain area.
- South of the tracks is identified as Natural Heritage overlay and the subject property is adjacent to natural heritage system on Schedule L3 of the OP (within 120 m)
- Schedule K of the OP identified unstable slopes associated with the Carp River and is a Wellhead Protection Area.
- The subject property is within the regulation limit of the Mississippi Valley Conservation Authority.
- There is a watercourse along the south end of the property along the lot line
- An Environmental Impact Statement that includes impacts to species at risk will be required, as the subject property has potentially significant wildlife habitat for Endangered and Threatened species as per OP policy 4.7.4. There are chimney swift (threatened species) observations on either side of the property (within 120 m) and in the vicinity. The property's proximity to the natural system overlay also triggers the requirement for an EIS.
- The address lies within the Wellhead Protection Area for the Carp well; specifically the WHPA-C with vulnerability scores of 6 and 8. There are

applicable Source Protection policies in this area for certain activities, specifically non-residential activities since future non-residential storage and handling of certain chemicals is prohibited in this area (see Policy DNAPL-2-LB-S57 in the Mississippi-Rideau Source Protection Plan). The storage and handling of certain chemicals is prohibited (I can provide more information) and a source protection screening will be required for a complete application.

Development Applications Required

To move forward with this proposal, a Site Plan Control, Manager Approval, Public Consultation Application will be required. Please review the fees associated with this here.

Attached is the *Applicant's Study and Plan Identification List*, which identifies the required studies and plans to support your application. For additional information on preparing studies and plans, please click on the following hyperlink: Guide to Preparing Studies and Plans.

Also attached is the *Public Notification list*, which lists the contact information for the community groups registered to be notified of development within this area. As you may know, the property is in Ward 5-West Carleton-March, with Councillor Eli El-Chantiry. It is in your best interest to initiate contact with close neighbours as well as the Councillor and Registered Community Groups. In addition, it may be beneficial to contact key technical agencies that may be involved in this file to discuss the proposal before submitting an application.

You may also want to reference information available on the City's website for building permits/demolition permits and development charges as well. For additional information on these items, please follow the following associated links: Building Permits or Development Charges. Please contact Building Code Services if you have any questions regarding permits or charges; they can be reached by phoning 311.

The above pre-consultation comments are valid for one year. If you submit a development application after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change.

Please do not hesitate to contact me if you have questions or require clarification.

Regards,

Jenny

Jenny Kluke

Planner

Development Review, Rural Branch

Planning, Infrastructure and Economic Development Department

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West, Ottawa, ON K1P 1J1

<image001.gif>613.580.2424 ext./poste 27184

E-mail: jennifer.kluke@ottawa.ca

ottawa.ca/planning / ottawa.ca/urbanisme

Vacation alert: Please note that I will be out of the office from August 6th to August 21st.

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This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

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Jessica D'Aoust, M.Pl
Planner, Lloyd Phillips & Associates Ltd.
(t): 613-236-5373 x 3
(c): 613-812-1726

APPENDIX B

Development Servicing Study Checklist

437 DONALD B. MUNRO DRIVE, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	Addressed (Y/N/NA)	Comments
Executive Summary (for larger reports only).	N/A	
Date and revision number of the report.	Y	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Refer to Report Figures
Plan showing the site and location of all existing services.	Y	Refer to Grading and Servicing Plans
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y	Refer to Site Plan
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	
Statement of objectives and servicing criteria.	Y	Report Sections: 2.0 Site Servicing , 3.0 Storm Drainage and Stormwater Management
Identification of existing and proposed infrastructure available in the immediate area.	Y	
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Y	
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	Refer to Grading Plan and Stormwater Management Plan

4.1 General Content	Addressed (Y/N/NA)	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A	
Proposed phasing of the development, if applicable.	N/A	
Reference to geotechnical studies and recommendations concerning servicing.	Y	Report Section 1.6 Geotechnical Investigation
All preliminary and formal site plan submissions should have the following information:		
Metric scale	Y	
North arrow (including construction North)	Y	
Key plan	Y	
Name and contact information of applicant and property owner	Y	
Property limits including bearings and dimensions	Y	
Existing and proposed structures and parking areas	Y	
Easements, road widening and rights-of-way	Y	
Adjacent street names	Y	

4.2 Water	**Addressed (Y/N/NA)**	**Comments**
Confirm consistency with Master Servicing Study, if available.	N/A	
Availability of public infrastructure to service proposed development.	Y	Refer to DSS & SWM Report
Identification of system constraints.	N/A	
Identify boundary conditions.	Y	Provided by City of Ottawa
Confirmation of adequate domestic supply and pressure.	Y	Refer to DSS & SWM Report
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	Refer to DSS & SWM Report
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	Refer to DSS & SWM Report
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	N/A	
Address reliability requirements such as appropriate location of shut-off valves.	N/A	
Check on the necessity of a pressure zone boundary modification.	N/A	
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	Report Section 2.2 Water
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	Report Section 2.2 Water
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	Report Section 2.2 Water
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A	

4.3 Wastewater	Addressed (Y/N/NA)	**Comments**
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	Report Section 2.1 Sanitary Sewage
Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A	
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	Report Section 2.1 Sanitary Sewage
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	y	Report Section 2.1 Sanitary Sewage
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A	
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	Report Section 2.1 Sanitary Sewage
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A	
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A	
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A	
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A	
Special considerations such as contamination, corrosive environment etc.	N/A	

4.4 Stormwater	**Addressed (Y/N/NA)**	**Comments**
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Analysis of the available capacity in existing public infrastructure.	N/A	
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y	Figure 3 Pre Development Drainage Area Plan Storm Drainage Area Plan (119023-STM)
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Set-back from private sewage disposal systems.	N/A	
Watercourse and hazard lands setbacks.	N/A	
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A	
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Any proposed diversion of drainage catchment areas from one outlet to another.	N/A	
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM	N/A	
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A	

4.4 Stormwater	**Addressed (Y/N/NA)**	**Comments**
Identification of potential impacts to receiving watercourses.	N/A	
Identification of municipal drains and related approval requirements.	N/A	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Inclusion of hydraulic analysis including HGL elevations.	N/A	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	Report Section 5.0 Erosion and Sediment Control
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A	
Identification of fill constrains related to floodplain and geotechnical investigation.	N/A	

4.5 Approval and Permit Requirements	**Addressed (Y/N/NA)**	**Comments**
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Y	Report Section 3.0 Storm Drainage and Stormwater Management
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A	
Changes to Municipal Drains.	N/A	
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A	

4.6 Conclusion	**Addressed (Y/N/NA)**	**Comments**
Clearly stated conclusions and recommendations.	Y	Report Section 6.0 Conclusions
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	N/A	T.B.D.
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	

APPENDIX C

Fire Flow Demand, Watermain Boundary Conditions, Sanitary Design Sheet

437 Donald B. Munroe Drive
Water Demand

	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Apartment	N/A	2	6.2	0.025	0.063	0.138
Commercial	0.17	N/A	N/A	0.055	0.083	0.149
Total	**0.17**	**2**	**6.2**	**0.080**	**0.145**	**0.287**

Water Demand Parameters

Apartments	3.1	ppl/unit
Residential Demand	350	L/c/day
Commercial Demand	28000	L/gross ha/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Commercial Max Day	1.5	x Avg Day
Commercial Peak Hour	1.8	x Max Day
Fire Flow	60	L/s

OBC Water Supply for Firefighting Calculation

Based on OBC 2012 (Div. B, Article 3.2.5.7)

References: Ontario Fire Marshal - OBC Fire Fighting Water Supply
Ontario Building Code 2012, Appendix A, Vol 2., A-3.2.5.7

Novatech Project #: 119023
Project Name: 437 Donald B. Munroe
Date: 5/1/2019
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Building Description: 2-storey mixed use (Commercial 1st floor, Residential 2nd floor)

Unsprinklered

Step		Calculation Inputs	Calculation Notes	Value
Minimum Fire Protection Water Supply Volume				
1	**Water Supply Coefficient**			
	Building Classification =	C, D	From Table 3.1.2.1	
	Water Supply Coefficient - K =		From Table 1 (A3.2.5.7)	**23**
2	**Total Building Volume**			
	Building Width - W	17.50 m		
	Building Length - L	22.30 m	Area (W * L) = 390 m	
	Building Height - H	7.5 m		
	Total Building Volume - V =		W * L * H	**2927 m³**
3	**Spatial Coefficient Value**			
	Exposure Distances: (Exterior building face to property/lot line, to street centre, or to mid-point between proposed building and another building on same lot)		**Spatial Coefficients:** From Figure 1 (Spatial Coefficient vs Exposure Distance)	
	North	12.70 m	Sside 1 = **0.00**	
	East	1.22 m	Sside 2 = **0.50**	
	South	27.00 m	Sside 3 = **0.00**	
	West	5.00 m	Sside 4 = **0.50**	
	Total of Spacial Coefficient Values - S-Tot as obtained from the formula =		1.0 + (Sside 1 + Sside 2 + Sside 3 + Sside 4) (Max. value = 2.0)	**2.00**
4	**Minimum Fire Protection Water Supply Volume**			
	Q =		$K * V * S_{Tot}$	**134,636 L**
Required Minimum Water Supply Flow Rate				
5	**Minimum Water Supply Flow Rate =**		From Table 2 (For water supply from a municipal or industrial water supply system, min. pressure is 140 kPa)	**3,600 L/min** or **60 L/s**
Minimum Fire Protection Water Supply Volume for 30 minutes				
6	**Q =**		= Minimum Water Supply Flow Rate (L/min) * 30 minutes	**108,000 L**
Required Fire Protection Water Supply Volume				
7	**Q =**		Highest volume out of (4) and (6)	**134,636 L**
Notes				

Lucas Wilson

From: Bakhit, Reza <reza.bakhit@ottawa.ca>
Sent: Monday, May 6, 2019 10:52 AM
To: Lucas Wilson
Subject: RE: 437 Donald B. Munroe Boundary Condition Request
Attachments: 437 Don Munroe April 2019.pdf

Good morning Lucas,

The following are boundary conditions, HGL, for hydraulic analysis at 437 Donald Munroe (zone Carp) assumed to be connected to the 305mm on Donald Munroe (see attached PDF for location).
Minimum HGL = 150.0m
Maximum HGL = 160.0m
MaxDay + FireFlow (60 L/s) = 135.0m to 163.0m. Please note the minimum pressure during a fire flow occurs just before the large pump at the Carp pumping station turns on. The maximum pressure occurs when the large pump is on.

These are for current conditions and are based on computer model simulation.
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation

Regards,

Reza Bakhit, E.I.T, C.E.T.
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Rural Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 19346, reza.bakhit@ottawa.ca

From: Lucas Wilson <l.wilson@novatech-eng.com>
Sent: Wednesday, May 01, 2019 11:46 AM
To: Bakhit, Reza <reza.bakhit@ottawa.ca>
Subject: RE: 437 Donald B. Munroe Boundary Condition Request

Good Morning Reza,

Using the OBC to calculate fire flows has yielded a flow of 60 L/s.

Please let me know if you need anything else in order to provide the boundary conditions.

Thanks,
Lucas Wilson, P.Eng., Project Coordinator | Engineering
NOVATECH
Engineers, Planners & Landscape Architects | 200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6
Office 613.254.9643 x282 | **Fax** 613.254.5867 | **Email** l.wilson@novatech-eng.com

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From: Bakhit, Reza <reza.bakhit@ottawa.ca>
Sent: Monday, April 29, 2019 11:12 AM
To: Lucas Wilson <l.wilson@novatech-eng.com>
Subject: 437 Donald B. Munroe Boundary Condition Request

Good morning Lucas,

The fire flow demand of 233L/s is very high for a closed zone like Carp water system. You may use OBC to calculate fire flows.

Regards,

Reza Bakhit, E.I.T, C.E.T.
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Rural Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 19346, reza.bakhit@ottawa.ca

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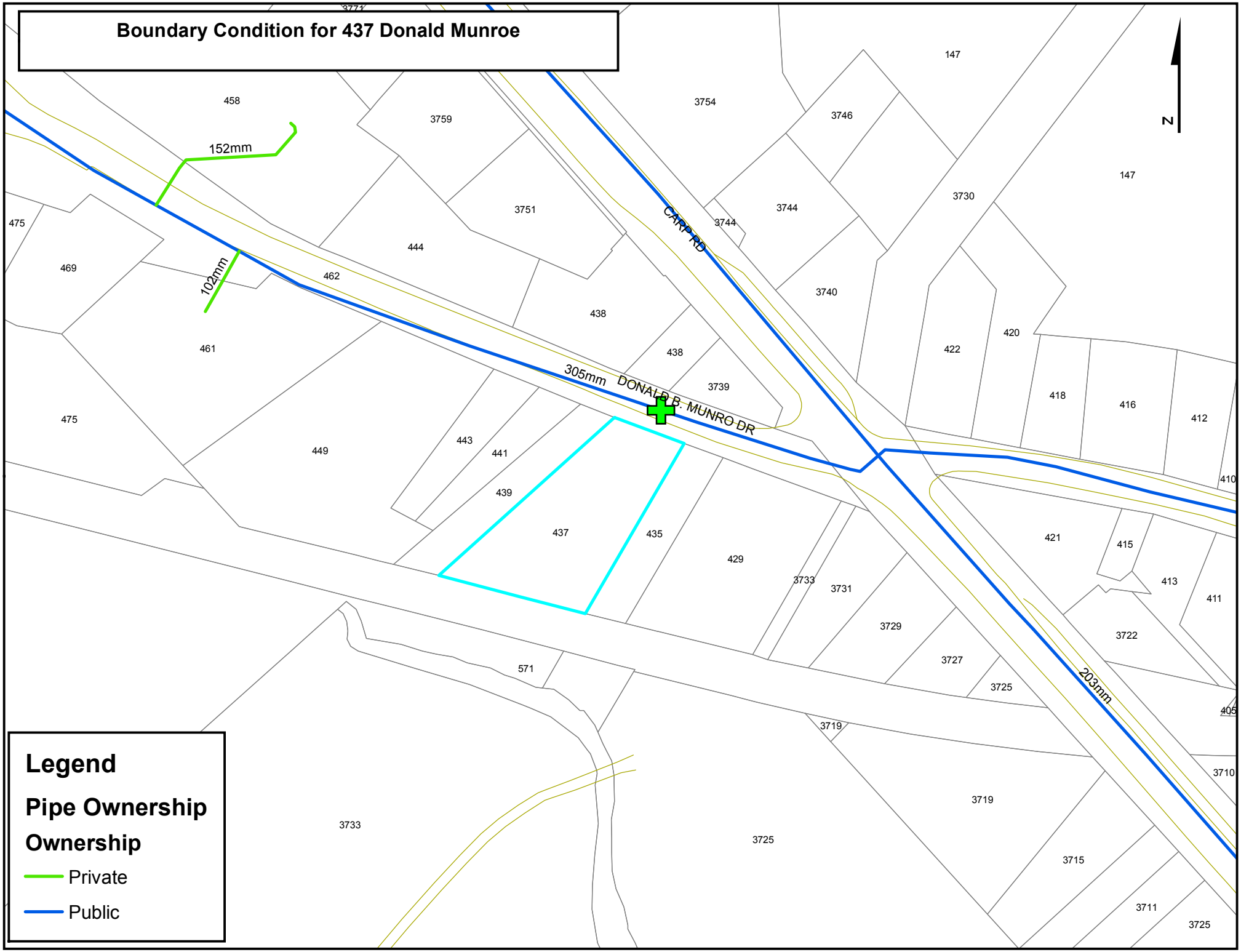
Boundary Condition for 437 Donald Munroe
N
152mm
102mm
305mm
DONALD B. MUNRO DR
CARP RD
203mm
458
3759
3754
3746
147
147
3730
3744
3744
3751
475
469
444
462
3740
438
461
438
422
420
418
416
412
410
3739
475
449
443
441
439
437
435
429
421
415
413
411
3733
3731
3729
3722
3727
3725
405
571
3719
3710
3719
3733
3725
3715
3711
3725
Legend
Pipe Ownership
Ownership
Private
Public

437 Donald B. Munroe Drive - Sanitary Sewer Design Sheet

AREA			RESIDENTIAL								ICI			INFILTRATION				PIPE					
			SINGLES		APARTMENT		TOTAL																
ID	From	To	Units	Pop.	Units	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Commercial Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
Site																							
				0.0	2	6.2	6.2	6.2	3.7	0.08	0.17	0.17	0.08	0.17	0.17	0.06	0.21	300	0.56	35.4	75.5	1.03	0.3%
Pre-Development																							
			1	3.4		0.0	3.4	3.4	4.0	0.04				0.17	0.17	0.06	0.10						

Design Parameters:

Population Density:

Project: 437 Donald B. Munroe Drive (119023)

ISTB-2018-01 Avg Flow/Person =	280	l/day		ppl/unit	units/net ha
Comm./Inst. Flow =	28000	l/ha/day	Mixed Use	1.80	
ISTB-2018-01 Infiltration =	0.33	l/s/ha			
Pipe Friction n =	0.013		Singles	3.40	
Residential Peaking Factor = Harmon Equation (max 4, min 2)			3 Bdrm Apartment	3.10	
Peaking Factor Comm./Inst. 1.5					

Designed: LRW

Checked: MAB

Date: May 21, 2019

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Engineers, Planners & Landscape Architects

APPENDIX D

Stormwater Management Calculations

437 Donald B. Munroe Drive (119023)
Pre-Development Catchment Parameters and Peak Flows

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Existing Catchment Parameters

Catchment ID	Areas (ha)			Runoff Coefficient		%Imperv.
	Total	Hard Surfaces (C=0.90)	Soft Surfaces (C=0.20)	C_{avg}	C_{100yr} [1]	
1 (Pre-Dev)	0.165	0.041	0.124	0.38	0.44	25.0%

[1] *Runoff coefficient increases by 25%, up to a maximum value of 1.00, for the 100-year event.*

Pre-Development Peak Flows

Catchment ID	Rainfall Intensity (mm/hr)[1]			Peak Flows (L/s)		
	2-year	5-year	100-year	2-year	5-year	100-year
Site Boundary (existing conditions)	76.81	104.19	178.56	13.2	17.9	35.8

[1] *Tc = 10 minutes*

Notes:

Rainfall Intensity based on City of Ottawa Sewer Design Guidelines (Oct. 2012)

- 100 year Intensity = $1735.688 / (Tc + 6.014)^{0.820}$
- 5 year Intensity = $998.071 / (Tc + 6.053)^{0.814}$
- 2 year Intensity = $732.951 / (Tc + 6.199)^{0.810}$

Q(peak flow) = 2.78 x C x I x A

- C is the runoff coefficient
- I is the rainfall intensity
- A is the total drainage area

437 Donald B. Monroe Drive
Infiltration Calculations

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Infiltration Criteria and Storage Provided for Infiltration

Subcatchment Parameters for the Site		Infiltration Criteria		Dimensions of Clearstone below Stormtech Chambers for Infiltration				
STM Areas	Total Drainage Area of Site (ha)	Annual Infiltration Requirement[1] (mm/year)	Volume to be Infiltrated Annually (m^3/year)	Length (m)	Width (m)	Height (m)	Bottom Area (m^2)	Storage for Infiltration[3] (m^3)
1 - 5	0.165	73	120.5	34.72	1.164	0.300	40.4	4.8

[1] *Annual infiltration requirement from Carp River Subwatershed Study (Dec. 2004); for low recharge areas.*

[2] *Volume to be infiltrated = 73mm / year x total site area (0.165 ha).*

[3] *Assumed 40% void ratio for Clearstone.*

Retention Time and Annual Infiltration

Subcatchment Parameters to the Infiltration System		Retnetion Time			Annual Infiltration			
STM Areas	Drainage Area to Infiltration System (ha)	Percolation Rate[1] (mm/hr)	Infiltration Rate (L/s)	Retention Time (hours)	Infiltration Depth (mm)	% of Annual Rainfall (515mm) Infiltrated[2] (%)	Amount of Annual Rainfall Infiltrated (mm/year)	Volume of Rainfall Infiltrated / Year (m^3/year)
4 & 5	0.130	10	0.11	12.0	3.7	37%	192.8	250.7

[1] *Percolation rate estimated for silty sand = 20 mm/hr; divided by 2 to account for clogging.*

[2] *Based on 30-years (1971 - 2000) of daily climate data (May - October).*

Government of Canada Gouvernement du Canada

Canada

Climate

Canadian Climate Normals 1971-2000 Station Data

The minimum number of years used to calculate these Normals is indicated by a code for each element. A "+" beside an extreme date indicates that this date is the first occurrence of the extreme value. Values and dates in bold indicate all-time extremes for the location.

Data used in the calculation of these Normals may be subject to further quality assurance checks. This may result in minor changes to some values presented here.

OTTAWA CDA * ONTARIO					
Latitude:	45°23'00.000" N	Longitude:	75°43'00.000" W	Elevation:	79.20 m
Climate ID:	6105976	WMO ID:		TC ID:	WCG

* This station meets WMO standards for temperature and precipitation.

▼ Temperature

Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-10.5	-8.6	-2.4	6.0	13.6	18.4	21.0	19.7	14.7	8.2	1.5	-6.6	6.3	A
Standard Deviation	2.9	2.7	2.5	1.9	1.8	1.3	1.1	1.1	1.2	1.6	1.7	3.3	0.8	A
Daily Maximum (°C)	-6.1	-3.9	2.1	10.9	19.1	23.8	26.4	25.0	19.7	12.6	4.9	-2.9	11.0	A
Daily Minimum (°C)	-14.8	-13.2	-7.0	1.1	8.0	13.0	15.5	14.3	9.7	3.7	-1.9	-10.3	1.5	A
Extreme Maximum (°C)	11.7	12.2	25.6	31.2	35.0	36.7	37.8	**37.8**	36.7	29.4	23.3	16.1		
Date (yyyy/dd)	1932/14	1953/21	1945/28	1990/27	1921/21	1921/22	1913/04	**1917/01**	1931/11	1891/03	1961/03	1951/07		
Extreme Minimum (°C)	-37.8	-38.3	-36.7	-20.6	-7.2	0.0	3.3	1.7	-4.4	-12.8	-23.9	**-38.9**		
Date (yyyy/dd)	1925/19	1934/17	1938/04	1923/01	1902/10	1910/04	1942/10	1934/30	1947/28	1933/26	1925/30	**1933/29**		

▼ Precipitation

Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	22.9	16.1	33.6	59.7	80.9	91.2	88.9	87.6	86.8	76.2	60.5	28.8	733.2	A
Snowfall (cm)	49	41	32	7	0	0	0	0	0	3	18	52	203	A

Precipitation (mm)	64.2	51.6	64.9	67.7	81.0	91.2	88.9	87.6	86.8	79.1	77.0	74.1	914.2	A
Average Snow Depth (cm)	21	25	20	2	0	0	0	0	0	0	1	11	7	A
Median Snow Depth (cm)	21	25	20	1	0	0	0	0	0	0	1	10	7	A
Snow Depth at Month-end (cm)	23	26	9	0	0	0	0	0	0	0	4	16	7	A
Extreme Daily Rainfall (mm)	40.1	38.4	41.8	48.3	75.9	77.5	74.2	90.4	**93.2**	58.4	49.0	73.2		
Date (yyyy/dd)	1995/ 15	1997/ 21	1980/ 21	1956/ 15	1916/ 17	1946/ 17	1899/ 11	1943/ 23	**1942/ 09**	1995/ 05	1907/ 07	1933/ 31		
Extreme Daily Snowfall (cm)	**56**	46	48	33	19	0	0	0	0	22	53	38		
Date (yyyy/dd)	**1894/ 29**	1895/ 08	1947/ 02	1970/ 02	1907/ 04	1890/ 01	1890/ 01	1890/ 01	1890/ 01	1933/ 24	1912/ 25	1973/ 20		
Extreme Daily Precipitation (mm)	55.9	45.7	48.8	48.3	75.9	77.5	74.2	90.4	**93.2**	58.4	53.3	73.2		
Date (yyyy/dd)	1894/ 29	1895/ 08	1962/ 12	1956/ 15	1916/ 17	1946/ 17	1899/ 11	1943/ 23	**1942/ 09**	1995/ 05	1912/ 25	1933/ 31		
Extreme Snow Depth (cm)	53	**97**	89	66	8	0	0	0	0	18	30	51		
Date (yyyy/dd)	1971/ 30	**1971/ 24**	1971/ 12	1971/ 01	1963/ 11	1961/ 01	1961/ 01	1961/ 01	1961/ 01	1997/ 27	1995/ 28	1970/ 25		

▼ Days with Maximum Temperature

Days with Maximum Temperature														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
<= 0 °C	23.3	19.8	10.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	5.8	19.1	79.7	A
> 0 °C	7.7	8.5	20.1	29.1	31.0	30.0	31.0	31.0	30.0	31.0	24.2	11.9	285.5	A
> 10 °C	0.0	0.1	3.0	15.3	29.5	30.0	31.0	31.0	29.5	20.5	5.4	0.4	195.6	A
> 20 °C	0.0	0.0	0.1	2.6	12.8	24.1	29.8	27.4	13.6	2.6	0.1	0.0	113.2	A
> 30 °C	0.0	0.0	0.0	0.0	0.7	2.3	4.3	2.5	0.5	0.0	0.0	0.0	10.3	A
> 35 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	A

▼ Days with Minimum Temperature

Days with Minimum Temperature														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
> 0 °C	1.0	1.1	4.5	17.5	30.3	30.0	31.0	31.0	29.5	23.6	10.5	1.8	211.9	A

<= 2 °C	30.9	27.9	29.5	18.5	2.5	0.1	0.0	0.0	1.5	12.3	24.3	30.4	177.9	A
<= 0 °C	30.0	27.2	26.5	12.5	0.7	0.0	0.0	0.0	0.5	7.4	19.5	29.2	153.4	A
< -2 °C	29.0	25.6	21.9	7.0	0.2	0.0	0.0	0.0	0.0	2.7	13.1	26.2	125.7	A
< -10 °C	21.8	18.7	10.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.9	15.2	67.9	A
< -20 °C	8.6	5.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	18.9	A
< - 30 °C	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	A

▼ Days with Rainfall

Days with Rainfall														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 0.2 mm	3.9	3.3	6.3	10.8	13.4	12.9	12.4	12	14.1	13.7	10.7	5.1	118.5	A
>= 5 mm	1.5	1.1	2.1	4	5.3	5.2	5.1	4.9	5.3	4.7	3.7	2.1	45	A
>= 10 mm	0.73	0.47	1	1.9	2.7	3.1	3.1	2.6	2.8	2.3	1.9	1.1	23.9	A
>= 25 mm	0.23	0.07	0.20	0.30	0.37	0.80	0.70	0.83	0.63	0.47	0.40	0	5	A

▼ Days With Snowfall

Days With Snowfall														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 0.2 cm	14.8	10.6	8.2	2.7	0.17	0	0	0	0	1.1	5.5	13.4	56.6	A
>= 5 cm	3.4	2.7	2.6	0.37	0	0	0	0	0	0.10	1.2	3.6	13.9	A
>= 10 cm	0.80	0.93	0.83	0.17	0	0	0	0	0	0.07	0.40	1.4	4.6	A
>= 25 cm	0	0.13	0	0	0	0	0	0	0	0	0.03	0.07	0.23	A

▼ Days with Precipitation

Days with Precipitation														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 0.2 mm	16.6	12.2	12.4	12.4	13.4	12.9	12.4	12.0	14.1	14.2	14.7	16.1	163.4	A
>= 5 mm	4.3	3.0	4.3	4.6	5.3	5.2	5.1	4.9	5.3	4.9	4.7	5.2	57.0	A
>= 10 mm	1.4	1.5	1.9	2.2	2.7	3.1	3.1	2.6	2.8	2.4	2.4	2.3	28.5	A
>= 25 mm	0.2	0.2	0.2	0.3	0.4	0.8	0.7	0.8	0.6	0.5	0.4	0.1	5.3	A

▼ Days with Snow Depth

Days with Snow Depth														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
>= 1 cm	30.3	28	25.7	5.4	0.04	0	0	0	0	0.40	5.9	23.8	119.5	A
>= 5 cm	28.2	27.6	23.5	3.6	0	0	0	0	0	0.13	3.7	20.3	107.1	A
>= 10 cm	24.2	24.3	20.5	2.6	0	0	0	0	0	0.03	1.6	13.8	87	A
>= 20 cm	15.6	16.4	12.8	1.5	0	0	0	0	0	0	0.17	5.3	51.7	A

▼ Degree Days

Degree Days														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Above 24 °C	0	0	0	0	0.2	2.7	6.9	3.2	0.5	0	0	0	13.4	A

Above 18 °C	0	0	0	0.9	13	51	99.8	71.6	16.4	0.5	0	0	253	A
Above 15 °C	0	0	0	3.8	37.3	114.2	186.1	147.7	46.2	3.4	0	0	538.6	A
Above 10 °C	0	0	0.6	19.8	125.9	253.7	340.6	299.7	148.4	31.6	2.7	0	1222.8	A
Above 5 °C	0.1	0.3	8	76	266.3	403.2	495.6	454.7	291.1	115.3	21.1	0.8	2132.4	A
Above 0 °C	4.7	6.9	43.7	188.6	420.7	553.2	650.6	609.7	441	254.2	85.7	12.1	3270.9	A
Below 0 °C	329.8	249.1	118.9	8.5	0	0	0	0	0	0.3	39.8	217.5	963.9	A
Below 5 °C	480.2	383.8	238.2	46	0.7	0	0	0	0.1	16.5	125.2	361.2	1651.7	A
Below 10 °C	635.1	524.9	385.8	139.7	15.2	0.5	0	0	7.4	87.7	256.8	515.4	2568.5	A
Below 15 °C	790.1	666.2	540.2	273.7	81.6	11	0.5	3	55.3	214.5	404.1	670.4	3710.6	A
Below 18 °C	883.1	751	633.2	360.8	150.3	37.8	7.2	20	115.4	304.6	494.1	763.4	4520.8	A

▼ Soil Temperature

Soil Temperature														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
at 5 cm depth (AM obs) (°C)	-0.2	-0.7	-0.2	3.0	11.1	16.6	19.1	18.2	14.2	8.3	3.5	0.5	7.8	A
at 5 cm depth (PM obs) (°C)	-0.2	-0.6	-0.0	5.2	14.4	20.2	23.0	21.8	17.0	10.3	4.1	0.5	9.6	A
at 10 cm depth (AM obs) (°C)	0.0	-0.5	-0.1	3.2	11.2	16.7	19.2	18.4	14.6	8.8	3.8	0.8	8.0	A
at 10 cm depth (PM obs) (°C)	0.0	-0.4	0.0	4.7	13.6	19.4	22.1	21.1	16.6	10.2	4.2	0.8	9.4	A
at 20 cm depth (AM obs) (°C)	0.5	-0.1	0.3	3.4	11.5	17.0	19.6	19.0	15.3	9.7	4.6	1.4	8.5	A
at 20 cm depth (PM obs) (°C)	0.5	-0.0	0.3	4.1	12.6	18.3	21.0	20.2	16.2	10.2	4.8	1.4	9.1	A
at 50 cm depth (AM obs) (°C)	1.1	0.3	0.3	2.5	9.8	15.0	17.8	17.8	15.2	10.4	5.6	2.2	8.2	A
at 100 cm depth (AM obs) (°C)	2.9	2.0	1.6	2.5	7.6	12.3	15.2	16.2	15.0	11.7	7.8	4.5	8.3	A
at 150 cm depth (AM obs) (°C)	5.0	3.9	3.3	3.5	6.8	10.7	13.6	15.0	14.8	12.7	9.7	6.7	8.8	C
at 300 cm depth (AM obs) (°C)	7.0	5.9	5.1	4.6	5.7	8.1	10.4	12.1	12.9	12.3	10.7	8.7	8.6	A

▼ Evaporation

Evaporation														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Lake Evaporation (mm)	0	0	0	0	3.6	4.3	4.5	3.7	2.4	1.4	0	0	0	C

▼ Bright Sunshine

Bright Sunshine														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Total Hours	101.2	129.8	159.8	189.4	230.3	253.3	276.8	246.7	171.5	136.7	83.6	82.0	2061.1	C
Days with measureable	21.6	22.3	24.7	25.5	27.9	28.6	30.2	29.7	26.5	25.8	20.9	19.7	303.4	C

% of possible daylight hours	35.7	44.3	43.3	46.8	50.0	54.1	58.4	56.5	45.5	40.2	29.1	30.1	44.5	C
Extreme Daily	8.9	10.4	11.6	13.5	14.9	**15.2**	15.0	14.0	12.7	10.6	9.6	8.1		A
Date (yyyy/dd)	1981/31	1974/26	1987/24	1974/26	1997/27	**1979/25**	1978/01	1978/05	1991/01	1976/01	1985/01	1979/30		

▼ Radiation

Radiation														
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**	**Code**
Extreme Global - RF1 (MJ/m2)	11.4	16.7	22.6	27.9	31.3	32.5	30.8	28.8	23.6	17.2	11.7	8.7		
Date (yyyy/dd)	1994/31	1994/27	1994/30	1986/23	1990/30	1987/20	1996/01	1987/01	1991/01	1992/01	1985/01	1989/01		
Extreme Net - RF4 (MJ/m2)	2.6	1.8	11.8	15.3	17.7	19.3	19.3	15.7	12.5	7.8	3.7	1.7		
Date (yyyy/dd)	1988/31	1986/28	1996/31	1993/14	1987/15	1987/17	1997/16	1995/07	1996/01	1995/01	1988/03	1987/10		

Legend

- A = WMO "3 and 5 rule" (i.e. no more than 3 consecutive and no more than 5 total missing for **either** temperature **or** precipitation)
- B = At least 25 years
- C = At least 20 years
- D = At least 15 years

Date modified: 2014-07-09

APPENDIX E

Stormtech Chambers Information

437 Donald B. Monroe Drive
Underground Storage System (Stormtech Chambers)

NOVATECH
Engineers, Planners & Landscape Architects

Storage Unit	Number of Chambers	Total Storage Provided[1] (m^3)	Storage Provided per Metre[2] (m^3/m)	Bottom Area[3] (m^2)	Total Length[4] (m)	Total Height[5] (m)	Width Used in PCSWMM Model[6] (m)
SC-310 Stormtech Chambers	16	11.2	0.32	40.4	34.72	0.555	0.579
300mm Clearstone Base	-	4.8	0.14	40.4	34.72	0.300	0.466
TOTAL	**16**	**16.0**	**0.46**	**40.4**	**34.72**	**0.855**	**-**

[1] Installed storage per chamber = 1.00 m^3/chamber or 0.46 m^3/m. Includes 150 mm clearstone cover and spacing; 300 mm clearstone base.

[2] Installed storage per chamber = 0.70 m^3/chamber and 0.30 m^3/chamber for clearstone, respectively. Chamber Length = 2.17 m.

[3] Installed chamber width = 1.164 m; storage unit width = 0.864 m + 0.15m (x2) clearstone on each side.

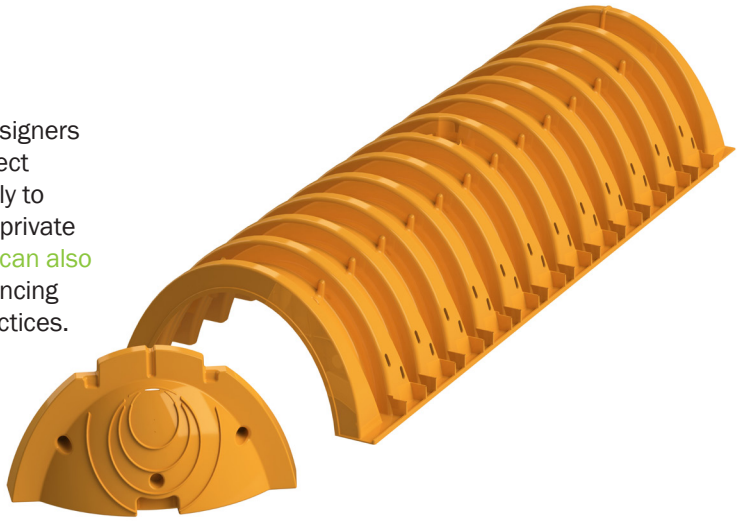
[4] Length per chamber = 2.17 m; end caps are not included.

[5] Chamber height = 405 mm + 150 mm clearstone cover.

[6] Represents equivalent storage per m within a rectangular conduit.

SC-310 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH SC-310 CHAMBER
(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
85.4" x 34.0" x 16.0"
2,170 mm x 864 mm x 406 mm

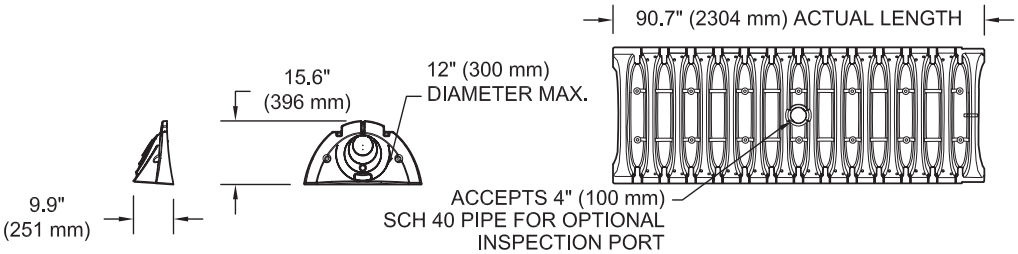
Chamber Storage
14.7 ft³ (0.42 m³)

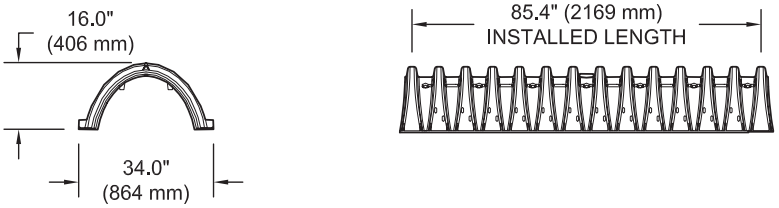
Min. Installed Storage*
31.0 ft³ (0.88 m³)

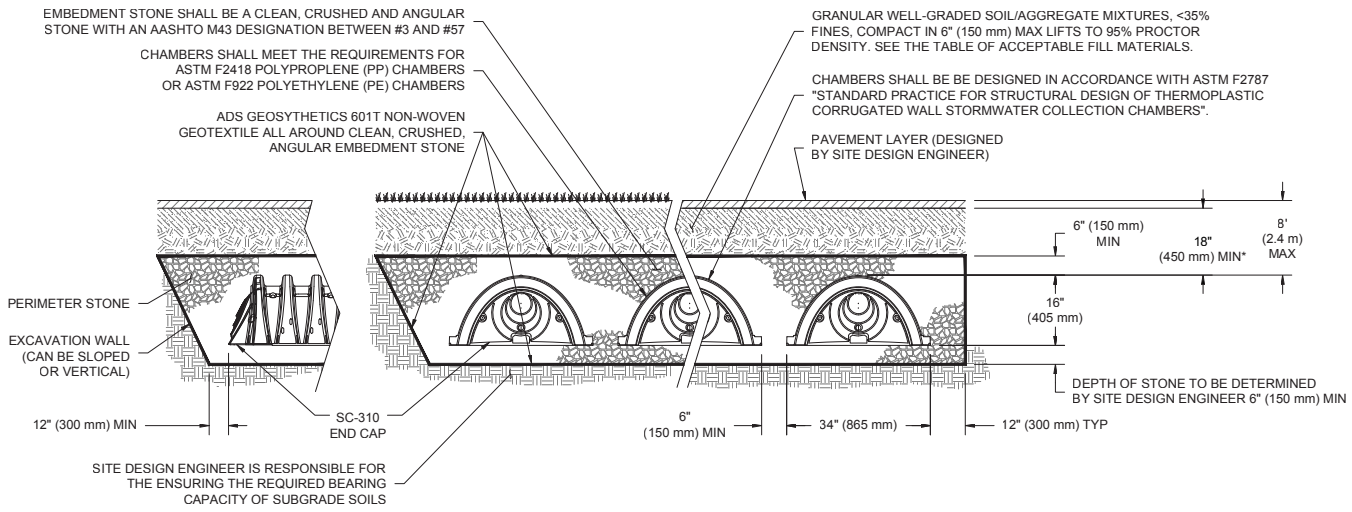
Weight
37.0 lbs (16.8 kg)

Shipping
41 chambers/pallet
108 end caps/pallet
18 pallets/truck

*Assumes 6" (150 mm) stone above and below chambers and 40% stone porosity.







*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

SC-310 CUMULATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)		Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)		14.70 (0.416)	31.00 (0.878)
27 (686)		14.70 (0.416)	30.21 (0.855)
26 (680)	Stone	14.70 (0.416)	29.42 (0.833)
25 (610)	Cover	14.70 (0.416)	28.63 (0.811)
24 (609)		14.70 (0.416)	27.84 (0.788)
23 (584)		14.70 (0.416)	27.05 (0.766)
22 (559)		14.70 (0.416)	26.26 (0.748)
21 (533)		14.64 (0.415)	25.43 (0.720)
20 (508)		14.49 (0.410)	24.54 (0.695)
19 (483)		14.22 (0.403)	23.58 (0.668)
18 (457)		13.68 (0.387)	22.47 (0.636)
17 (432)		12.99 (0.368)	21.25 (0.602)
16 (406)		12.17 (0.345)	19.97 (0.566)
15 (381)		11.25 (0.319)	18.62 (0.528)
14 (356)		10.23 (0.290)	17.22 (0.488)
13 (330)		9.15 (0.260)	15.78 (0.447)
12 (305)		7.99 (0.227)	14.29 (0.425)
11 (279)		6.78 (0.192)	12.77 (0.362)
10 (254)		5.51 (0.156)	11.22 (0.318)
9 (229)		4.19 (0.119)	9.64 (0.278)
8 (203)		2.83 (0.081)	8.03 (0.227)
7 (178)		1.43 (0.041)	6.40 (0.181)
6 (152)		0	4.74 (0.134)
5 (127)		0	3.95 (0.112)
4(102)	Stone Foundation	0	3.16 (0.090)
3 (76)		0	2.37 (0.067)
2 (51)		0	1.58 (0.046)
1 (25)		0	0.79 (0.022)

Note: Add 0.79 ft³ (0.022 m³) of storage for each additional inch. (25 mm) of stone foundation.

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
StormTech SC-310	14.7 (0.4)	31.0 (0.9)	35.7 (1.0)	40.4 (1.1)

Note: Assumes 6" (150 mm) of stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

AMOUNT OF STONE PER CHAMBER

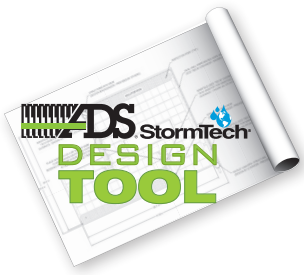
ENGLISH TONS (yds³)	Stone Foundation Depth		
	6"	12"	18"
StormTech SC-310	2.1 (1.5 yd³)	2.7 (1.9 yd³)	3.4 (2.4 yd³)
METRIC KILOGRAMS (m³)	**150 mm**	**300 mm**	**450 mm**
StormTech SC-310	1830 (1.1 m³)	2490 (1.5 m³)	2990 (1.8 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth		
	6" (150 mm)	12" (300 mm)	18" (450 mm)
StormTech SC-310	2.9 (2.2)	3.4 (2.6)	3.8 (2.9)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as the depth of the cover increases.



Working on a project?
Visit us at www.stormtech.com
and utilize the StormTech Design Tool

For more information on the StormTech SC-310 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

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4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

APPENDIX F

Inlet Control Device (ICD) Information

Conrad Stang

From: Rosiu, Cornel <Cornel.Rosiu@ipexna.com>
Sent: Friday, May 24, 2019 11:25 AM
To: Conrad Stang
Cc: Donnelly, Ryan; Lucas Wilson
Subject: RE: Tempest LMF ICD request (437 Donald Monro Drive)
Attachments: 2019052401 Novatech - Donald Monro Drive ICD Submittal.pdf

Conrad,

Please see attached ICD submittal

Regards,

Cornel Rosiu
IPEX Inc. - *Municipal Estimator, ON*
Cornel.Rosiu@ipexna.com
6810 Invader Crescent, Mississauga, ON, L5T 2B6 T: (905) 670-7676 x200

From: Conrad Stang <c.stang@novatech-eng.com>
Sent: May 24, 2019 10:49 AM
To: Rosiu, Cornel <Cornel.Rosiu@ipexna.com>
Cc: Donnelly, Ryan <Ryan.Donnelly@ipexna.com>; Lucas Wilson <l.wilson@novatech-eng.com>
Subject: Tempest LMF ICD request (437 Donald Monro Drive)

Hi Cornel,

Can I please have sizing / documentation for a Tempest LMF ICD for a proposed development at 437 Donald B. Monro Drive, in Ottawa, Ontario.

ICD Location	Head (m)	Release Rate (L/s)
CB01	1.50	17.8

**100-year 3-hour Chicago Storm*

The Tempest LMF ICD will be installed within a square 600mm x 600mm CB; 300mm outlet pipe.

Thanks,

Conrad

Conrad Stang, M.A.Sc., P.Eng., Project Manager | Water Resources
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x310 | Fax: 613.254.5867
Email: c.stang@novatech-eng.com | Website: www.novatech-eng.com

TEMPEST Product Submittal Package

Date: May 24, 2019

Customer: Novatech

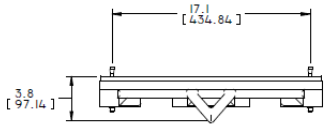
Contact: Conrad Stang

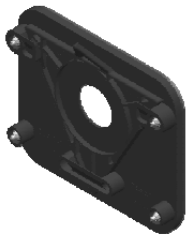
Location: Ottawa

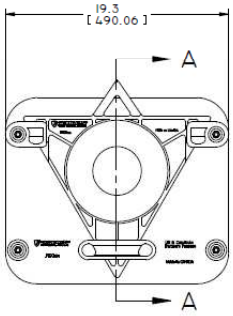
Project Name: Donald B. Monro Drive

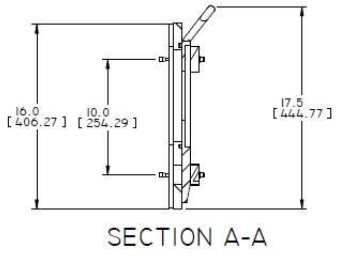
IPEX

Tempest MHF ICD Sq Shop Drawing







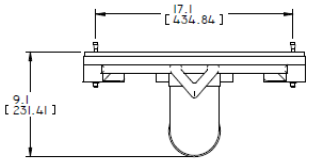


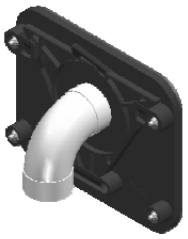
SECTION A-A

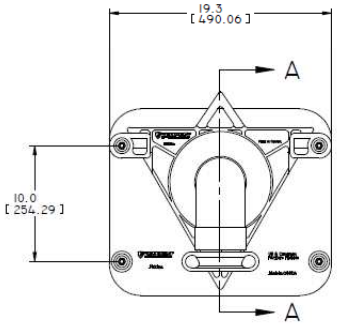
TOLERANCES:	IPEX TECHNOLOGIES INC.				
	PROJECTION	UNITS: in (mm)	TITLE: MHF SQUARE CB ASSEMBLY		
	DRAWN BY: H. M-MARTIN	DATE: 2011-07-25	SIZE: B	SCALE(S): 1/8	SHEET: 1 OF 1
	VERIFIED BY:	DATE: 2011-07-25	DRAWING NUMBER: 50117-_-FA007R01		REV: 1

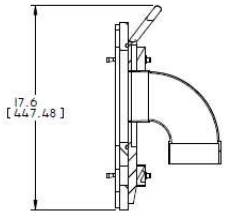
IPEX

Tempest HF ICD Sq Shop Drawing









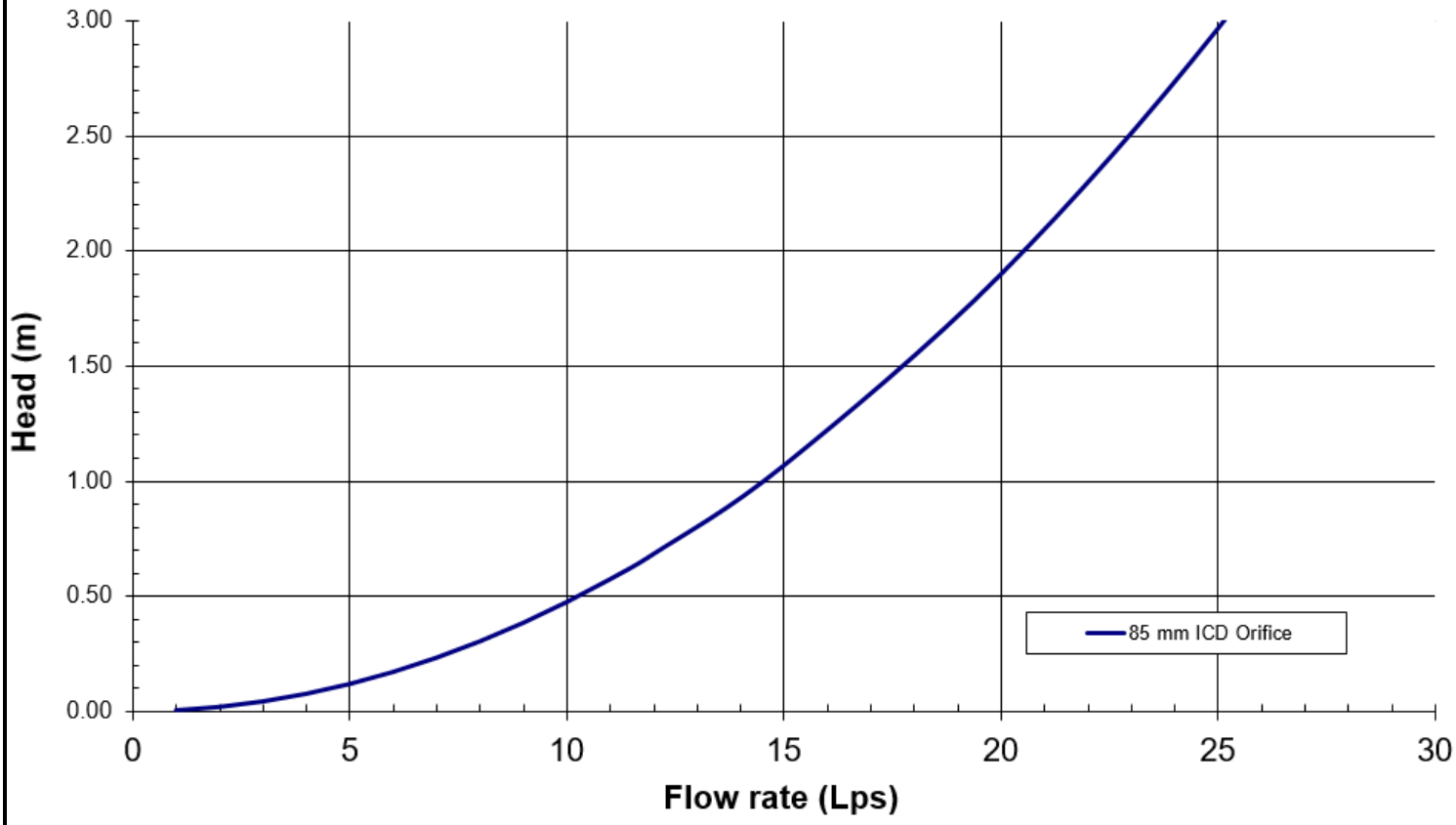
SECTION A-A

TOLERANCES: UNLESS OTHERWISE SPECIFIED: LINEAR: X ±0.060" [±1.52 mm] X.X ±0.030" [±0.76 mm] X.XX ±0.020" [±0.51 mm] X.XXX ±0.010" [±0.25 mm] FRACTION ±1/16" ANGULAR ±1.0°	IPEX TECHNOLOGIES INC.				Product development engineering 3 Place du Commerce, Suite 10 Ile des Soeurs, Montreal, QC, H3E 1H7 Canada Tel. 514 769 2200 www.ipexna.com
	PROJECTION	UNITS	TITLE	HF SQUARE CB ASSEMBLY	
		in (mm)			
	DRAWN BY	DATE	SIZE	SCALE(S)	SHEET
	M. M-MARTIN	2011-07-25	B	1/8	1 OF 1
	VERIFIED BY	DATE	DRAWING NUMBER		REV
		2011-07-25	SGM74_FA003R04		4

IPEX

Tempest MHF/HF ICD Flow Curve

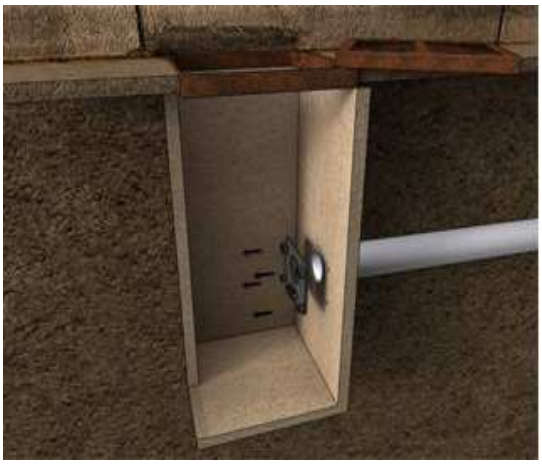
Flow: 17.8 L/s
Head: 1.50 m
CB 01

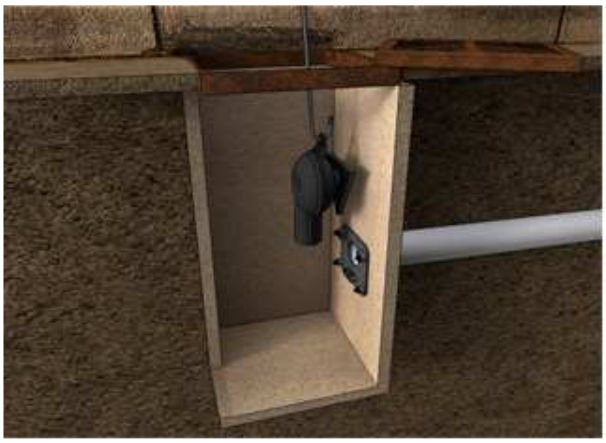


IPEX

Square CB Installation Notes:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8'' concrete bit, torque wrench for 9/16''nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8'' concrete bit to make the four holes at a minimum of 1-1/2'' depth up to 2-1/2''. Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you will hit the anchors with the hammer. Remove the nuts on the ends of the anchors
5. Install the wall mounting plate on the anchors and screw the nut in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the LMF device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.



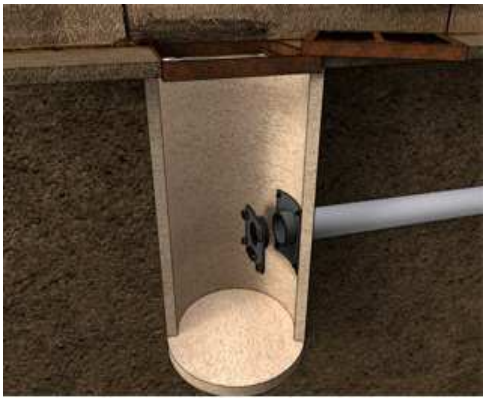


IPEX

Round CB Installation Notes: (Refer to square install notes above for steps 1 , 3, & 4)

2. Use spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lb-ft). There should be no gap between the CB spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate and the spigot of the spigot CB wall plate. Slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered into the mounting plate and has created a seal.






CAUTION/WARNING/DISCLAIM:

- Verify that the inlet(s) pipe(s) is not protruding into the catch basin. If it is, cut it back so that the inlet pipe is flush with the catch basin wall.
- Any required cement in the installation must be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Please refer to the IPEX solvent cement guide to confirm required curing times or attend the IPEX **Online Solvent Cement Training Course**.
- Call your IPEX representative for more information or if you have any questions about our products.

IPEX

IPEX TEMPEST Inlet Control Devices Technical Specification

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's must have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

APPENDIX G

Water Quality Treatment Unit Information

Conrad Stang

From: Evelyn Krolicka <evelyn@echelonenvironmental.ca>
Sent: Friday, May 24, 2019 1:13 PM
To: Conrad Stang
Subject: RE: 437 Donald B. Monro - CDS Model Request
Attachments: CDS TSSR- 437 Donald B Monro Drive.pdf

Hello Conrad,

I hope you're doing well!
I have attached the TSS removal calculations for the project at 437 Donald B. Monro Drive in Ottawa, Ontario.
For this project, we recommend our smallest CDS unit, PMSU2015_4. The sample drawings can be found after the calculations in the attachment.

If you have any questions you can contact me at your convenience.

Have a good weekend!

Evelyn Krolicka
Project Manager
ECHELON ENVIRONMENTAL
505 Hood Road |Markham, ON | L3R5V6
Tel: 905-948-0000 | **Fax**: 905-948-0577
Email: *evelyn@echelonenvironmental.ca*

From: Conrad Stang [mailto:c.stang@novatech-eng.com]
Sent: Friday, May 24, 2019 10:46 AM
To: Evelyn Krolicka
Cc: Lucas Wilson
Subject: 437 Donald B. Monro - CDS Model Request

Hi Evelyn,

Can I please get sizing / documentation for water quality treatment unit, preferably a CDS unit. Here are the design parameters:

80% long-term TSS removal (enhanced)

Drainage Area: 0.133 ha
Runoff Coefficient: 0.89

Controlled water quality flow rate: 6.7 L/s (25mm 4-hour Chicago storm)

Controlled 100-year flow rate: 17.8 L/s (100-year 4-hour Chicago storm)

This for a proposed development at 437 Donald B. Monro in Ottawa, Ontario.

Kind regards,

Conrad

Conrad Stang, M.A.Sc., P.Eng., Project Manager | Water Resources
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x310 | Fax: 613.254.5867
Email: c.stang@novatech-eng.com | Website: www.novatech-eng.com

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 437 Donald B. Monro Dr
Location: Ottawa, ON
OGS #: OGS

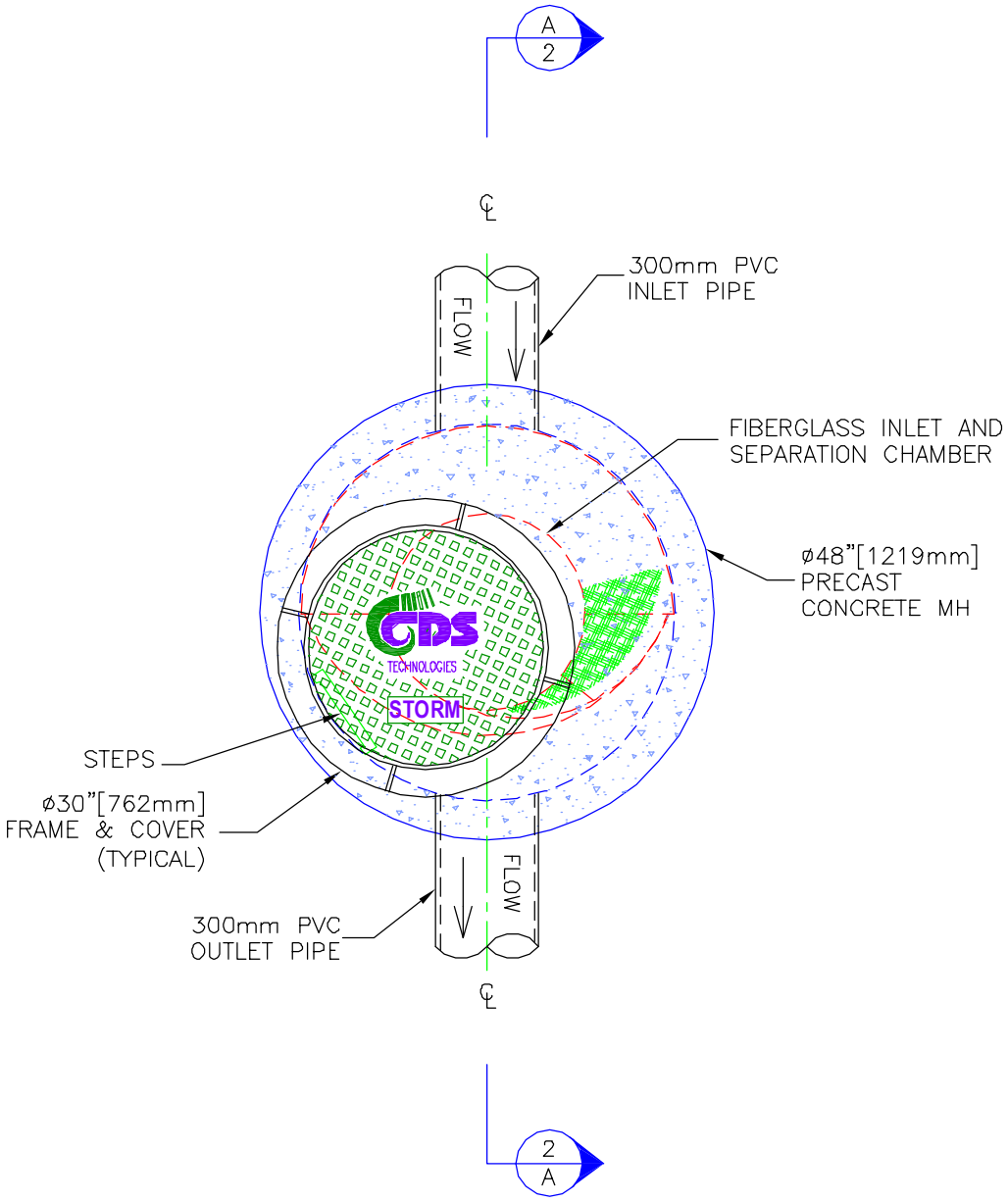
Engineer: NOVATECH
Contact: Conrad Stang, P.Eng
Report Date: 24-May-19

Area	0.13	ha	**Rainfall Station #**	215	
Weighted C	0.89		**Particle Size Distribution**	FINE	
CDS Model	2015-4		**CDS Treatment Capacity**	20	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	0.3	0.3	1.7	98.4	10.4
1.5	9.9%	29.7%	0.5	0.5	2.5	98.1	9.7
2.0	8.4%	38.1%	0.7	0.7	3.3	97.9	8.2
2.5	7.7%	45.8%	0.8	0.8	4.1	97.7	7.5
3.0	5.9%	51.7%	1.0	1.0	5.0	97.4	5.8
3.5	4.4%	56.1%	1.2	1.2	5.8	97.2	4.2
4.0	4.7%	60.7%	1.3	1.3	6.6	97.0	4.5
4.5	3.3%	64.0%	1.5	1.5	7.5	96.7	3.2
5.0	3.0%	67.1%	1.6	1.6	8.3	96.5	2.9
6.0	5.4%	72.4%	2.0	2.0	10.0	96.0	5.2
7.0	4.4%	76.8%	2.3	2.3	11.6	95.5	4.2
8.0	3.5%	80.3%	2.6	2.6	13.3	95.1	3.4
9.0	2.8%	83.2%	3.0	3.0	14.9	94.6	2.7
10.0	2.2%	85.3%	3.3	3.3	16.6	94.1	2.1
15.0	7.0%	92.3%	4.9	4.9	24.9	91.7	6.4
20.0	4.5%	96.9%	6.6	6.6	33.2	89.3	4.1
25.0	1.4%	98.3%	8.2	8.2	41.5	87.0	1.3
30.0	0.7%	99.0%	9.9	9.9	49.8	84.6	0.6
35.0	0.5%	99.5%	11.5	11.5	58.1	82.2	0.4
40.0	0.5%	100.0%	13.2	13.2	66.4	79.8	0.4
45.0	0.0%	100.0%	14.8	14.8	74.7	77.4	0.0
50.0	0.0%	100.0%	16.5	16.5	83.0	75.1	0.0
							96.1
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**89.6%**
						Predicted Annual Rainfall Treated =	**99.0%**

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

PLAN VIEW

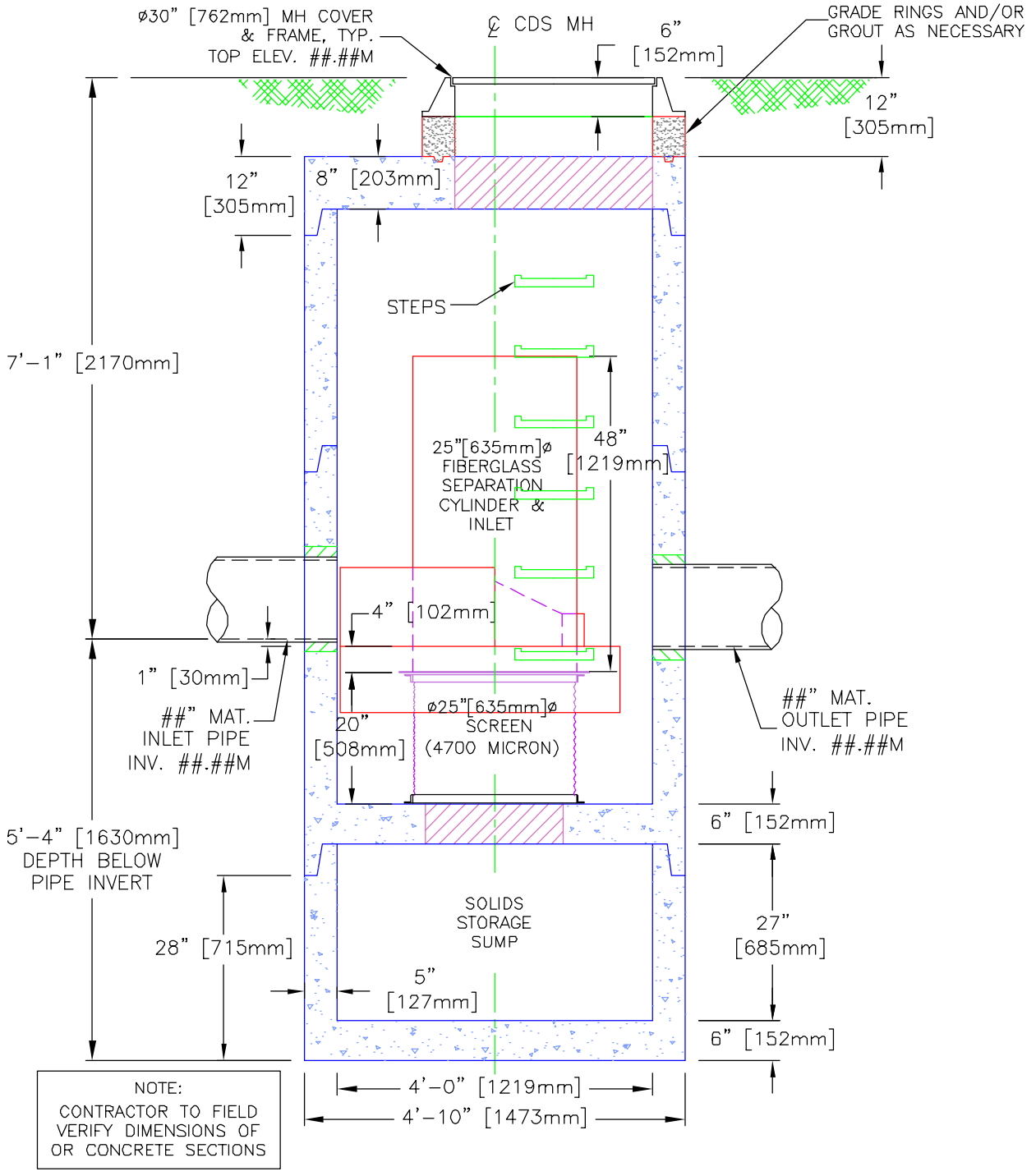


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 1
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

SECTION A–A
ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF OR CONCRETE SECTIONS

CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX–##–###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 2
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

APPENDIX H

Stormwater Management Modeling
PCSWMM Model Schematic, Output Data

437 Donald B. Monro Drive (119023)
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Overall Model Schematic

Date: 2019-05-24
M:\2019\119023\DATA\Calculations\Sewer Calcs\SWM\Model Schematic-Output\PCSWMM Model Schematic.docx

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

Allowable Release Rates (Pre-Dev.):
2-year = 13.2 L/s
5-year = 17.9 L/s


*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 5
Number of nodes ........... 9
Number of links ........... 8
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
------------------------------------------------------------------------
Design_Storms        C3hr-2yr                     INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                         Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------
1                            0.02     60.00     14.30    5.0000 Design_Storms        Out(Uncontrolled)
2                            0.01     26.67     84.30    2.0000 Design_Storms        Out(Uncontrolled)
3                            0.00     15.00     42.90    2.0000 Design_Storms        MH100
4                            0.09     90.00    100.00    2.0000 Design_Storms        Stormtech01
5                            0.04     50.00    100.00    1.5000 Design_Storms        Stormtech01


************
Node Summary
************
                                       Invert      Max.    Ponded    External
Name                 Type                Elev.     Depth      Area    Inflow
```

```
-------------------------------------------------------------------------------
```

```
CB01(ICD)            JUNCTION            92.33      1.25       0.0
MH100                JUNCTION            92.51      1.80       0.0
OGS                  JUNCTION            92.22      1.73       0.0
Stormtech01          JUNCTION            92.12      2.46       0.0
Stormtech02          JUNCTION            92.06      2.52       0.0
Out(Major)           OUTFALL             93.82      0.73       0.0
Out(Minor)           OUTFALL             92.17      0.30       0.0
Out(Uncontrolled)    OUTFALL             93.80      0.00       0.0
CB01                 STORAGE             92.33      2.25       0.0


************
Link Summary
************
Name             From Node        To Node          Type            Length    %Slope Roughness
-------------------------------------------------------------------------------------------------
CB01(Major)      CB01             Out(Major)       CONDUIT           3.0    1.0001    0.0150
CB01-OGS         CB01(ICD)        OGS              CONDUIT          16.8    0.4759    0.0130
Clearstone       Stormtech01      Stormtech02      CONDUIT          34.7    0.1728    0.0130
MH100-OGS        MH100            OGS              CONDUIT          11.0    1.0019    0.0130
OGS-OUT(minor)   OGS              Out(Minor)       CONDUIT           5.7    0.8834    0.0130
Stormtech-CB01   Stormtech02      CB01             CONDUIT           4.8    1.0374    0.0130
StormtechChambers Stormtech01      Stormtech02      CONDUIT          34.7    0.1728    0.0130
CB01(ICD)        CB01             CB01(ICD)        ORIFICE


*********************
Cross Section Summary
*********************
                                  Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape           Depth     Area     Rad.    Width  Barrels     Flow
-------------------------------------------------------------------------------------
CB01(Major)      RECT_OPEN        0.73     2.19     0.59     3.00        1 10237.96
CB01-OGS         CIRCULAR         0.30     0.07     0.07     0.30        1    66.71
Clearstone       RECT_CLOSED      0.30     0.14     0.09     0.47        1    90.62
MH100-OGS        CIRCULAR         0.15     0.02     0.04     0.15        1    15.24
OGS-OUT(minor)   CIRCULAR         0.30     0.07     0.07     0.30        1    90.90
Stormtech-CB01   CIRCULAR         0.30     0.07     0.07     0.30        1    98.50
StormtechChambers RECT_CLOSED      0.55     0.32     0.14     0.58        1   279.29


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
```

```
not just on results from each reporting time step.
***********************************************************

***************
Analysis Options
***************
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date ..... 05/10/2019 00:00:00
Ending Date ..... 05/11/2019 00:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:01:00
Wet Time Step ..... 00:01:00
Dry Time Step ..... 00:01:00
Routing Time Step ..... 2.00 sec
Variable Time Step ..... YES
Maximum Trials ..... 8
Number of Threads ..... 1
Head Tolerance ..... 0.001500 m


********************
Control Actions Taken
********************


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation .....         0.005        31.857
Evaporation Loss .....            0.000         0.000
Infiltration Loss .....           0.001         4.518
Surface Runoff .....              0.004        26.410
Final Storage .....               0.000         0.966
Continuity Error (%) .....      -0.117
```

```
*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .....          0.000         0.000
Wet Weather Inflow .....          0.004         0.044
Groundwater Inflow .....          0.000         0.000
RDII Inflow .....                 0.000         0.000
External Inflow .....            0.000         0.000
External Outflow .....           0.004         0.038
Flooding Loss .....               0.000         0.000
Evaporation Loss .....            0.000         0.000
Exfiltration Loss .....           0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume .....         0.001         0.005
Continuity Error (%) .....       0.669


************************
Highest Continuity Errors
************************
Node Stormtech02 (8.22%)


***************************
Time-Step Critical Elements
***************************
Link Stormtech-CB01 (1.28%)


*******************************
Highest Flow Instability Indexes
*******************************
Link CB01(ICD) (2)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     1.99 sec
Maximum Time Step           :     2.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00
Percent Not Converging      :     0.00
```

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
1	31.86	0.00	0.00	27.16	4.33	0.15	4.49	0.00	1.05	0.141
2	31.86	0.00	0.00	4.94	25.57	0.07	25.64	0.00	1.51	0.805
3	31.86	0.00	0.00	18.05	13.00	0.15	13.16	0.00	0.32	0.413
4	31.86	0.00	0.00	0.00	30.33	0.00	30.33	0.03	19.20	0.952
5	31.86	0.00	0.00	0.00	31.90	0.00	31.90	0.01	8.53	1.001

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB01(ICD)	JUNCTION	0.01	0.08	92.41	0 01:20	0.08
MH100	JUNCTION	0.00	0.01	92.52	0 01:10	0.01
OGS	JUNCTION	0.00	0.06	92.28	0 01:20	0.06
Stormtech01	JUNCTION	0.29	0.65	92.77	0 01:20	0.65
Stormtech02	JUNCTION	0.34	0.71	92.77	0 01:19	0.71
Out(Major)	OUTFALL	0.00	0.00	93.82	0 00:00	0.00
Out(Minor)	OUTFALL	0.00	0.06	92.23	0 01:20	0.06
Out(Uncontrolled)	OUTFALL	0.00	0.00	93.80	0 00:00	0.00
CB01	STORAGE	0.02	0.44	92.77	0 01:19	0.44

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB01(ICD)	JUNCTION	0.00	8.21	0 01:19	0	0.0346	-0.148
MH100	JUNCTION	0.32	0.32	0 01:10	0.000395	0.000395	0.281
OGS	JUNCTION	0.00	8.29	0 01:20	0	0.0351	0.003
Stormtech01	JUNCTION	27.74	27.74	0 01:10	0.0401	0.0408	5.871
Stormtech02	JUNCTION	0.00	19.23	0 01:09	0	0.0386	8.957
Out(Major)	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
Out(Minor)	OUTFALL	0.00	8.29	0 01:20	0	0.0351	0.000
Out(Uncontrolled)	OUTFALL	2.56	2.56	0 01:10	0.00313	0.00313	0.000
CB01	STORAGE	0.00	8.46	0 01:10	0	0.0346	0.026

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB01	0.000	0	0	0	0.000	1	0 01:19	8.21

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr

Out(Major)	0.00	0.00	0.00	0.000
Out(Minor)	14.80	2.91	8.29	0.035
Out(Uncontrolled)	11.04	0.35	2.56	0.003
System	8.61	3.26	2.56	0.038

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
CB01(Major)	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
CB01-OGS	CONDUIT	8.21	0	01:20	0.63	0.12	0.24
Clearstone	CONDUIT	14.76	0	01:02	0.11	0.16	1.00
MH100-OGS	CONDUIT	0.30	0	01:10	0.34	0.02	0.10
OGS-OUT(minor)	CONDUIT	8.29	0	01:20	0.80	0.09	0.20
Stormtech-CB01	CONDUIT	8.46	0	01:10	0.56	0.09	1.00
StormtechChambers	CONDUIT	11.97	0	01:09	0.07	0.04	0.69
CB01(ICD)	ORIFICE	8.21	0	01:19			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
CB01(Major)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CB01-OGS	1.00	0.04	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00
Clearstone	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.01	0.00
MH100-OGS	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
OGS-OUT(minor)	1.00	0.03	0.00	0.00	0.87	0.11	0.00	0.00	0.90	0.00
Stormtech-CB01	1.00	0.04	0.00	0.00	0.09	0.00	0.00	0.86	0.02	0.00
StormtechChambers	1.00	0.04	0.87	0.00	0.09	0.00	0.00	0.00	0.02	0.00

****

Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
Clearstone	2.19	2.19	23.05	0.01	0.01
Stormtech-CB01	0.42	0.42	0.57	0.01	0.01

Analysis begun on: Fri May 24 11:01:53 2019
Analysis ended on: Fri May 24 11:01:53 2019
Total elapsed time: < 1 sec

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

Allowable Release Rates (Pre-Dev.):
2-year = 13.2 L/s
5-year = 17.9 L/s


*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 5
Number of nodes ........... 9
Number of links ........... 8
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
------------------------------------------------------------------
Design_Storms        C3hr-100yr                  INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------
1                           0.02     60.00     14.30    5.0000 Design_Storms        Out(Uncontrolled)
2                           0.01     26.67     84.30    2.0000 Design_Storms        Out(Uncontrolled)
3                           0.00     15.00     42.90    2.0000 Design_Storms        MH100
4                           0.09     90.00    100.00    2.0000 Design_Storms        Stormtech01
5                           0.04     50.00    100.00    1.5000 Design_Storms        Stormtech01


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type                Elev.     Depth      Area    Inflow
```

```
-------------------------------------------------------------------------------
```

```
CB01(ICD)            JUNCTION            92.33      1.25       0.0
MH100                JUNCTION            92.51      1.80       0.0
OGS                  JUNCTION            92.22      1.73       0.0
Stormtech01          JUNCTION            92.12      2.46       0.0
Stormtech02          JUNCTION            92.06      2.52       0.0
Out(Major)           OUTFALL             93.82      0.73       0.0
Out(Minor)           OUTFALL             92.17      0.30       0.0
Out(Uncontrolled)    OUTFALL             93.80      0.00       0.0
CB01                 STORAGE             92.33      2.25       0.0


************
Link Summary
************
Name             From Node        To Node          Type            Length    %Slope Roughness
---------------------------------------------------------------------------------------------
CB01(Major)      CB01             Out(Major)       CONDUIT           3.0    1.0001    0.0150
CB01-OGS         CB01(ICD)        OGS              CONDUIT          16.8    0.4759    0.0130
Clearstone       Stormtech01      Stormtech02      CONDUIT          34.7    0.1728    0.0130
MH100-OGS        MH100            OGS              CONDUIT          11.0    1.0019    0.0130
OGS-OUT(minor)   OGS              Out(Minor)       CONDUIT           5.7    0.8834    0.0130
Stormtech-CB01   Stormtech02      CB01             CONDUIT           4.8    1.0374    0.0130
StormtechChambers Stormtech01      Stormtech02      CONDUIT          34.7    0.1728    0.0130
CB01(ICD)        CB01             CB01(ICD)        ORIFICE


*********************
Cross Section Summary
*********************
                                   Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape            Depth     Area     Rad.    Width  Barrels     Flow
---------------------------------------------------------------------------------------
CB01(Major)      RECT_OPEN         0.73     2.19     0.59     3.00        1 10237.96
CB01-OGS         CIRCULAR          0.30     0.07     0.07     0.30        1    66.71
Clearstone       RECT_CLOSED       0.30     0.14     0.09     0.47        1    90.62
MH100-OGS        CIRCULAR          0.15     0.02     0.04     0.15        1    15.24
OGS-OUT(minor)   CIRCULAR          0.30     0.07     0.07     0.30        1    90.90
Stormtech-CB01   CIRCULAR          0.30     0.07     0.07     0.30        1    98.50
StormtechChambers RECT_CLOSED       0.55     0.32     0.14     0.58        1   279.29


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
```

```
not just on results from each reporting time step.
*********************************************************

***************
Analysis Options
***************
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date ..... 05/10/2019 00:00:00
Ending Date ..... 05/11/2019 00:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:01:00
Wet Time Step ..... 00:01:00
Dry Time Step ..... 00:01:00
Routing Time Step ..... 2.00 sec
Variable Time Step ..... YES
Maximum Trials ..... 8
Number of Threads ..... 1
Head Tolerance ..... 0.001500 m


********************
Control Actions Taken
********************


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation .....         0.012        71.667
Evaporation Loss .....            0.000         0.000
Infiltration Loss .....           0.001         6.259
Surface Runoff .....              0.011        64.557
Final Storage .....               0.000         0.966
Continuity Error (%) .....      -0.159
```

```
*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .....          0.000         0.000
Wet Weather Inflow .....          0.011         0.107
Groundwater Inflow .....          0.000         0.000
RDII Inflow .....                 0.000         0.000
External Inflow .....            0.000         0.000
External Outflow .....           0.010         0.102
Flooding Loss .....               0.000         0.000
Evaporation Loss .....            0.000         0.000
Exfiltration Loss .....           0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume .....         0.001         0.005
Continuity Error (%) .....      -0.681


************************
Highest Continuity Errors
************************
Node Stormtech02 (2.96%)


**************************
Time-Step Critical Elements
**************************
Link Stormtech-CB01 (1.06%)


*******************************
Highest Flow Instability Indexes
*******************************
Link CB01(ICD) (2)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.10 sec
Average Time Step           :     1.99 sec
Maximum Time Step           :     2.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.01
Percent Not Converging      :     0.06
```

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
1	71.67	0.00	0.00	37.62	10.03	23.91	33.94	0.01	10.42	0.474
2	71.67	0.00	0.00	6.86	59.16	4.43	63.59	0.01	3.88	0.887
3	71.67	0.00	0.00	25.00	30.09	16.02	46.11	0.00	1.37	0.643
4	71.67	0.00	0.00	0.00	70.21	0.00	70.21	0.06	44.64	0.980
5	71.67	0.00	0.00	0.00	71.78	0.00	71.78	0.03	19.84	1.002

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB01(ICD)	JUNCTION	0.01	0.11	92.44	0 01:20	0.11
MH100	JUNCTION	0.00	0.03	92.54	0 01:10	0.03
OGS	JUNCTION	0.01	0.09	92.31	0 01:10	0.09
Stormtech01	JUNCTION	0.34	1.77	93.89	0 01:10	1.77
Stormtech02	JUNCTION	0.40	1.83	93.89	0 01:10	1.83
Out(Major)	OUTFALL	0.00	0.00	93.82	0 00:00	0.00
Out(Minor)	OUTFALL	0.01	0.09	92.26	0 01:10	0.09
Out(Uncontrolled)	OUTFALL	0.00	0.00	93.80	0 00:00	0.00
CB01	STORAGE	0.08	1.50	93.83	0 01:20	1.50

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB01(ICD)	JUNCTION	0.00	16.04	0 01:20	0	0.0875	-0.031
MH100	JUNCTION	1.37	1.37	0 01:10	0.00138	0.00138	0.078
OGS	JUNCTION	0.00	17.24	0 01:10	0	0.0889	0.003
Stormtech01	JUNCTION	64.48	65.78	0 01:04	0.0919	0.0926	1.743
Stormtech02	JUNCTION	0.00	64.51	0 01:05	0	0.0911	3.050
Out(Major)	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
Out(Minor)	OUTFALL	0.00	17.24	0 01:10	0	0.0889	0.000
Out(Uncontrolled)	OUTFALL	14.30	14.30	0 01:10	0.0132	0.0132	0.000
CB01	STORAGE	0.00	64.20	0 01:10	0	0.0877	0.135

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
Stormtech01	JUNCTION	0.92	0.914	0.691
Stormtech02	JUNCTION	0.99	0.972	0.693

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB01	0.000	2	0	0	0.019	80	0 01:20	16.04

****

Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
Out(Major)	0.00	0.00	0.00	0.000
Out(Minor)	16.37	6.40	17.24	0.089
Out(Uncontrolled)	11.91	1.30	14.30	0.013
System	9.43	7.70	14.30	0.102

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
CB01(Major)	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
CB01-OGS	CONDUIT	16.04	0 01:20	0.75	0.24	0.34
Clearstone	CONDUIT	17.34	0 01:01	0.15	0.19	1.00
MH100-OGS	CONDUIT	1.37	0 01:10	0.53	0.09	0.20
OGS-OUT(minor)	CONDUIT	17.24	0 01:10	0.99	0.19	0.30
Stormtech-CB01	CONDUIT	64.20	0 01:10	0.91	0.65	1.00
StormtechChambers	CONDUIT	48.56	0 01:10	0.15	0.17	1.00
CB01(ICD)	ORIFICE	16.04	0 01:20			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
CB01(Major)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CB01-OGS	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
Clearstone	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.01	0.00
MH100-OGS	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
OGS-OUT(minor)	1.00	0.02	0.00	0.00	0.86	0.12	0.00	0.00	0.90	0.00
Stormtech-CB01	1.00	0.03	0.00	0.00	0.11	0.00	0.00	0.86	0.01	0.00
StormtechChambers	1.00	0.03	0.86	0.00	0.11	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
Clearstone	2.57	2.57	23.26	0.01	0.01
Stormtech-CB01	1.44	1.44	1.56	0.01	0.09
StormtechChambers	0.92	0.92	0.99	0.01	0.01

Analysis begun on: Fri May 24 11:03:03 2019
Analysis ended on: Fri May 24 11:03:04 2019
Total elapsed time: 00:00:01

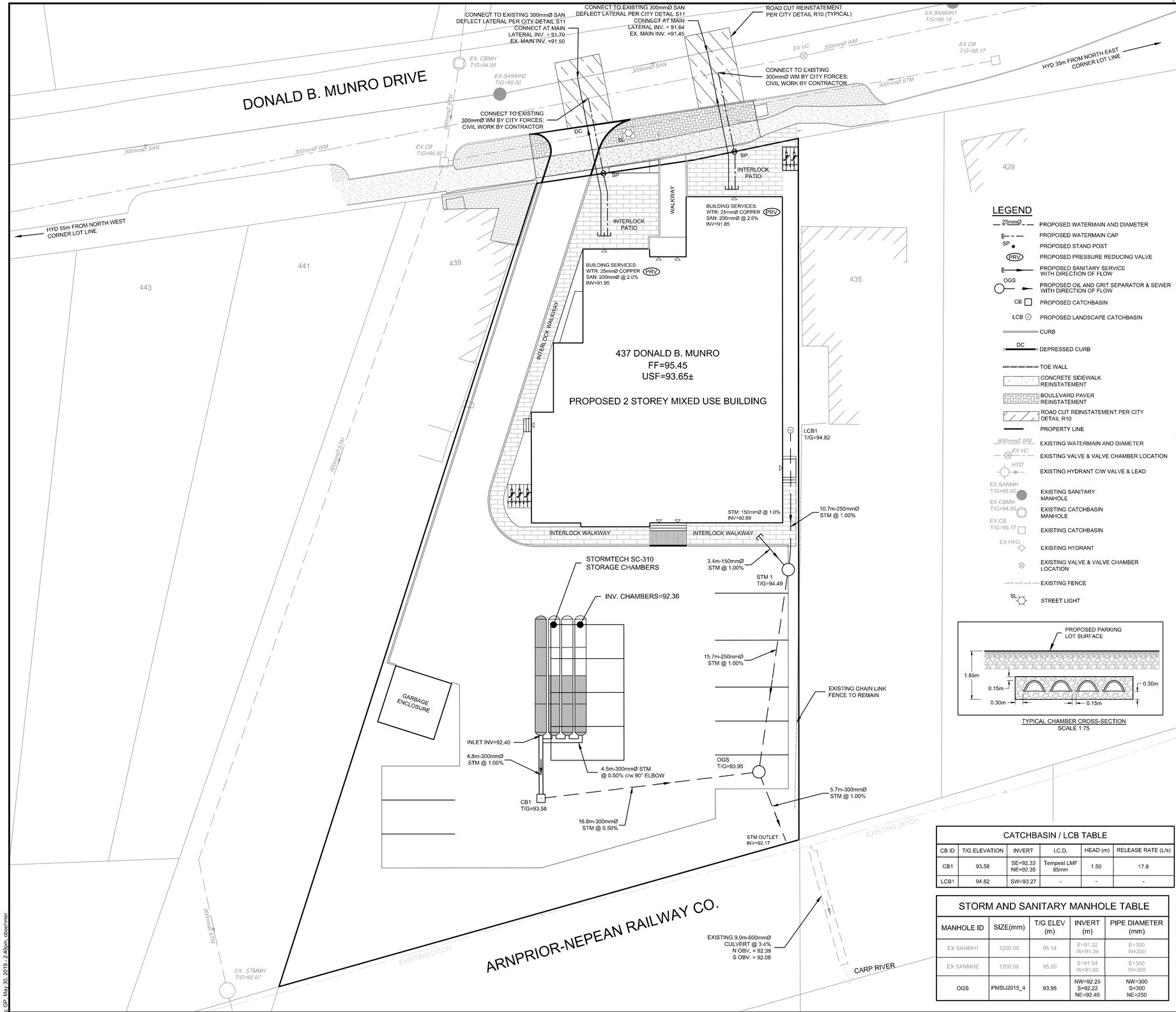
APPENDIX I

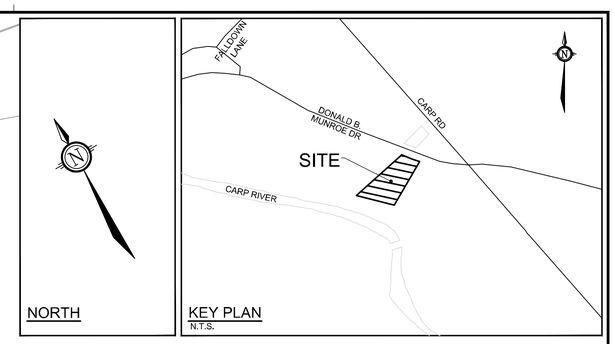
General Plan of Services (119023-GP)

Grading and Drainage Plan (119023-GR)

Removals and Erosion Sediment Control Plan (119023-ESC)

Storm Drainage Area Plan (119023-STM)





LEGEND

- 25mmØ — PROPOSED WATERMAIN AND DIAMETER
- PROPOSED WATERMAIN CAP
- SP — PROPOSED STAND POST
- PRV — PROPOSED PRESSURE REDUCING VALVE
- PROPOSED SANITARY SERVICE WITH DIRECTION OF FLOW
- OGS — PROPOSED OIL AND GRIT SEPARATOR & SEWER WITH DIRECTION OF FLOW
- CB — PROPOSED CATCHBASIN
- LCB — PROPOSED LANDSCAPE CATCHBASIN
- CURB
- DC — DEPRESSED CURB
- TOE WALL
- CONCRETE SIDEWALK REINSTATEMENT
- BOULEVARD PAVER REINSTATEMENT
- ROAD CUT REINSTATEMENT PER CITY DETAIL R10
- PROPERTY LINE
- 600mmØ WM — EXISTING WATERMAIN AND DIAMETER
- EX VC — EXISTING VALVE & VALVE CHAMBER LOCATION
- HYD — EXISTING HYDRANT C/W VALVE & LEAD
- EX SANMH T/G=95.00 — EXISTING SANITARY MANHOLE
- EX CBMH T/G=94.95 — EXISTING CATCHBASIN MANHOLE
- EX CB T/G=95.17 — EXISTING CATCHBASIN
- EX HYD — EXISTING HYDRANT
- EXISTING VALVE & VALVE CHAMBER LOCATION
- EXISTING FENCE
- SL — STREET LIGHT

TYPICAL CHAMBER CROSS-SECTION
SCALE 1:75

CATCHBASIN / LCB TABLE

CB ID	T/G ELEVATION	INVERT	I.C.D.	HEAD (m)	RELEASE RATE (L/s)
CB1	93.58	SE=92.33 NE=92.35	Tempest LMF 85mm	1.50	17.8
LCB1	94.82	SW=93.27	-	-	-

STORM AND SANITARY MANHOLE TABLE

MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)
EX SANMH1	1200.00	95.14	E=91.32 W=91.34	E=300 W=300
EX SANMH2	1200.00	95.00	E=91.54 W=91.60	E=300 W=300
OGS	PMSU2015_4	93.95	NW=92.25 S=92.22 NE=92.40	NW=300 S=300 NE=250

GENERAL NOTES & INSTRUCTIONS:

1. THE ORIGINAL GROUND ELEVATIONS, SERVICING, UTILITY, AND SURVEY INFORMATION SHOW ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
2. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITIES, INCLUDING THE REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, ALL TO THE SATISFACTION OF THE ENGINEER.
3. PRIOR TO CONSTRUCTION START, THE CONTRACTOR SHALL PROVIDE PROOF OF INSURANCE TO THE ENGINEER IN THE AMOUNT AND TYPE OUTLINED IN THE CONTRACT AGREEMENT. THE INSURANCE POLICY SHALL NAME THE OWNER, ENGINEER, AND MUNICIPALITY AS CO-INSURED.
4. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
5. CONFIRM DIMENSIONS AND LAYOUT INFORMATION BEFORE CONSTRUCTION START, AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
6. ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS. DIMENSIONS ARE IN METERS UNLESS OTHERWISE STATED.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE CONSTRUCTION START.
8. ALL WORK AND MATERIALS SHALL CONFORM TO THE LATEST MUNICIPAL STANDARDS AND SPECIFICATIONS, AND ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
9. RESTORE ALL DISTURBED AREAS TO EXISTING CONDITIONS OR BETTER, TO THE SATISFACTION OF THE ENGINEER.
10. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT" AND REGULATIONS FOR CONSTRUCTION PROJECTS, THE GENERAL CONTRACTOR IS DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
11. CONSTRUCTION SIGNAGE MUST CONFORM TO THE CURRENT MTO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

REPORTS & REFERENCE PLANS:

1. REFER TO SITE PLAN AND ARCHITECTURAL DRAWINGS FOR BUILDING LAYOUT AND DETAILS.
2. REFER TO LANDSCAPE ARCHITECTURE PLANS FOR HARDSCAPE FEATURES AND PLANTING INFORMATION.
3. REFER TO THE SERVICING BRIEF R-2019-098 DATED MAY 31, 2019 FOR SERVICING DESIGN DETAILS.
4. REFER TO GEOTECHNICAL REPORT PG4916-1 DATED MAY 24, 2019 PREPARED BY PATERSON FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT SHALL REVIEW SITE CONDITIONS

STORM SEWERS:

1. CONTRACTOR SHALL SUPPLY AND INSTALL ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH CURRENT MUNICIPAL STANDARDS AND SPECIFICATIONS (APPLIES TO STORM AND SANITARY SEWERS).
2. REINFORCED CONCRETE STORM SEWER PIPES SHALL BE IN ACCORDANCE WITH CSA A257.2. NON-REINFORCED CONCRETE STORM SEWER PIPES SHALL BE IN ACCORDANCE WITH WITH CSA A257.1. PIPE SHALL BE JOINTED WITH STANDARD RUBBERIZED GASKETS PER CSA A257.3. LATEST AMENDMENT APPLIES TO ALL OF THE ABOVE ITEMS.
3. STORM SEWER TRENCHING SHALL BE IN ACCORDANCE WITH OTTAWA DETAIL S6 AND S7.
4. PIPE BEDDING, COVER AND BACKFILL TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 802.010/802.013 FOR FLEXIBLE PIPE, AND 802.031/802.033 FOR RIGID PIPE. PIPE BEDDING SHALL BE CLASS "B", UNLESS OTHERWISE NOTED, AND SHALL CONSIST OF 150mm GRANULAR "A" (300mm IN ROCK) COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
5. PVC STORM SEWERS SHALL BE SDR35 APPROVED PER CSA B182.2, UNLESS OTHERWISE NOTED.
6. STORM LATERAL TO BE 150mmØ WHITE PVC SDR28 WITH A 1.0% GRADIENT (MIN). CONSTRUCT SERVICES TO WITHIN 1.0m OF THE BUILDING FACE AND CAP; MARK WITH A WOODEN 50mm x 100mm STAKE PAINTED GREEN THAT EXTENDS 1.0m ABOVE GROUND.
7. SERVICE CONNECTIONS TO SEWER MAIN IN ACCORDANCE WITH OTTAWA DETAIL S11 OR S11.1 AS APPROPRIATE.
8. STORM MANHOLE FRAME AND COVER SHALL BE PER OTTAWA DETAIL S24.1, AND S25.
9. CATCH BASINS IN ACCORDANCE WITH OTTAWA DETAIL S1 (CONCRETE GUTTER), S3 (INLET CATCHBASIN), AND OPSD 705.010. FRAME AND GRATE PER OTTAWA DETAIL S19 FOR BOTH ROADWAY AND REAR YARD STRUCTURES.
10. CATCH BASIN LEADS SHALL BE 200mmØ WITH A 1.0% (MIN) SLOPE (USE 250mm LEAD FOR DOUBLE CB STRUCTURES).
11. CATCH BASINS AND CBMH STRUCTURES TO HAVE 600mm DEEP SUMPS.
12. CCTV ALL STORM SEWERS 250mm OR GREATER PRIOR TO PLACEMENT OF ASPHALT BASE COURSE.

SANITARY SEWERS:

1. SANITARY SEWER TRENCH PER OTTAWA DETAIL S6 AND S7 WITH A CLASS "B" BEDDING.
2. SANITARY LATERALS TO BE 200mmØ NON-WHITE PVC SDR35, IPEX "RING-TITE" (OR EQUIVALENT) WITH A 1.0% GRADIENT (2.0% PREFERRED). CONSTRUCT SERVICES TO WITHIN 1.0m OF THE BUILDING FACE AND CAP, MARK WITH A WOODEN 50mm X 100mm STAKE PAINTED RED THAT EXTENDS 1.0m ABOVE THE GROUND. LATERALS IN GENERAL CONFORMANCE WITH DETAIL S11.3, SECTION A-A.
3. BACK WATER VALVES SHALL BE INSTALLED ON ALL SANITARY SERVICES PER OTTAWA DETAIL S14.1 OR S14.2.
4. SANITARY MANHOLE FRAME AND COVERS PER OTTAWA DETAIL S24 AND S25.
5. SAFETY PLATFORMS PER OPSD 404.02.
6. CONTRACTOR TO PERFORM LEAKAGE TEST ON SANITARY SEWER IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24.
7. CCTV ALL SANITARY SEWERS 200mm OR GREATER PRIOR TO PLACEMENT OF ASPHALT BASE COURSE.

WATER SUPPLY:

1. WATERMAIN TRENCH AND BEDDING IN ACCORDANCE WITH OTTAWA DETAIL W17.
2. PVC FITTINGS SHALL BE INSTALLED WITH A TRACER WIRE IN ACCORDANCE WITH OTTAWA DETAIL W36.
3. THE WATER SERVICES SHALL BE 25mmØ COPPER. WATER SERVICE SHALL BE MARKED WITH A 50mm X 100mm STAKE PAINTED BLUE.
4. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS PER OTTAWA DETAIL W40 AND W42.
5. INSULATION FOR WATERMAIN CROSSING OVER AND BELOW SEWERS IN ACCORDANCE WITH OTTAWA DETAIL W25.2 AND W25 (APPLICABLE IF WATERMAIN COVER IS LESS THAN 2.4M).
6. INSULATE WATER SERVICES PER OTTAWA DETAIL W23, WHEN SEPARATION BETWEEN SERVICE AND MANHOLE IS LESS THAN 1.2m.
7. MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER OR UTILITY IS 0.25m WHEN CROSSING OVER A PIPE (W25.2), AND 0.50m WHEN CROSSING UNDER A PIPE (W25). THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ADEQUATE SUPPORT TO THE EXISTING INFRASTRUCTURE.
8. WATER SERVICES CROSSING SEWERS SHALL BE INSTALLED PER OTTAWA DETAIL W38.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	SITE PLAN SUBMISSION	MAY 31/19	MAB

SCALE
1:150
1:150
0 2 4 6

DESIGN LRW
CHECKED MAB
DRAWN CB
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
L. R. WILSON
100160065
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2019.05.31
PROVINCE OF ONTARIO

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Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
437 - DONALD B. MUNRO DRIVE

SERVICING PLAN

PROJECT No. 119023
REV REV # 1
DRAWING No. 119023-GP

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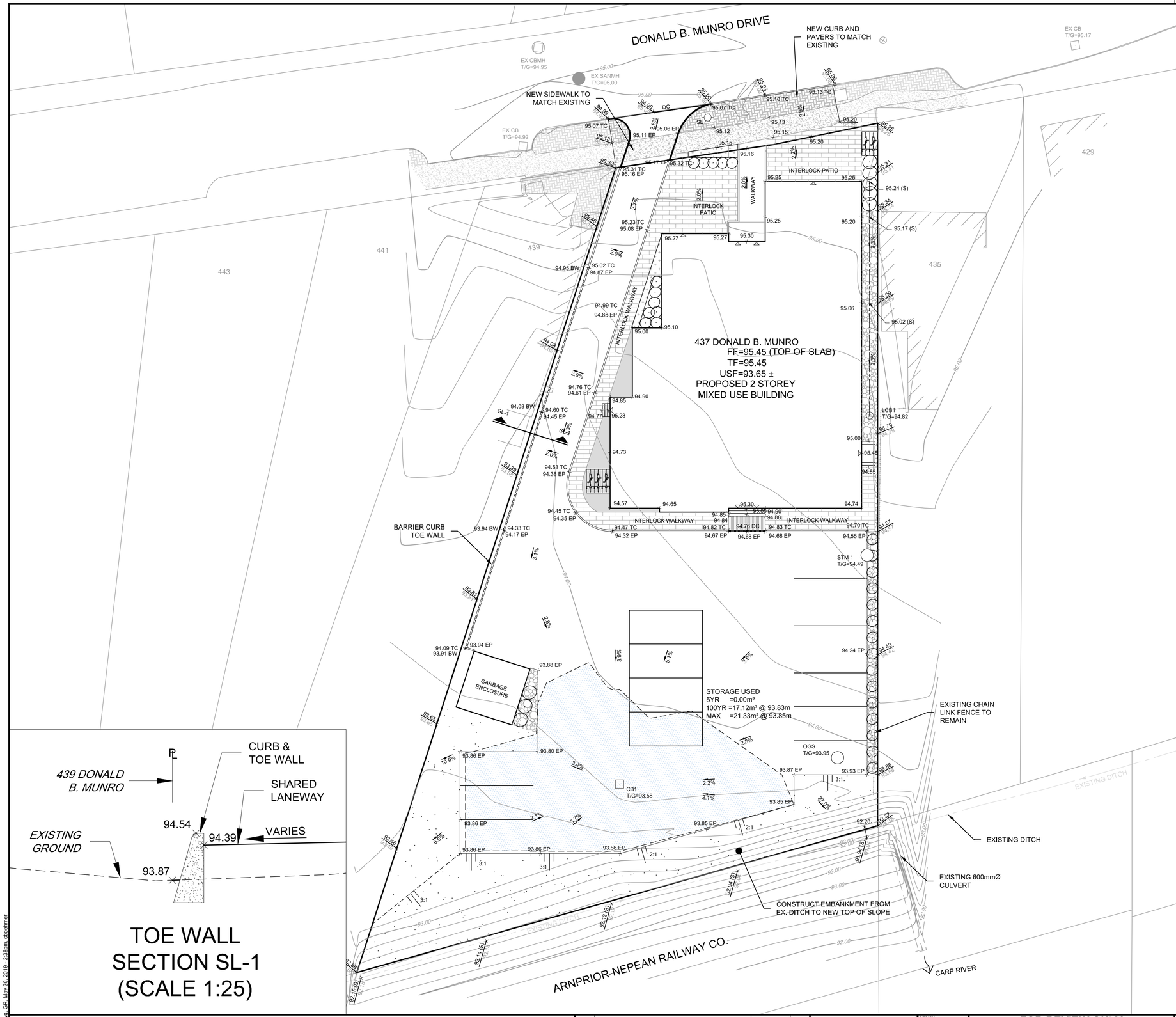
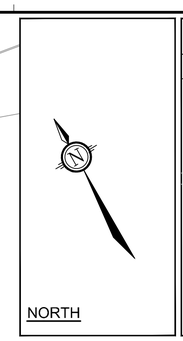
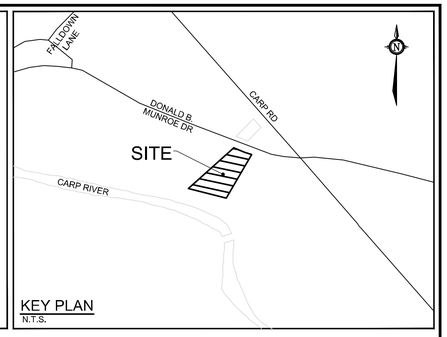
PLANA1.DWG - 841mmx594mm







LEGEND

2.6%	PROPOSED SLOPE AND DIRECTION		CURB SC1.1
72.55 / 72.45	PROPOSED ELEVATION / EXISTING ELEVATION	DC	DEPRESSED CURB
×103.41	PROPOSED ELEVATION		TOE WALL
×103.41 BW	PROPOSED ELEVATION AT BOTTOM OF WALL		CONCRETE SIDEWALK REINSTATEMENT
×103.41 EP	PROPOSED ELEVATION AT EDGE OF PAVEMENT		BOULEVARD PAVER REINSTATEMENT
×103.41 TC	PROPOSED ELEVATION AT TOP OF CURB	OGS	PROPOSED OIL GRIT SEPARATOR
×103.41 DC	PROPOSED ELEVATION AT DEPRESSED CURB	LCB	PROPOSED LANDSCAPE CATCHBASIN
×103.41 (S)	PROPOSED ELEVATION AT CENTRE OF DITCH	CB	PROPOSED CATCHBASIN
FF=	FINISH FLOOR (TOP OF SLAB)	EX SANMH T/G=95.00	EXISTING SANITARY MANHOLE
TF=	TOP OF FOUNDATION	EX CBMH T/G=94.95	EXISTING CATCHBASIN MANHOLE
USF=	UNDERSIDE OF FOOTING ELEVATION	EX CB T/G=95.17	EXISTING CATCHBASIN
	PROPOSED SWALE	EX HYD	EXISTING HYDRANT
	MAX STATIC PONDING AREA		EXISTING VALVE & VALVE CHAMBER LOCATION
SL	STREET LIGHT		EXISTING FENCE

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES.
   - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA DETAIL R-10.
   - THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS TO MATCH EXISTING.
   - BOULEVARDS SHALL BE REINSTATED WITH 100mm OF TOPSOIL, SEED AND MULCH.
9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. REFER TO GEOTECHNICAL INVESTIGATION PROJECT NUMBER: PG4916-1 (DATED MAY 24, 2019), PREPARED BY PATERSON FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.

GRADING AND PAVEMENT NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (ie. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE HEAVILY PROOF ROLLED WITH A LARGE (10 TON) VIBRATORY STEEL DRUM ROLLER UNDER DRY CONDITIONS AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. ASPHALTIC CONCRETE TO BE COMPACTED TO 92-97% MAX. RELATIVE DENSITY.
6. ROADWAY SUBGRADE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION TO REVIEW IF A WOVEN GEOTEXTILE IS REQUIRED BELOW THE GRANULAR MATERIALS; AND TO CONFIRM THE DEPTH AND COMPACTION OF GRANULAR 'B'
7. PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE.
8. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
9. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
10. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.1).
11. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

TOE WALL SECTION SL-1 (SCALE 1:25)

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	SITE PLAN SUBMISSION	MAY 31/19	MAB

SCALE 1:150 (1:150 0 2 4 6)

DESIGN LRW | CHECKED MAB | DRAWN CB | CHECKED MAB | APPROVED JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — L. R. WILSON — 100160065 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — M.A. BISSETT — 2019.05.31 — PROVINCE OF ONTARIO

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CITY OF OTTAWA
437 - DONALD B. MUNRO DRIVE

GRADING AND DRAINAGE PLAN

PROJECT No. 119023
REV REV # 1
DRAWING No. 119023-GR

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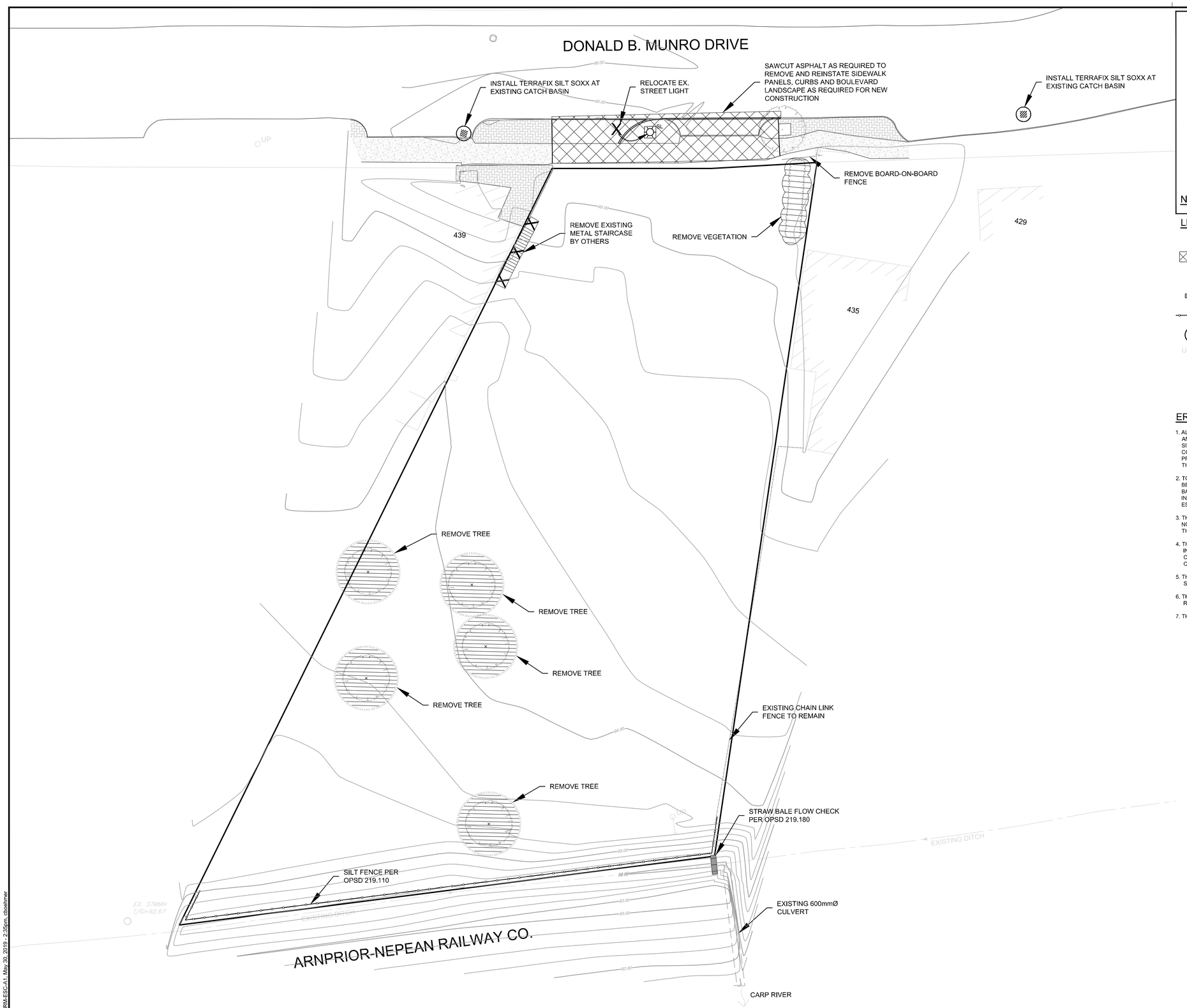
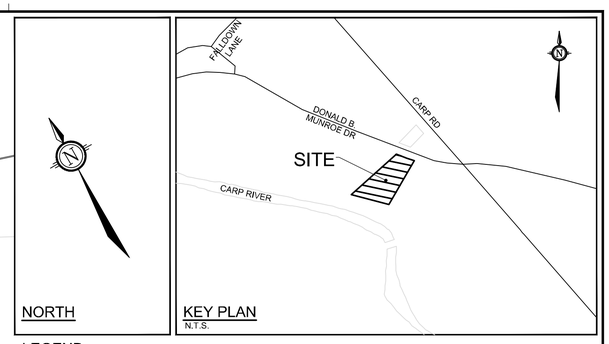
PLAN47.DWG - 841mmx594mm





LEGEND

- REMOVAL OF CONCRETE, ASPHALT SIDEWALKS AND CURBS, INCLUDING PAVERS
- REMOVALS
- STRAW BALE FLOW CHECK PER OPSD 219.180
- SILT FENCE PER OPSD 219.110
- TERRAFIX SILT SOXX INSTALLED AT CATCH BASIN
- UTILITY POLE
- STREET LIGHT
- REMOVE EXISTING TREE(S) AND VEGETATION
- CONCRETE SIDEWALK
- INTERLOCK PAVERS
- SIGN
- EXISTING STRUCTURE

EROSION AND SEDIMENT CONTROL NOTES :

1. ALL EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, THE MUNICIPALITY AND THE CONSERVATION AUTHORITY, THEY SHALL BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES SHALL BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE DITCH OR STORM SYSTEM DURING CONSTRUCTION, FILTER SOCKS WILL BE PLACED UNDER GRATES OF ALL PROPOSED AND EXISTING CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED IN SELECTED LOCATIONS SHOWN ON THIS PLAN, AND STRAW BALE BARRIERS WILL BE INSTALLED WITHIN THE OUTLET DITCHES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
4. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
5. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
6. THE CONTRACTOR SHALL PROVIDE DUST CONTROL WITH THE APPLICATION OF WATER AND/OR CALCIUM CHLORIDE AS REQUIRED.
7. THE CONTRACTOR SHALL PROTECT ALL SURVEY MONUMENTS.

NOTE:
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No.	REVISION	DATE	BY
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SCALE 1:150

1:150
0 2 4 6

DESIGN LRW
CHECKED MAB
DRAWN CB
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER L. R. WILSON 100160065 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2019.05.31 PROVINCE OF ONTARIO

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CITY OF OTTAWA
437 DONALD B. MUNRO DRIVE

EXISTING CONDITIONS, REMOVALS, AND EROSION SEDIMENT CONTROL PLAN

PROJECT No. 119023
REV REV # 1
DRAWING No. 119023-ESC

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PLAN-A1.DWG - 841mmx594mm

DONALD B. MUNRO DRIVE

EX. CBMH
T/G=94.95

EX. CB1
T/G=95.17

EX. CB
T/G=94.92

900mmØ STM

300mmØ STM

443

441

439

429

435

437 DONALD B. MUNRO

PROPOSED 2 STOREY MIXED USE BUILDING

INTERLOCK PATIO

INTERLOCK PATIO

WALKWAY

PRV

PRV

INTERLOCK WALKWAY

0.008 ha
2
0.79

0.003 ha
3
0.50

0.040 ha
5
0.90

NOTE:
ROOF DRAIN
DISCHARGE TO
PARKING LOT
(CONTAINED ON SITE)

8.9m-250mmØ
STM @ 1.00%

INTERLOCK WALKWAY

INTERLOCK WALKWAY

STORMTECH SC-310
STORAGE CHAMBERS

INV. CHAMBERS=92.36

3.4m-150mmØ
STM @ 1.00%

STM 1
T/G=94.49

15.7m-250mmØ STM @ 1.00%

0.090 ha
4
0.90

GARBAGE
ENCLOSURE

STORAGE USED
5YR =0.00m³
100YR =17.12m³ @ 93.83m
MAX =21.33m³ @ 93.85m

OGS
T/G=93.95

16.8m-300mmØ STM @ 0.50%

CB1
T/G=93.58

5.7m-300mmØ
STM @ 1.00%

0.024 ha
1
0.30

EXISTING DITCH

EXISTING 9.0m-600mmØ CULVERT @ 3.4%
N OBV. = 92.39
S OBV. = 92.08

ARNPRIOR-NEPEAN RAILWAY CO.

CARP RIVER

900mmØ STM

EX. STMMH
T/G=92.67

EXISTING DITCH

NORTH

FALLOWN LANE

DONALD B. MUNROE DR

CARP RD

SITE

CARP RIVER

KEY PLAN
N.T.S.

LEGEND

- 0.240 ha / 88a / 0.65 — AREA (hectares), AREA ID, RUN-OFF COEFFICIENT
- STORM DRAINAGE AREA BOUNDARY
- CB — PROPOSED CATCHBASIN
- LCB — PROPOSED LANDSCAPE CATCH BASIN
- 100 — PROPOSED STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- MAJOR SYSTEM FLOW ROUTE
- MAX STATIC PONDING AREA

STORM STRUCTURE TABLE

MANHOLE ID	INVERT
CB1	SE=92.33 NE=92.35
LCB1	SW=93.27
OGS	NW=92.25 S=92.22 NE=92.40
STM 1	N=92.66 SW=92.56 NE=93.16

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LOCATION
CITY OF OTTAWA
437 - DONALD B. MUNRO DRIVE

DRAWING NAME
STORM DRAINAGE AREA PLAN

PROJECT No. 119023
REV. REV # 1
DRAWING No. 119023-STM

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PLAN (ARCH C - 24.0in x 36.0in)